3. Dr. Sandeep Singh Gill

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY, JALANDHAR

Ph.D NOTIFICATION

Endst. No. IKGPTU/Ph.D/378

Dated: 20-6-19

Notification: IKGPTU/2019/625 for the Ph.D degree award

With the approval of competent authority, I. K. Gujral Punjab Technical University notify the award of Ph.D degree to Mr/Ms. *Harsimranjit Singh Gill* S/D/o *Didar Singh Gill*, Regd. No. *1405013* in the faculty of *Engineering (Electronics & Communication Engineering)*. This notification is issued on 20-6-19 after completion of thesis work and successfully defended his/her case during presentation among expert panel of university.

Year of Enrolment	Date of Viva-voce	Title of the Thesis	Name & Address of the Research Supervisor
2014	20/05/2019	*MITIGATION OF SECURITY ISSUES IN NEXT GENERATION PASSIVE OPTICAL NETWORKS*	*Dr. Sandeep Singh Gill Professor, GNDEC, Ludhiana.* *Dr. Kamaljit Singh Bhatia Assistant Professor, Batala Campus, IKGPTU, Batala.*

Final degree will be conferred in the annual convocation of the University.

Dean (R&D)

Controller of Examination

Registrar

4. Dr. Munish Rattan

PUNJABI UNIVERSITY PATIALA

(Established Under Punjab Act No. 35 of 1961)

Ph.D. GAZETTE NOTIFICATION

No. Ph.D./1051

The following candidates of the **FACULTY OF ENGINEERING & TECHNOLOGY** have been awarded the Degree of *Doctor of Philosophy* on the recommendations made by the Research Award Committee in its meeting held on **30-07-2019** (deemed date of the Award of Ph.D. Degree):

Sr. No.	Roll No.	Regd. No.	Name of the Candidate/Father /Mother	Subject	Title of the Thesis	Deptt.	Supervisor / Co-Supervisor	Candidate's Address	State
1	4054	7141-13-1113	KIRANJOT KAUR SATVINDER SINGH NIRDOSH KAUR	ELECTRONICS & COMMUNICATION ENGINEERING	OPTIMIZATION OF COGNITIVE RADIO SYSTEM USING HEURISTIC TECHNIQUES	ELECTRONICS & COMMUNICATION ENGINEERING	DR. MANJEET SINGH PATTERH PROF. DEPTT. OF ELECTRONICS & COMMUNICATION ENGINEERING PUNJABI UNIVRESITY PATIALA CO-SUPER DR. MUNISH RATTAN PROF. DEPT OF ELECTRONICS & COMMUNICATION ENGINEERING GNDEC, LUDHIANA	DEO FARM HOUSE ,VILL LADIAN KALAN P.O. BAGGA KHURD, LUDHIANA-141008	PUNJAB
2	4055	UCE(P)2009-689	PRAGAT SINGH RAJ RAVINDER SINGH MANJEET KAUR	MECHANICAL ENGINEERING	PERFORMANCE EVALUATION OF MINIMUM QUANTITY LUBRICATION (MQL)DURING MILLING OF STICKY MATERIALS	MECHANICAL ENGINEERING	DR. JASMINDER SINGH DUREJA, DEPTT. OF MECHANICAL ENGG. PUNJABI UNIVRESITY.PATIALA CO-SUPER DR. HARWINDER SINGH DEPT OF MECHANICAL ENGINEERING, GNDEC, LUDHIANA.	VILL MITHRI BUDHGIR TEHSIL MALOUT,DISTT MUKUTSAR	PUNJAB

PATIALA
DATED: 05/08/2019

CLERK   O.S.E   A.R. / D.R. (Examination)   Controller (Examination)

Copy of the above is forwarded to:
1. THE EDITOR, CSIR, DIRECTORATE, OLD MILL ROAD, NEW DELHI.
2. THE REGISTRARS OF ALL THE INDIAN UNIVERSITIES.
3. THE SECRETARY, UGC, RAFI MARG, NEW DELHI.
4. THE SECRETARY, ASSOCIATION OF INDIAN UNIVERSITIES, AIU HOUSE, 16, COMRADE INDRAJIT GUPTA MARG (KOTLAMARG), NEW DELHI-110002.
5. THE DIRECTOR, DIRECTORATE OF SOCIAL SCIENCES DOCUMENTATION CENTRE, 35, ICS SR, FEROZESHAH ROAD, NEW DELHI.
6. THE HEAD OF DEPARTMENT, PUNJABI UNIVERSITY, PATIALA – 147002.
7. SUPERVISOR/CO-SUPERVISOR OF THE CANDIDATE
8. THE SUPERINTENDENT, SECRECY, RESEARCH THESIS EVALUATION CELL AND PMU CELL PUNJABI UNIVERSITY, PATIALA.
9. THE CHIEF LIBRARIAN, PUNJABI UNIVERSITY, PATIALA.

PATIALA
DATED: 05/08/2019

SUPERINTENDENT (EXAMINATION)

5. Dr. B.S. Dhaliwal

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY, JALANDHAR

Ph.D NOTIFICATION

Endst. No. IKGPTU/Ph.D/ 611

Dated: 18|10|19

Notification: IKGPTU/2019/707 for the Ph.D degree award

With the approval of competent authority, I. K. Gujral Punjab Technical University notify the award of Ph.D degree to Mr/Ms. *Priyadarshni* S/D/o *Vijay Kumar*, Regd. No. *1005010* in the faculty of *Engineering (Electronics & Communication Engineering)*. This notification is issued on 18|10|19 after completion of thesis work and successfully defended his/her case during presentation among expert panel of university.

Year of Enrolment	Date of Viva-voce	Title of the Thesis	Name & Address of the Research Supervisor
2011	06/09/2019	*IMPROVEMENT OF ARTIFICIAL NEURAL NETWORK BASED CHARACTER RECOGNITION SYSTEM BY TOPOLOGY OPTIMIZATION USING SCILAB*	*Dr. Balwinder Singh Dhaliwal Assistant Professor, GNDEC, Ludhiana.* Dr. J.S.Sohal Director, *LCET, Ludhiana.*

Final degree will be conferred in the annual convocation of the University.

Dean (R&D)

Controller of Examination

Registrar

6. Dr. Munish Rattan

I. K. GUJRAL PUNJAB TECHNICAL UNIVERSITY, JALANDHAR

Ph.D NOTIFICATION

Endst. No. IKGPTU/Ph.D/ 217

Dated: 9/5/18

Notification: IKGPTU/2018/415 for the Ph.D degree award

With the approval of competent authority, I. K. Gujral Punjab Technical University notify the award of Ph.D degree to Mr/Ms. Narwant Singh Grewal S/D/o S. Dalvir Singh, Regd. No. 1005008 in the faculty of Engineering (Electronics And Communication Engineering). This notification is issued on 9/5/18 after completion of thesis work and successfully defended his/her case during presentation among expert panel of university.

Year of Enrolment	Date of Viva-voce	Title of the Thesis	Name & Address of the Research Supervisor
2011	26.04.2018	ANTENNA ARRAY FAILURE CORRECTION USING OPTIMIZATION TECHNIQUES.	Dr. Munish Rattan Assistant Professor, GNDEC, Ludhiana. Dr. Manjeet Singh Patterh Professor, UCoE, Punjabi University, Patiala.

Final degree will be conferred in the annual convocation of the University.

Dean (R&D)

Controller of Examination

Registrar 9/5/18

7. Dr. K. Kandu

CANDIDATE'S DECLARATION

I hereby certify that the work which is being presented in the thesis entitled "**Biodiesel Production Using Waste Cooking Oil : A Waste To Energy Conversion (W.T.E.) Strategy**" by "**Sonal Tripathi**" in partial fulfillment of requirements for the award of degree of Master of Technology (Environmental Science and Engineering) submitted in the Department of Civil Engineering at **Guru Nanak Dev Engineering College under I.K. Gujral Punjab Technical University, Jalandhar** is an authentic record of my own work carried out during a period from Jan'16 to Jun 16 under the supervision and guidance of **Dr. Amanpreet Kaur Sodhi** and **Dr. Krishnendu Kundu**. The matter presented in this thesis has not been submitted by me in any other University / Institute for the award of Master of Technology Degree.

Date: 23|07|2016

Signature of Student

CERTIFICATE

This is to certify that the above statement made by the candidate is correct to the best of our knowledge.
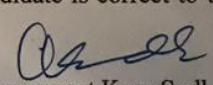
Dr. Krishnendu Kundu

Scientist and Head

Department of Biofuel

MERADO

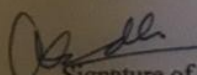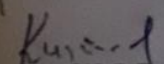Ludhiana
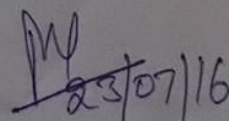
Dr.Amanpreet Kaur Sodhi

Assistant Professor

Department of Applied Sciences

Guru Nanak Dev Engineering College

Ludhiana

The M-Tech Viva-Voice examination of SONAL TRIPATHI has been held on 23/07/16 and accepted.

Signature of Supervisor(s)
23/07/16

Signature of External Examiner

Signature of H.O.D

8. Dr. Neeraj Bhanot

CANDIDATE'S DECLARATION

I hereby certify that the work, which is being presented in the Thesis entitled, **"SUSTAINABLE BIOCONCRETE PRODUCTION INTEGRATED WITH WASTE MANAGEMENT PRACTICES"** by RAJWINDER SINGH, Roll No. (1607543) in partial fulfilment of requirements for the award of degree of M.Tech (Environmental Science and Engineering) submitted in the Department of Civil Engineering at GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA under I.K GUJRAL PUNJAB TECHNICAL UNIVERSITY, JALANDHAR is an authentic record of my own work carried out during a period from Jan 2018 to July 2018 under the guidance of **DR. AMANPREET KAUR SODHI,** Assistant Professor, Department of Applied Science at GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA and **DR. NEERAJ BHANOT,** Assistant Professor, Quantitative Methods and Operations Management at INDIAN INSTITUTE OF MANAGEMENT, AMRITSAR. The matter presented in this thesis has not been submitted by me in any other University/Institute for the award of M.Tech or any other degree.

Rajwinder Singh

Signature of the Student

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Dr. Amanpreet Kaur Sodhi

Dr. Neeraj Bhanot

Assistant Professor

Assistant Professor

Department of Applied Science

Quantitative Methods and Operations Management

GNDEC Ludhiana

IIM, AMRITSAR

The M.Tech Viva-Voce Examination of Rajwinder Singh has been held on 14/08/2018 and accepted.

Signature of the Supervisor

Signature of Co Supervisor

Signature of External Examiner

Signature of H.O.D

i
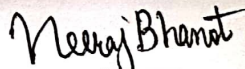
DECLARATION CERTIFICATE

I hereby certify that the work presented in this thesis entitled **A Comparative Study for** Bioremediation of **EN-19** Alloy Steel using *Acidithiobacillus ferrooxidans* and *Aspergillus niger* in partial fulfillment of requirements for the award of the degree of Master of Technology in Environmental Science and Engineering, is a bonafide research work carried out by me during the period of ____June____ 2018 to ___May___ 2019 under the able supervision of Dr. Amanpreet Kaur Sodhi and Dr. Neeraj Bhanot. I have submitted the above-entitled work in the Department of Civil Engineering at **Guru** Nanak Dev Engineering College, Ludhiana **under I.K Gujral** Punjab Technical University, Jalandhar, and this work has not been submitted elsewhere for the award of any degree/diploma/certificate.

Tanveer Singh Jhajj

This is to certify that the above statement made by the Tanveer Singh Jhajj is correct to the best of my knowledge.

Dr. Amanpreet Kaur Sodhi
Assistant Professor
Dept. of Applied Sciences
Guru Nanak Dev Engineering
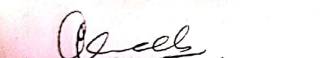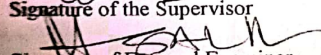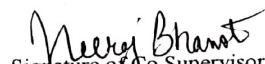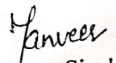College, Ludhiana

Dr. Neeraj Bhanot
Assistant Professor
Quantitative Methods and
Operations Management
Indian Institute of Management Amritsar

The M.Tech Viva-Voice Examination of Tanveer Singh Jhajj has been held on __19-7-19__ and accepted.

Signature of the Supervisor (1)

Signature of the Supervisor (2)

Signature of External Examiner

Signature of HOD

i

CANDIDATE'S DECLARATION

I hereby certify that the work is being presented in the thesis entitled "Application of *Acidithiobacillus ferrooxidans* and *Aspergillus niger* for Biomachining of Aluminium Alloy 4004" by "Pallvi Verma" in partial fulfillment of requirements for the award of degree of M.Tech (Environmental Science and Engineering) submitted in the Department of Civil Engineering at Guru Nanak Dev Engineering College, Ludhiana under I.K. Gujral Punjab Technical University, Jalandhar is an authentic record of my own work carried out during a period from Jan 2018 to June 2018 under the supervision of Dr. Amanpreet Kaur Sodhi and Dr. Neeraj Bhanot. The matter presented in this thesis has not been submitted by me in any other University/ Institute for the award of M. Tech Degree.

Pallvi Verma
Signature of the Student

Date: 10-08-2018

CERTIFICATE

This is to certify that the above statement made by the candidate is correct to the best of my/our knowledge.

Dr. Amanpreet Kaur Sodhi
Assistant Professor
Deptt. of Applied Sciences
Guru Nanak Dev Engineering College
Ludhiana

For

Dr. Neeraj Bhanot
Assistant Professor
Quantitative Methods and
Operations Management
IIM Amritsar

The M.Tech Viva-Voce Examination of (PALLVI VERMA) has been held on 10-08-2018 and accepted.

Signature of Supervisor(s)

Signature of External Examiner 10/8/18

Signature of HOD

i

CANDIDATE'S DECLARATION

I certify that the work, which is being presented in the thesis entitled, "**STUDY ON PARTIAL REPLACEMENT OF CEMENT BY PRE-TREATED INDUCTION FURNACE SLAG FOR CONCRETE PRODUCTION**" by Jay Kumar, Roll No. (1707241) in partial fulfillment of requirements for the award of degree of M.Tech (Environmental Science and Engineering) submitted in the Department of Civil Engineering at GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA under I.K GUJRAL PUNJAB TECHNICAL UNIVERSITY, JALANDHAR is an authentic record of my own work carried out during a period of **January 2019** to **June 2019** under the guidance of **Dr. AMANPREET KAUR SODHI**, Assistant Professor, Department of Applied Science at GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA and **Dr. NEERAJ BHANOT**, Assistant Professor, Quantitative Methods and Operations Management at INDIAN INSTITUTE OF MANAGEMENT, AMRITSAR. The matter presented in this thesis has not been submitted by me in any other University/Institute for the award of M. Tech. or any other degree.

Signature of the Student

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Amanpreet Kaur Sodhi

Assistant Professor

Department of Applied Science

G.N.D.E.C., LUDHIANA
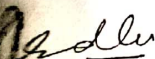
Dr. Neeraj Bhanot

Assistant Professor

Quantitative Methods and Operations Management

IIM, AMRITSAR

The M. Tech. Viva-Voce Examination of Jay Kumar has been held on ___19-7-19___ and accepted.
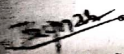
Signature of the Supervisor

Signature of Co Supervisor

Signature of External Examiner

Signature of H.O.D

i
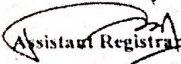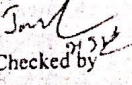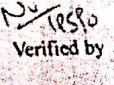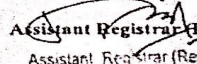
9. Dr. Kiran Jyoti

LOVELY PROFESSIONAL UNIVERSITY

Transforming Education Transforming India

Sr. No. 81
Code No. CRT144

LPU/DE/DOR/EC/190907/0001/LE92/14/0015
Date: 5-Sep-19

TO WHOM SO EVER IT MAY CONCERN

Name of the Student Ms	Shabnam Sharma
Daughter of Mr.	Hari Bhagwan
Registration No.	41400206
Name of the Programme	Doctor of Philosophy in Computer Science and Engineering
Batch	2014

Lovely Faculty of Technology & Sciences

This is to certify that the above said student has pursued the above said program under the guidance of Dr. Sahil Verma as supervisor and Dr. Kiran Jyoti as co-supervisor.

Further, the student has successfully defended the Viva Voce of the thesis titled "Design and Development of Bat Algorithm Strategies for Dynamic Environment in Application Specific Context" conducted on 24th August, 2019.

She will be awarded the Ph.D degree after the recommendation of Academic Council at the next Convocation of the University

Assistant Registrar (Records)

Assistant Registrar (Records)
Lovely Professional University

Prepared by

Checked by

Verified by

Jalandhar-Delhi G.T.Road, Phagwara, Punjab (India) - 144411
Ph: +91-1824-444538, 444548 Fax: 01824-506111 E-mail: ao.records@lpu.co.in website: www.lpu.in

10. Dr. Kiran Jyoti

Division of Examination

Recognized by UGC under Section 2(f) of the University Grants Commission Act, 1956 by the Notification No. F.9-10/ [CPP-1]

Member of Association of Indian Universities (AIU), New Delhi

LOVELY PROFESSIONAL UNIVERSITY

Transforming Education Transforming India

Sr. No. 79

Code No. CRT144

LPU/DE/DOR/EC/190808/0001/1E92/14/0003

Date: 7-Aug-19

TO WHOM SO EVER IT MAY CONCERN

Name of the Student Mr.	Parminder Singh
Son of Mr.	Baldev Singh
Registration No.	41400088
Name of the Programme	Doctor of Philosophy in Computer Science and Engineering
Batch	2014

Lovely Faculty of Technology & Sciences

This is to certify that the above said student has pursued the above said program under the guidance of Dr. Pooja Gupta as supervisor and Dr. Kiran Jyoti as co-supervisor.

Further, the student has successfully defended the Viva Voce of the thesis titled "RESOURCE PROVISIONING FOR MULTI-TIER WEB APPLICATIONS BASED ON WORKLOAD PREDICTION IN CLOUD COMPUTING" conducted on 3rd August, 2019.

He will be awarded the Ph.D degree after the recommendation of Academic Council at the next Convocation of the University

Assistant Registrar (Records)

Assistant Registrar (Records)
Lovely Professional University

Prepared by

Checked by

Verified by

Disclaimer : This certificate is issued on the basis of information available in the office of records on the date of its issue and the University reserves the right to change any information contained herein without notice further the University expressly disclaims all obligations to confirm the accuracy of any of the particulars in this certificate based upon information submitted by the candidate.

Jalandhar-Delhi G.T.Road , Phagwara, Punjab (India) - 144411
For enquiry : Ph : +91-1824-444538, 444548 Fax : 01824-506111 E-mail : ao.records@lpu.co.in website : www.lpu.in

11. Dr. Manpreet Singh Malhi

Final Viva Voce : Ph.D. thesis CSE of Ms. Avinash Kaur Reg.No 41400090.

rdc <rdc@lpu.co.in>
To Avinash Salaria <avinashsalaria@gmail.com>
Cc Pooja Gupta <pooja.19580@lpu.co.in>, Manpreet Singh Malhi <mpreet78@gmail.com>

Thu, Aug 1, 2019 at 3:12 PM

Dear Candidate,

Greetings of the day,

This is for information and reference that the final Viva voce for Ph.D. thesis in CSE is scheduled on 3rd August, 2019. The venue for the Ph.D. viva voce is Block No. 27 Room No. 201 (Conference room) at 11:00 AM, Lovely Professional University, Phagwara Punjab.

You are required to be there along with a copy of thesis and presentation at 10:45 AM

For any further query, please write to us.

12. Dr. K S Mann

Comparative Study of TDMA-Based MAC Protocols in VANET: A Mirror Review

Ranbir Singh Batth, Monisha Gupta, Kulwinder Singh Mann, Sahil Verma and Atul Malhotra

Abstract In recent years, Vehicular ad hoc networks emerge as the promising applications of Mobile ad hoc network. It is specially designed for road safety and comforts to people. It assists vehicles to communicate among themselves and to perceive the road situation such as accidents or traffic jams in their vicinity. This goal can be achieved by using safety applications which can broadcast the warning messages wirelessly between neighboring vehicles informing drivers of any dangerous situation nearby. Vehicles use transmission channels, which is shared medium and neighboring nodes are not allowed to transmit simultaneously because a transmission collision may occur. Therefore, Medium Access Control (MAC) protocols are required to proficiently share the medium and dependable conveyance of messages. Sharing the medium efficiently in VANET is a difficult task due to the special characteristics like high node mobility, frequently changing topology, etc. Various Time Division Multiple Access (TDMA) based MAC protocols have been proposed as it provides bounded delay with less packet loss ratio than other multiple access schemes and experiences no interference from concurrent transmission. In this paper, the comparative analysis of different classification of TDMA-based protocols has presented. The protocols are compared on the basis of different performance metrics such as access collision, merging collision, synchronization, safety services, scalability, etc. Some of the execution measurements are highlighted in the introduction section. In

R. S. Batth · M. Gupta (✉) · S. Verma (✉) · A. Malhotra
Lovely Professional University, Phagwara, India
e-mail: monishagupta2705@gmail.com

S. Verma
e-mail: sahil.21915@lpu.co.in

R. S. Batth
e-mail: ranbir.21123@lpu.co.in

A. Malhotra
e-mail: atul.18011@lpu.co.in

K. S. Mann
GNDEC Ludhiana, Ludhiana, India
e-mail: mannkulvinder@yahoo.com

107

2019

18. Harpreet Kaur Sandhu

OYO
ROOMS

Date: 14th June'2018

Subject: Letter of Internship

Dear Harpreet,
Congratulations! It is our pleasure to inform you that you have been selected for a 6 month Internship with OYO Rooms Pvt Ltd. You will be based at our Chandigarh office.

Function: Operations
Start Date: 15th June '2018

The following terms & conditions shall apply to you:

1. You shall not, during your training or thereafter, use or disclose to others any confidential information related to the business of the Company, obtained by you during your training with the Company

2. You shall not publish your Research / Project report about the company in any form in the media & the same is to be treated strictly for academic requirements of your Institution.

3. Your stipend for above duration will be as INR 10000 per month.

4. You are requested to please signify your acceptance of the terms & condition herein above by signing and returning to us the duplicate copy of this letter.

Please reply back with a confirmation on email itself.

We look forward to having you join us & wish you the very best for this assignment.

Sincerely,

Shivang Pandoh
Human Resources Business Partner

19. Kanwardeep Singh

Jaimal Singh Satnam Singh

Factory : VILLAGE BAJRA, RAHON ROAD, LUDHIANA - 141007
E-mail : rtexmandeep@gmail.com

30th May, 2018

Mr. Kanwardeep Singh

3476 , MIG Flats , Phase-2 , Dugri road

Ludhiana-141002

Subject- Offer of Traineeship

Dear Kanwardeep Singh,

In reference to your application for training with M/s Jaimal Singh Satnam Singh, we are pleased to offer traineeship at M/s Jaimal Singh Satnam Singh.

1. Terms for Traineeship:

1.1 **Duration:** Your training period shall be of six months
1.2 **Date of commencement:** 20th June, 2018
1.3 **Reporting location:** Rahon Road, Village bajra, Ludhiana, Punjab
1.4 **Stipend:** you will be paid a monthly stipend of Rs. 8,000 with effect from 20th June, 2018.

2. Assignment of intellectual property:

All rights in and to any information, materials, inventions, discoveries and any kind developed by you during the course with M/s Jaimal Singh Satnam Singh shall be owned solely and exclusively by M/s Jaimal Singh Satnam Singh.

Sincerely,

Ajinderpal Singh

Ajinderpal Singh
Proprietor, M/s Jaimal Singh Satnam Singh Ludhiana

I have read and understood the terms and conditions set forth in this traineeship offer letter and herby accept training with M/s Jaimal Singh Satnam Singh on the terms and conditions set fort herein.

Kanwardeep Singh

Name: KANWARDEEP SINGH

Date: 30th MAY, 2018

Place: LUDHIANA

19. Mannoor Kaur Dhingra

Jaimal Singh Satnam Singh

Tel : +91 99145-00017, 84270-777 77

Factory : VILLAGE BAJRA, RAHON ROAD, LUDHIANA - 141007
E-mail : rtexmandeep@gmail.com

30th May, 2018

Ms. Mannoor Kaur Dhingra

459, Model Town

Ludhiana-141002

Subject- Offer of Traineeship

Dear Mannoor,

In reference to your application for training with M/s Jaimal Singh Satnam Singh, we are pleased to offer traineeship at M/s Jaimal Singh Satnam Singh.

1. Terms for Traineeship:

1.1 **Duration:** Your training period shall be of six months
1.2 **Date of commencement:** 20th June, 2018
1.3 **Reporting location:** Rahon Road, Village bajra, Ludhiana, Punjab
1.4 **Stipend:** you will be paid a monthly stipend of Rs. 8,000 with effect from 20th June, 2018.

2. Assignment of intellectual property:

All rights in and to any information, materials, inventions, discoveries and any kind developed by you during the course with M/s Jaimal Singh Satnam Singh shall be owned solely and exclusively by M/s Jaimal Singh Satnam Singh.

Sincerely,

Ajinderpal Singh

Proprietor, M/s Jaimal Singh Satnam Singh Ludhiana

I have read and understood the terms and conditions set forth in this traineeship offer letter and herby accept training with M/s Jaimal Singh Satnam Singh on the terms and conditions set fort herein.

Name: Mannoor Kaur Dhingra
Date: 30th May. 2018
Place: Ludhiana.

20. Chand Singh

Deputy Directorate General of
Signal Intelligence (Center Zone),
IHQ of ministry of Defence (MoD)
C/o 56 APO
PIN No-226001

08 Dec 2018

Training and Placement Cell
GNDEC, Gill Road, Ludhiana
Pin-141006

INTERNSHIP OF STUDENTS

1.   Please refer our letter No IT/I/2018/8/Spl-01 dated 29 Aug 18.

2.   Mr. Chand Singh student of your college has been selected for internship with Deputy Directorate General of Signal Intelligence, HQ IDS based on the telephonic interview conducted on 27 Aug 18.

3.   You are hereby informed about the same and directed to report to our office at Lucknow as per the internship schedule of the college. The students will be provided with the stipend of Rs 15,000 per month, subject to successful completion of assigned tasks in the stipulated duration. The scope of work has been briefly explained and will be enumerated on arrival at our office.

4.   **Non-performance Clause**.   This directorate, if deemed suitable, reserves the right to terminate the internship of the students in case of any in-discipline and non-performance issues. It must be borne by the students that being an Armed Forces organisation, security of information, discipline and integrity is of utmost importance.

5.   **Non-Disclosure Agreement (NDA)**.   A non-disclosure agreement will be signed by representatives of this directorate so as to ensure security of confidential information during and after the internship period. The NDA will be signed once the students report for internship to the directorate. All the development work carried out during the internship period will be the sole property of this directorate and the students/ college will not claim any ownership of the same. It is assumed that the University has carried out background check of the student and has been sensitised on adhering to safe guarding information security during and post their internship.

6.   You are requested to confirm availability of the students and intimate the schedule of internship at the earliest. The intern can join us for internship from first week of January 2019.

(S K Singh)
Col
DDGSI (CZ)
08 Dec 18

21. Shubham Sinha, Harshita Sharma, Neha Mishra, Sanjampreet Singh, Kanishka Sharma, Sukhdeep Singh

Infosys
Navigate your next

HRD/FINALSEMTRG/2018/12656067

December 27, 2018

Shubham Sinha,

Guru Nanak Dev Engineering College.

Dear Shubham,

This is in reference to the Program (as defined in the Training Agreement) as per the Training Agreement signed on _____ between you ("**Trainee**" hereafter) and Infosys Limited("**Infosys**" hereafter), a corporation organized and existing under the laws of India and having its primary place of business at Electronics City, Hosur Road, Bangalore 560 100, India. The details of the Program are as follows:

1. Program Date	:	**January 28, 2019**
2. Duration of the program	:	**16 Weeks**
3. Location	:	**Mysore, India**

Please note that you will be required to make your own arrangements for travel to Mysore (or any other Infosys location that may be communicated to you by designated Infosys personnel) and back to your university upon completion of the Program. Additionally, should you be required to travel between the Infosys offices located in different cities as part of your project, Infosys shall bear the cost of such travel. Your entitlements shall be communicated to you at that time.

A break-up of the benefits that you are eligible for is mentioned below:

Accommodation	Provided by the Company at no charge for the entire duration of the Program
Stipend	**Rs.10,000/- per month**

You would also be covered under the Personal Accident Insurance and Hospitalization Insurance of Infosys for the duration of your Program. If you require additional coverage, you would need to obtain this in your personal capacity.

If you are required to use the bus, library and fitness facilities (if any), you shall be provided access during the period of your Program in accordance with Infosys policies.

For the duration of the Program, you will be required to adhere to certain policies / practices that are applicable to employees of Infosys, including but not limited to the Trainee's obligations as per the Training Agreement. Additionally, you may be required to sign agreements with Infosys, at the sole discretion of Infosys, relating to protection of Infosys confidential and proprietary information. Infosys disclaims all liability and responsibility for acts or omissions by you that are in violation of any law, guideline, rule or regulation.

Digitally signed by RICHARD LOBO
Date: 2018.12.27 15:32:03 +05:30
Reason: Internship Offer Letter
Location: Bangalore

HRD/FINALSEMTRG/2018/12656069

January 18, 2019

Harshita Sharma.

Guru Nanak Dev Engineering College.

Dear Harshita,

This is in reference to the Program (as defined in the Training Agreement) as per the Training Agreement signed on _____between you ("Trainee" hereafter) and Infosys Limited("**Infosys**" hereafter), a corporation organized and existing under the laws of India and having its primary place of business at Electronics City, Hosur Road, Bangalore 560 100, India. The details of the Program are as follows:

1. Program Date   :   **January 28, 2019**

2. Duration of the program   :   **16 Weeks**

3. Location   :   **Mysore, India**

Please note that you will be required to make your own arrangements for travel to Mysore (or any other Infosys location that may be communicated to you by designated Infosys personnel) and back to your university upon completion of the Program. Additionally, should you be required to travel between the Infosys offices located in different cities as part of your project, Infosys shall bear the cost of such travel. Your entitlements shall be communicated to you at that time.

A break-up of the benefits that you are eligible for is mentioned below:

Accommodation	Provided by the Company at no charge for the entire duration of the Program
Stipend	Rs.10,000/- per month

You would also be covered under the Personal Accident Insurance and Hospitalization Insurance of Infosys for the duration of your Program. If you require additional coverage, you would need to obtain this in your personal capacity.

If you are required to use the bus, library and fitness facilities (if any), you shall be provided access during the period of your Program in accordance with Infosys policies.

For the duration of the Program, you will be required to adhere to certain policies / practices that are applicable to employees of Infosys, including but not limited to the Trainee's obligations as per the Training Agreement. Additionally, you may be required to sign agreements with Infosys, at the sole discretion of Infosys, relating to protection of Infosys confidential and proprietary information. Infosys disclaims all liability and responsibility for acts or omissions by you that are in violation of any law, guideline, rule or regulation.

Digitally signed by RICHARD LOBO
Date: 2019.01.18 18:11:00 +05:30
Reason: Internship Offer Letter
Location: Bangalore

HRD/FINALSEMTRG/2018/12656068

December 27, 2018

Sukhdeep Singh.

Guru Nanak Dev Engineering College.

Dear Sukhdeep,

This is in reference to the Program (as defined in the Training Agreement) as per the Training Agreement signed on _____ between you ("**Trainee**" hereafter) and Infosys Limited("**Infosys**" hereafter), a corporation organized and existing under the laws of India and having its primary place of business at Electronics City, Hosur Road, Bangalore 560 100, India. The details of the Program are as follows:

1. Program Date   :   **January 28, 2019**

2. Duration of the program   :   **16 Weeks**

3. Location   :   **Mysore, India**

Please note that you will be required to make your own arrangements for travel to Mysore (or any other Infosys location that may be communicated to you by designated Infosys personnel) and back to your university upon completion of the Program. Additionally, should you be required to travel between the Infosys offices located in different cities as part of your project, Infosys shall bear the cost of such travel. Your entitlements shall be communicated to you at that time.

A break-up of the benefits that you are eligible for is mentioned below:

Accommodation	Provided by the Company at no charge for the entire duration of the Program
Stipend	Rs.10,000/- per month

You would also be covered under the Personal Accident Insurance and Hospitalization Insurance of Infosys for the duration of your Program. If you require additional coverage, you would need to obtain this in your personal capacity.

If you are required to use the bus, library and fitness facilities (if any), you shall be provided access during the period of your Program in accordance with Infosys policies.

For the duration of the Program, you will be required to adhere to certain policies / practices that are applicable to employees of Infosys, including but not limited to the Trainee's obligations as per the Training Agreement. Additionally, you may be required to sign agreements with Infosys, at the sole discretion of Infosys, relating to protection of Infosys confidential and proprietary information. Infosys disclaims all liability and responsibility for acts or omissions by you that are in violation of any law, guideline, rule or regulation.

Digitally signed by RICHARD LOBO
Date: 2018.12.27 15:32:04 +05:30
Reason: Internship Offer Letter
Location: Bangalore

HRD/FINALSEMTRG/2018/12655914

December 27, 2018

Neha Mishra,

Guru Nanak Dev Engineering College.

Dear Neha,

This is in reference to the Program (as defined in the Training Agreement) as per the Training Agreement signed on _____between you ("**Trainee**" hereafter) and Infosys Limited("**Infosys**" hereafter), a corporation organized and existing under the laws of India and having its primary place of business at Electronics City, Hosur Road, Bangalore 560 100, India. The details of the Program are as follows:

1. Program Date   :   **January 28, 2019**

2. Duration of the program   :   **16 Weeks**

3. Location   :   **Mysore, India**

Please note that you will be required to make your own arrangements for travel to Mysore (or any other Infosys location that may be communicated to you by designated Infosys personnel) and back to your university upon completion of the Program. Additionally, should you be required to travel between the Infosys offices located in different cities as part of your project, Infosys shall bear the cost of such travel. Your entitlements shall be communicated to you at that time.

A break-up of the benefits that you are eligible for is mentioned below:

Accommodation	Provided by the Company at no charge for the entire duration of the Program
Stipend	Rs.10,000/- per month

You would also be covered under the Personal Accident Insurance and Hospitalization Insurance of Infosys for the duration of your Program. If you require additional coverage, you would need to obtain this in your personal capacity.

If you are required to use the bus, library and fitness facilities (if any), you shall be provided access during the period of your Program in accordance with Infosys policies.

For the duration of the Program, you will be required to adhere to certain policies / practices that are applicable to employees of Infosys, including but not limited to the Trainee's obligations as per the Training Agreement. Additionally, you may be required to sign agreements with Infosys, at the sole discretion of Infosys, relating to protection of Infosys confidential and proprietary information. Infosys disclaims all liability and responsibility for acts or omissions by you that are in violation of any law, guideline, rule or regulation.

Digitally signed by RICHARD LOBO
Date: 2018.12.27 15:31:46 +05:30
Reason: Internship Offer Letter
Location: Bangalore

M

Infosys Lex platform for Campus Recruits
1 message

Varadharaj V <TA_Vardha@Infosys.com>
To: sanjam531@gmail.com <sanjam531@gmail.com>, singhsanjam531@gmail.com <singhsanjam531@gmail.com>

Thu, 25 Oct, 2018 at 3:15 pm
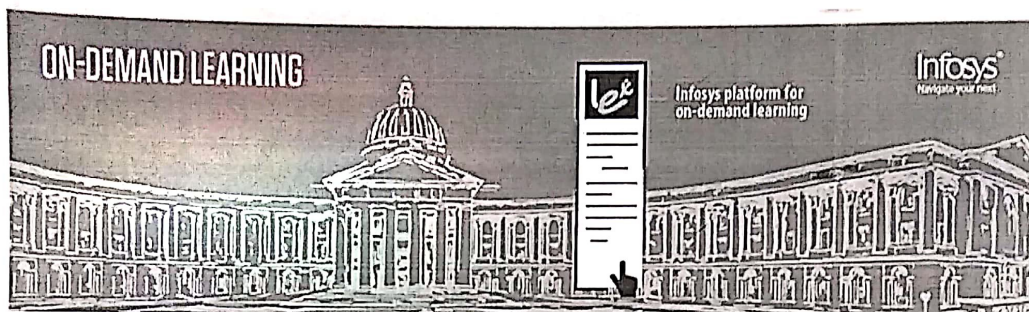
Dear Sanjampreet Singh,

Congratulations and welcome to Infosys!

As a preparatory step for all our offered students who will be joining Infosys, we require you to enroll on our **Lex** platform which has been created for our exclusive group of campus recruits. **Lex** is our advanced, anytime, anywhere learning platform to facilitate Learning-on-the-go. Registration on Lex is mandatory for all our campus hires.

The Infosys training program comprises three segments viz., **Foundational, Technical Stream** and **Soft Skills.** Through **Lex,** you get an opportunity to complete the **Foundational segment** even before you join us at Mysore. Within a week of your joining at Infosys, you will be administered a pre-training assessment on topics covered in **Lex.** Upon **Clearing the assessment**, you will be a **fast-tracker** and advance to the Stream and Soft Skills segments of our training program directly!

Benefits of this acceleration

- Shorter training program
- Faster deployment to unit
- Quicker confirmation
- Faster promotion
- Significant head start compared to peers
- You will also receive a financial incentive of **Rs. 25,000** along with the first month's payroll

If you do not clear the assessment, then you will go through the regular training program. I am very confident however that, being a future Infoscion, you have it in you to prepare well and 'crack' our assessments!

For more information, please login here using the below credentials:

- **Login ID:** sanjam531@gmail.com

Infosys Lex platform for Campus Recruits

25 October 2018 at 12:01 PM

Found in All Mail Mailbox

boxbe Varadharaj V (TA_Vardha@infosys.com) is not on you

Guest List | Approve sender | Approve domain

ON-DEMAND LEARNING

Infosys platform for on-demand learning

Infosys
Navigate your next
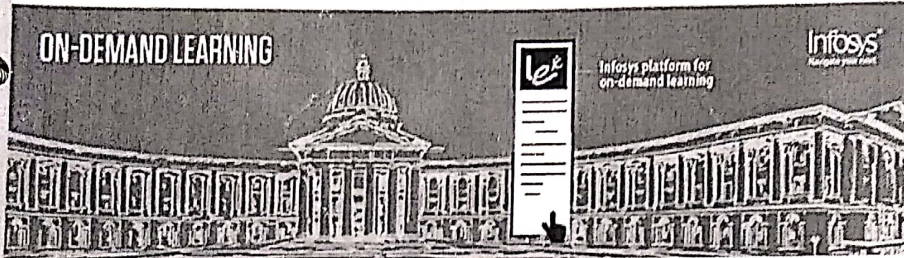
Dear Kanishka Sharma,

Congratulations and welcome to Infosys!

As a preparatory step for all our offered students who will be joining Infosys, we require you to enroll on our Lex platform which has been created for our exclusive group of campus recruits. Lex is our advanced, anytime, anywhere learning platform to facilitate Learning-on-the-go. Registration on Lex is mandatory for all our campus hires.

The Infosys training program comprises three segments viz., **Foundational, Technical Stream and Soft Skills**. Through Lex, you get an opportunity to complete the **Foundational** segment even before you join us at Mysore. Within a week of your joining at Infosys, you will be administered a pre-training assessment on topics covered in Lex. Upon **Clearing the assessment**, you will be a **fast-tracker** and advance to the Stream and Soft Skills segments of our training program directly!

Benefits of this acceleration
- Shorter training program
- Faster deployment to unit
- Quicker confirmation
- Faster promotion
- Significant head start compared to peers
- You will also receive a financial incentive of Rs. 25,000 along with the first month's payroll

If you do not clear the assessment, then you will go through the regular training program. I am very confident however that, being a future Infoscion, you have it in you to prepare well and 'crack' our assessments!

For more information, please login here using the below credentials:

- **Login ID:** kan████████.com
- **Password:** 3█████

Keep learning! Keep winning!

Regards,

Varadharaj V (Vardha)
AVP – Talent Acquisition
Infosys Limited

Stay Connected

22. Arshdeep Singh Chopra

NTT DATA Information Processing Services Private Limited
(Formerly known as Dell Business Process Solutions India Private Limited)
Plot No.7, Sector 144 & 125
Noida - 201306, Uttar Pradesh, India

12 April 2019

Arshdeep Singh Chopra
Guru Nanak Dev Engineering College

Dear Arshdeep Singh Chopra,

With reference to your application and the subsequent discussion(s) that we had, we are pleased to offer you Services IT Development Program Senior Associate I with NTT DATA Information Processing Services Private Limited (hereinafter referred to as "the Company") subject to below terms and condition. Please note that your subsequent employment with the Company is subject to your completing the training as given below.

Please note that this offer does not give you the employee status of the Company. Your appointment as trainee comes into effect only after completing the joining formalities with the Company and subject to the below Terms and Conditions. This communication does not confer you with any right against the company until you join for training.

You will be undergoing a training program anywhere in India and at the end of which, you will be evaluated. Company shall determine as necessary, the period of training on the basis of your performance during the training period. Please note that the duration of the training period shall depend on our evaluation of your skill, project, domain, etc. during the evaluation tests conducted by the Company. The discretion with respect to determining the duration of training period shall vest solely with the Company. On your start date, please bring the documents as per Annexure A.
During the training you will be given a stipend of Rs.12,000/-per month.

Please note that the offer of appointment and continuation of employment thereof is subject to successful completion of your:

a) Qualifying exams with maximum of 2 arrears during the entire course, no pending arrears on completion of course and having minimum of 60% aggregate.

b) Induction training on joining the Company with a minimum score of 65% in the final evaluation on completion of the training.

On successful completion of your training, you will be appointed as a Services IT Development Program Senior Associate I in Grade 4 and will be on probation for an initial period of 6 months. Your confirmation is subject to evaluation of performance, which will happen subsequent to completion of the probation period. Your services will be confirmed, extended or terminated in writing. Till such letter is issued, you will continue to be on probation.

Your total compensation inclusive of all benefits will be Rs.300,000/-during probation and on confirmation and the same will be subject to a deduction of tax at source in accordance with the prevailing laws. The retirement age is 62 years. This contract of employment can be terminated by either party by giving a notice period of 30 days for employees on probation and 60 days for employees who have been confirmed in your Salary Grade. Either party is not bound to give any reasons thereof.Any retention Bonus if applicable will be detailed in your letter of employment and will be subject to the terms and conditions of your letter of employment.

A formal letter communicating your location (anywhere in Indiaand can include Company's affiliate offices across India) and date of joining will be sent to you at a later period. We will endeavor to give you adequate notice so that you can make necessary arrangements and travel plan. At the time of joining, you are requested to submit the documents as per Annexure A.You shall be on the rolls of companies establishment at Bangalore and this offer shall be subject to jurisdiction of Bangalore, Karnataka.This is an offer of appointment. On your acceptance, a detailed formal letter of appointment will be issued to you at the time of joining.

Yours sincerely,
FOR NTT DATA INFORMATION PROCESSING SERVICES PRIVATE LIMITED

SRINIVASULU BB
VICE PRESIDENT – TALENT ACQUISITION

We request you to please read and sign the enclosed copy of this letter and return it by 12 Apr 19to indicate your acceptance of this Offer.I agree & accept employment on the terms and conditions mentioned in this letter.

Signature: _____
Arshdeep Singh Chopra

Date: _____

23. Jasjot Singh, Akash Puri

[TECHNOSSUS]

SCO 59, THIRD FLOOR, URBAN ESTATE,
PHASE-II, DUGRI,LUDHIANA, PUNJAB
+91.161.463.6563 TECHNOSSUS.COM

EMPLOYMENT OFFER

May 27, 2019

Jasjot Singh
Ludhiana

Re: Offer of Employment

Dear Jasjot:

Technossus Software Services Pvt. Ltd., (the "Company"), is pleased to offer you full-time employment on the following terms:

1. **Position.** You will be employed in the full-time position of **TRAINEE – SOFTWARE DEVELOPMENT.** A comprehensive description of this position is attached to this offer as Annexure – 3.

    You will report to **MR. GAURAV MADAAN, PRINCIPAL CONSULTANT – SOFTWARE DEVELOPMENT** and your location of employment will be LUDHIANA, PUNJAB.

    As a full-time employee, the Company requires that you devote your full business time, attention, skills and efforts to the duties and responsibilities of your position.

2. **Start Date.** Your first date of employment with the Company will be **June 10, 2019** ("**Start Date**").

3. **Compensation.** All compensation is payable less deductions authorized by you plus all tax withholdings as required by applicable law. Compensation will be paid in accordance with the Company's established policies and procedures on the Company's regularly scheduled pay days. In this position, you will be eligible for the following compensation:

    a. **Stipend.** You will be paid a stipend of Twelve Thousand Forty-One (Rs. 12,041) per month for the initial six months. You will be paid gross emoluments as detailed in Annexure – 1.

    b. **Salary.** From the seventh month you will be paid a salary in the Total Compensation of Two Lakh Thirty-One Thousand One Hundred Forty-Eight (Rs.2,31,148)) annually. Your salary will be paid to you monthly. You will be paid gross emoluments as detailed in Annexure – 2.

    c. **Performance bonus.** After completion of 12 and 18 months, you will be eligible to receive a Performance Bonus (one-time bonus up to 20000 as per performance).

    d. **Bonus.** In addition to your salary, you will be eligible to receive an annual bonus of up to 10% of your Gross Earnings as identified in Annexure – 1. This bonus is measured across four quarters of the calendar year and paid annually. (Annual Bonus). The Annual Bonus will be contingent on your specific quarterly goals, MBOs (Management by Objectives) and Company Goals being met. The company reserves the right to amend or withdraw the bonus, on an annual basis.

4. **Terms of Employment.** Your employment with us will be governed by the Terms & Conditions as detailed in Annexure – 4.

If you wish to accept employment with the Company under the terms described above, please sign and date this letter and the Non-Disclosure Agreement and return them to me by **May 28, 2019,** after which date this offer will be withdrawn and of no further force or effect.

For TECHNOSSUS SOFTWARE SERVICES PVT. LTD.
Sincerely,

Ramanjeet Deol
HR Manager

Name: JASJOT SINGH

Signature of Candidate

I accept the foregoing offer of employment. I have read and understand and agree to its terms. I understand that this offer sets forth the entire agreement between myself and the Company, regarding the terms of employment and supersedes any prior agreements, understanding or discussion which I may have prior to signing this offer letter.

[T]

TECHNOSSUS.COM
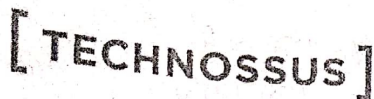
[TECHNOSSUS]

EMPLOYMENT OFFER

May 23, 2019

Akash Puri
Ludhiana

Re: Offer of Employment

Dear Akash:

Technossus Software Services Pvt. Ltd., (the "Company"), is pleased to offer you full-time employment on the following terms:

1. **Position.** You will be employed in the full-time position of TRAINEE – SOFTWARE DEVELOPMENT. A comprehensive description of this position is attached to this offer as Annexure – 3.

   You will report to MR. SUNNY SETIA, PRINCIPAL CONSULTANT – SOFTWARE DEVELOPMENT and your location of employment will be LUDHIANA, PUNJAB.

   As a full-time employee, the Company requires that you devote your full business time, attention, skills and efforts to the duties and responsibilities of your position.

2. **Start Date.** Your first date of employment with the Company will be <u>June 10, 2019</u> ("Start Date").

3. **Compensation.** All compensation is payable less deductions authorized by you plus all tax withholdings as required by applicable law. Compensation will be paid in accordance with the Company's established policies and procedures on the Company's regularly scheduled pay days. In this position, you will be eligible for the following compensation:

   a. <u>Stipend.</u> You will be paid a stipend of Twelve Thousand Forty-One (Rs. 12,041) per month for the initial six months. You will be paid gross emoluments as detailed in Annexure – 1.

   b. <u>Salary.</u> From the seventh month you will be paid a salary in the Total Compensation of Two Lakh Thirty-One Thousand One Hundred Forty-Eight (Rs.2,31,148)) annually. Your salary will be paid to you monthly. You will be paid gross emoluments as detailed in Annexure – 2.

   c. <u>Performance bonus.</u> After completion of 12 and 18 months, you will be eligible to receive a Performance Bonus (one-time bonus up to 20000 as per performance).

   d. <u>Bonus.</u> In addition to your salary, you will be eligible to receive an annual bonus of up to 10% of your Gross Earnings as identified in Annexure – 1. This bonus is measured across four quarters of the calendar year and paid annually. (Annual Bonus). The Annual Bonus will be contingent on your specific quarterly goals, MBOs (Management by Objectives) and Company Goals being met. The company reserves the right to amend or withdraw the bonus, on an annual basis.

4. **Terms of Employment.** Your employment with us will be governed by the Terms & Conditions as detailed in Annexure – 4.
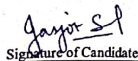
If you wish to accept employment with the Company under the terms described above, please sign and date this letter and the Non-Disclosure Agreement and return them to me by May 24, 2019, after which date this offer will be withdrawn and of no further force or effect.

For TECHNOSSUS SOFTWARE SERVICES PVT. LTD.
Sincerely,

Ramanjeet Deol
HR Manager

Name:

Signature of Candidate
_____

I accept the foregoing offer of employment. I have read and understand and agree to its terms. I understand that this offer sets forth the entire agreement between myself and the Company, regarding the terms of employment and supersedes any prior agreements, understanding or discussion which I may have prior to signing this offer letter.

[T]

24. Nishant Soni

Cybage
Delivering Value Scientifically

Date: September 23, 2017

Letter of Offer

Dear **Nishant Soni**

Further to your interview dated September 23, 2017, we are pleased to offer you the position of **Trainee - QA Engineer** with our organization.

On joining the company, you will be on training for a minimum period of 3 months. The monthly stipend during your training period will be Rs. 18,000/- (including Provident Fund & deductions will be as applicable).

Subject to successful completion of the training, your employment will be confirmed as **QA Engineer.**

Please refer to the attached Annexure-1 for your salary structure and an explanation of its components.

The date of joining and location will be informed to you by **June, 2018.**

Upon joining, you will be subject to the employee policies and practices of the Company. A summary of the present policies is included as Annexure-2 to this letter of offer for your reference. Also refer Annexure-3 for the list of documents to be submitted.

You are required to successfully complete the Bachelor's degree before the date of confirmation.

Cybage reserves the right to defer or cancel this offer at any time before or after your join in case any information furnished by you is found incorrect or misleading.

We look forward to your joining at Cybage and wish you a successful career with us.

Sincerely,
For Cybage Software Pvt. Ltd.

Pooja Walia Garde
Group Manager – Talent Acquisition

Cybage Software Pvt. Ltd.
Cybage Towers, Survey No 13A/ 1+2+3/1
Wadgaon Sheri, Pune, Maharashtra - 411014.
Ph: +91. 20. 6604 1700
Fax: +91. 20. 6604 1701
Email: biz@cybage.com

25. Nikhil Sarna, Damanpreet Singh

M Gmail

Nikhil Sarna <nikhil.sarna11@gmail.com>

Letter of Intent - Nikhil Sarna - Ref. No.: 7481670
2 messages

careers@wipro.com <careers@wipro.com>
To: nikhil.sarna11@gmail.com
Cc: manager.campus@wipro.com

Wed, Feb 28, 2018 at 5:46 PM

Campus - Letter Of Intent

February 28, 2018

Dear Nikhil Sarna,

Congratulations! We are pleased to inform that you have successfully completed the selection processes conducted by Wipro for the role of Project Engineer. This Letter is to confirm that we intend to offer you this role on the following terms:

I. Your designation would be **Project Engineer**, belonging to career band **Team Rainbow (TRB-II)**.

II. You will undergo a training program (classroom/on the job) for 3 months from your date of joining. During this period, you will be paid a stipend of **Rs. 18000/-** per month. On satisfactory completion of the training you will be assigned to projects in Wipro Limited.

III. On joining you would be required to sign a training agreement which is applicable to you during the training period and up to twelve months post completion of the Training period. The agreement requires you to reimburse **Rs 75000** to Wipro, for the cost of training incurred, in the event you exit before the said period.

a. The salary stack for Project Engineer is as given below:

Component	Amount (INR)
Basic	9340
HRA	4700
Commutation	2500
Wipro Benefit Plan	6561
Total Fixed Cash	23101
PF	1130
Gratuity	496
Total Fixed Compensation	24727
QPLC	1340
Medical	600
Target CTC	26667
Total Annual Gross	320004

IV. As part of our ongoing commitment to your continued learning and development before joining Wipro, we have an e-learning initiative 'Online Project Campus'. This online platform enables you to access the assigned learning programs from the convenience of your computer. The redesigned program provides a greater opportunity for your skill development in C Programming, Java or C++ or C#, Database, Unix Operating System, Testing Concepts and Behavioural skills. After completing the modules you will be required to clear the evaluation which will firm up your joining date into the organization.

a. In addition to the components mentioned above, you will be entitled for Additional Allowance depending on your performance during the initial training program. The totalAnnual Gross therefore will be as indicated in the table below:

	TOTAL MONTHLY GROSS	TOTAL ANNUAL GROSS
Performance Category - 1	27500	330000

M Gmail

Nikhil Sarna <nikhil.sarna11@gmail.com>

Fwd: Letter of Intent - Damanpreet Singh - Ref. No.: 7482334
1 message

Damanpreet Singh <daman.4880@gmail.com>   Wed, Mar 7, 2018 at 12:11 PM
To: Nikhil Sarna <nikhil.sarna11@gmail.com>

---------- Forwarded message ----------
From: <careers@wipro.com>
Date: 28-Feb-2018 5:47 PM
Subject: Letter of Intent - Damanpreet Singh - Ref. No.: 7482334
To: <daman.4880@gmail.com>
Cc: <manager.campus@wipro.com>

Campus - Letter Of Intent

February 28, 2018

Dear Damanpreet Singh,

Congratulations! We are pleased to inform that you have successfully completed the selection processes conducted by Wipro for the role of Project Engineer. This Letter is to confirm that we intend to offer you this role on the following terms:

I. Your designation would be **Project Engineer**, belonging to career band **Team Rainbow (TRB-II).**

II. You will undergo a training program (classroom/on the job) for 3 months from your date of joining. During this period, you will be paid a stipend of **Rs. 18000/-** per month. On satisfactory completion of the training you will be assigned to projects in Wipro Limited.

III. On joining you would be required to sign a training agreement which is applicable to you during the training period and up to twelve months post completion of the Training period. The agreement requires you to reimburse **Rs 75000** to Wipro, for the cost of training incurred, in the event you exit before the said period.

    a. The salary stack for Project Engineer is as given below:

Component	Amount (INR)
Basic	9340
HRA	4700
Commutation	2500
Wipro Benefit Plan	6561
Total Fixed Cash	**23101**
PF	1130
Gratuity	496
Total Fixed Compensation	**24727**
QPLC	1340
Medical	600
Target CTC	**26667**
Total Annual Gross	**320004**

IV. As part of our ongoing commitment to your continued learning and development before joining Wipro, we have an e-learning initiative 'Online Project Campus'. This online platform enables you to access the assigned learning programs from the convenience of your computer. The redesigned program provides a greater opportunity for your skill development in C Programming, Java or C++ or C#, Database, Unix Operating System, Testing Concepts and Behavioural skills. After completing the modules you will be required to clear the evaluation which will firm up your joining date into the organization.

26. Parneet Kaur

17- 13611'/1 ...

Infosys

HRD/FINALSEMTRG/2018/12069291

December 08, 2017

Parmeet Kaur.

Guru Nanak Dev Engineering College

Dear Parmeet,

This is in reference to the Program (as defined in the Training Agreement) as per the Training Agreement signed on _____ between you (**"Trainee"** hereafter) and Infosys Limited(**"Infosys"** hereafter), a corporation organised and existing under the laws of India and having its primary place of business at Electronics City, Hosur Road, Bangalore 560 100, India. The details of the Program are as follows:

1. Program Date	:	**February 05, 2018**
2. Duration of the program	:	**16 Weeks**
3. Location	:	**Mysore, India**

Please note that you will be required to make your own arrangements for travel to Mysore (or any other Infosys location that may be communicated to you by designated Infosys personnel) and back to your university upon completion of the Program. Additionally, should you be required to travel between the Infosys offices located in different cities as part of your project, Infosys shall bear the cost of such travel. Your entitlements shall be communicated to you at that time.

A break-up of the benefits that you are eligible for is mentioned below:

Accommodation	Provided by the Company at no charge for the entire duration of the Program
Stipend	Rs.10,000/- per month

You would also be covered under the Personal Accident Insurance and Hospitalization Insurance of Infosys for the duration of your Program. If you require additional coverage, you would need to obtain this in your personal capacity.

If you are required to use the bus, library and fitness facilities (if any), you shall be provided access during the period of your Program in accordance with Infosys policies.

For the duration of the Program, you will be required to adhere to certain policies / practices that are applicable to employees of Infosys, including but not limited to the Trainee's obligations as per the Training Agreement. Additionally, you may be required to sign agreements with Infosys, at the sole discretion of Infosys, relating to protection of Infosys confidential and proprietary information. Infosys disclaims all liability and responsibility for acts or omissions by you that are in violation of any law, guideline, rule or regulation.

Digitally signed by RICHARD LOBO
Date: 2017.12.08 13:07:15 +05:30
Reason: Internship Offer Letter
Location: Bangalore

27. Jasmine Kaur, Navjot Kaur, Manroop Kaur, Jasleen Kaur

G. S. AUTO INTERNATIONAL LTD.

Regd. Office & Works : G.S. ESTATE , G.T.Road, Dhandari Kalan, Ludhiana.
Phones : 91-161-2511001/2/3/4/5 , Fax : 91-161-2510885,
E-Mail : hrm@gsgroupindia.com

DATED : 13.05.2017

Ms. Jasmine Kaur
Roll No. 1411270
Branch IT
G.N.E. College
Gill Road, Ludhiana

SUB : *Selection For Industrial Training.*

Dear Student,

This is to inform you that you are selected for six month Industrial Training in our Organization. Stipend Rs. 5000-00 per month will be paid to you and your timing 9.00 AM to 5.30 PM. Training will start from 05.06.2017 to Dec 2017 . Company will not provided any Conveyance , Accommodation and food. Students will manage themselves.

For G.S. Auto International Ltd.

Major Singh

Authorized Signatory

G. S. AUTO INTERNATIONAL LTD.

DATED : 13.05.2017

Ms. Navjot Kaur
Roll No. 1411287
Branch IT
G.N.E. College
Gill Road, Ludhiana

SUB   :   *Selection For Industrial Training.*

Dear Student,

This is to inform you that you are selected for six month Industrial Training in our Organization. Stipend Rs. 5000-00 per month will be paid to you and your timing 9.00 AM to 5.30 PM. Training will start from 05.06.2017 to Dec 2017 . Company will not provided any Conveyance , Accommodation and food. Students will manage themselves.

For G.S. Auto International Ltd.

Major Singh

Authorized   Signatory

G. S. AUTO INTERNATIONAL LTD.

Regd. Office & Works : G.S. ESTATE , G.T.Road, Dhandari Kalan, Ludhiana.
Phones : 91-161-2511001/2/3/4/5 , Fax : 91-161-2510885,
E-Mail : hrm@gsgroupindia.com

DATED : 13.05.2017

Ms. Manroop Kaur
Roll No. 1411284
Branch IT
G.N.E. College
Gill Road, Ludhiana

SUB   :   *Selection For Industrial Training.*

Dear Student,

      This is to inform you that you are selected for six month Industrial Training in our Organization. Stipend Rs. 5000-00 per month will be paid to you and your timing 9.00 AM to 5.30 PM. Training will start from 05.06.2017 to Dec 2017 . Company will not provided any Conveyance , Accommodation and food. Students will manage themselves.

For G.S. Auto International Ltd.

Major Singh

Authorized   Signatory

DATED : 13.05.2017

Ms. Jasleen Kaur
Roll No. 1411269
Branch IT
G.N.E. College
Gill Road, Ludhiana

SUB :   *Selection For Industrial Training.*

Dear Student,

This is to inform you that you are selected for six month Industrial Training in our Organization. Stipend Rs. 5000-00 per month will be paid to you and your timing 9.00 AM to 5.30 PM. Training will start from 05.06.2017 to Dec 2017 . Company will not provided any Conveyance , Accommodation and food. Students will manage themselves.

For G.S. Auto International Ltd.

Major Singh

Authorized   Signatory

28. Damanpreet Singh

Crowdfire India Pvt. Ltd.

802, Siddhi Heights, Sector 28, Plot 73, Near Balaji Temple, Nerul West,Navi Mumbai - 400706, Maharashtra,
CIN U72300MH2014PTC260125 INDIA. Website: www.crowdfireapp.com Email: contact@crowdfireapp.com Off No. 022-20870019

To
Damanpreet Singh
Roll no.: 1411247
Guru Nanak Dev Engineering College,
Ludhiana
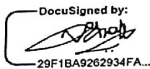
SUB: Internship Offer from Crowdfire

We'd love to have you on board as an intern from 3rd July to 31st December 2017. During this period, you will be working on technologies like Node.JS, Java, a few other databases, and AWS services.

Your monthly stipend would be Rs. 18,000/- (Rupees Eighteen Thousand only).

Looking forward to working with you,

For Crowdfire India Pvt. Ltd.

DocuSigned by:

29F1BA9262934FA...

Nischal Shetty
CEO

29 -32. Dr. Akshay Girdhar and Sachin Bagga

Springer Link

Computer Vision-Based Tomato Grading and Sorting

Advances in Data and Information Sciences pp 75-84 | Cite as

- Sukhpreet Kaur (1) Email author (sukhpreet885@gmail.com)
- Akshay Girdhar (1)
- Jasmeen Gill (2)

1. Guru Nanak Dev Engineering College, , Ludhiana, India
2. RIMT IET, , Mandi Gobindgarh, India

Abstract

Since ages, agricultural sector plays an important role in the economic development of a country. In recent years, industries have started using automated systems instead of manual techniques for quality evaluation. In agriculture field, grading is very necessary to increase the productivity of the vegetable products. Everyday a huge amount of vegetables are exported to other places and earn a good profit. So, quality evaluation is important in terms of improving the quality of vegetables and gaining profit. Traditionally, the vegetable grading and classification were done through manual procedures which were error prone and costly. Computer vision-based systems provide us such accurate and reliable results that are not possible with human graders/experts. This paper presents a vegetable grading and sorting system based on computer vision and image processing. For this work, tomatoes have been used as a sample vegetable. A total of 53 images were acquired using own camera setup. Afterward, segmentation using Otsu's method was performed so as to separate the vegetable from the background. The segmented images, thus obtained, were used to extract color and shape features. At last, grading and sorting were performed using backpropagation neural network. The proposed method has shown an accuracy of 92% and outperformed the existing system.

Keywords

Computer vision   Image processing   Grading and sorting   Feature extraction
Artificial neural network

13

RMI Approach to Cluster Based Image Decomposition for Filtering Techniques

Sachin Bagga, Akshay Girdhar, Munesh Chandra Trivedi, Yinan Bao and Jingwen Du

Abstract Logically programmed cluster provides the platform to compute certain complex problems which are not solvable on a single system. Parallel processing implemented on a distributed data, on a cluster with the help of multithreading is a base for the present work. It is very easy for an application based on parallelism to beat the results produced by the sequential program on the same platform. Taking this thing into consideration along with the cluster programming can be used to solve certain complex problems like processing of large size images to apply median filtering. In the present work, an image with large dimensions is break down into sub images with lesser dimensions and this breakdown is as per the number of nodes under consideration from a given cluster. For the purpose of communication between these nodes distributed object oriented programming remote method invocation (RMI) is used which creates a Single Instruction and Multiple Data (SIMD) model. At the master system there is actual breakdown of the image into smaller dimensions and at the slave systems there is virtual division of the sub image further into 3×3 or as per mask selected to apply median filter. Various

S. Bagga (✉) · A. Girdhar
Department of Information Technology, Guru Nanak Dev Engineering College,
Ludhiana, India
e-mail: sachin8510@gmail.com

A. Girdhar
e-mail: akshay1975@gmail.com

M.C. Trivedi
Department of Computer Science and Engineering, ABES Engineering College,
Ghaziabad, India
e-mail: Munish.Trivedi@gmail.com

Y. Bao
Department of Mechanical Engineering, Freshman, School of Engineering,
University of Wisconsin-Madison, Madison, USA
e-mail: ybao24@wisc.edu

J. Du
Dalian No. 24 High School, Dalian, China
e-mail: zoe.diamond@qq.com

MI Approach to Cluster Based Image Decomposition for Filtering Techniques

Sachin Bagga, Akshay Girdhar, Munesh Chandra Trivedi, Yinan Bao and Jingwen Du

Abstract Logically programmed cluster provides the platform to compute certain complex problems which are not solvable on a single system. Parallel processing implemented on a distributed data, on a cluster with the help of multithreading is a base for the present work. It is very easy for an application based on parallelism to beat the results produced by the sequential program on the same platform. Taking this thing into consideration along with the cluster programming can be used to solve certain complex problems like processing of large size images to apply median filtering. In the present work, an image with large dimensions is break down into sub images with lesser dimensions and this breakdown is as per the number of nodes under consideration from a given cluster. For the purpose of communication between these nodes distributed object oriented programming remote method invocation (RMI) is used which creates a Single Instruction and Multiple Data (SIMD) model. At the master system there is actual breakdown of the image into smaller dimensions and at the slave systems there is virtual division of the sub image further into 3 × 3 or as per mask selected to apply median filter. Various

S. Bagga (✉) · A. Girdhar
Department of Information Technology, Guru Nanak Dev Engineering College,
Ludhiana, India
e-mail: sachin8510@gmail.com

A. Girdhar
e-mail: akshay1975@gmail.com

M.C. Trivedi
Department of Computer Science and Engineering, ABES Engineering College,
Ghaziabad, India
e-mail: Munish.Trivedi@gmail.com

Y. Bao
Department of Mechanical Engineering, Freshman, School of Engineering,
University of Wisconsin-Madison, Madison, USA
e-mail: ybao24@wisc.edu

J. Du
Dalian No. 24 High School, Dalian, China
e-mail: zoe.diamond@qq.com

387

An Automated Survey Designing Tool for Indirect Assessment in Outcome Based Education using Data Mining

Jeevan Bhatia
Computer Engineering
Punjabi University
Patiala (Punjab), India
jeevankaur20@gmail.com

Akshay Girdhar
Information Technology
Guru Nanak Dev Engineering College
Ludhiana (Punjab), India
akshay1975@gmail.com

Inderjeet Singh
Information Technology
Guru Nanak Dev Engineering College
Ludhiana (Punjab), India
inderjeetsinghit@gmail.com

Abstract— In today's era, graduates need to acquire the competent skill sets to get a good job. The traditional education model suffers from the limitations of assessing these skills. Outcome Based Education (OBE) model plays an important role in this context by overcoming the above-specified issue. OBE empirically measures the student performance and helps to demonstrate the skills that are clearly articulated to them at the start of the program. Accrediting bodies are focusing more on the assessment of student learning outcomes. Every year huge datasets of assessment data are accumulated using OBE model. If analyzed properly, this data can be used to predict student competencies. Manual record keeping and attainment calculation make it a challenging task to extract meaningful information from this ever-growing data repository.

The proposed work implicates the construction of a framework to automate the attainment process using the assessment and mapping data of Program Outcomes and Course Outcomes retrieved from an indirect assessment tool. The attainment data so obtained is used to predict attainment of various programs and courses using the classification techniques. The work done helps the instructors to find meaningful information from assessment data and helps them to take proactive decisions to improve the attainment of low-performing courses. Moreover, with automation of attainment calculation, manual work for the faculty is reduced, resulting in time-saving and better focusing on attainment improvement and various other scholarly activities.

Keywords—Program Outcomes; Program Educational Objectives; Outcome Based Education; Course Outcomes.

I. INTRODUCTION

Educational model is the art and science of teaching and learning [1]. It depicts the teaching style, by describing teaching methodology and various ways of assessment [2]. It helps to improve the understanding of concepts and learning the ability of students by providing following learning approaches [3]. **Traditional education model** is teacher centered and consists pertinent ways of teaching and learning [4]. **Progressive education model** mainly focuses on practical learning by providing varied learning resources [5]. **Competency based education model** focuses on teaching job oriented courses. It gives awards based on clearly defined competencies, also known as learning outcomes [6]. **Outcome based education (OBE) model** is an approach in which the criteria's and educational decisions are driven by exit learning outcomes [7]. Many components are essential for achieving OBE like Vision, Mission, Course Outcomes, Program Outcomes and Program Educational Objectives [8].

II. OUTCOME BASED EDUCATION

The Outcome-based Education (OBE) focuses on the student-centered approach of teaching and learning. The main emphasis is given on student's satisfaction level, improving the ability of the student to learn, apply and use the concepts. It precisely describes the difference between aim, objective and learning outcome. In traditional education model [9] the teacher-centered approach is used, in which, a teacher decides the course and its respective contents. Implementation of OBE in the educational institute can lead to various amendments in course contents, assessments, and outcomes of the study.

According to Tshai et al. [10] top-down hierarchy of OBE consists of six as shown in Fig. 1.
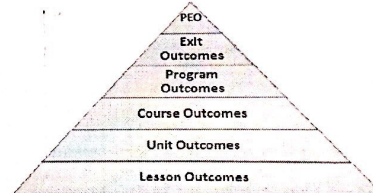
Fig. 1: Top down hierarchy of outcomes in OBE

In the 1950s, Bloom develops taxonomies which became the benchmarks in evaluation and formulation of the outcomes [11]. Mead and Bennett [12] depict the assessment criteria of learning outcomes based on Bloom's taxonomy. Bloom's [9] working provides us with six successive levels arranged in the hierarchy as shown in Fig. 2.

Fig. 2: Six increasingly complex levels of our thinking propose

95

AI based HealthCare Platform for Real Time, Predictive and Prescriptive Analytics using Reactive Programming

Jagreet Kaur[1], Dr. Kulwinder Singh Mann[2]

[1]Data Scientist, XenonStack, IT Park, Chandigarh, India.
[2]Professor and Head of the IT Department, GNDEC, Ludhiana, India

Abstract. AI in Healthcare needed to bring real, actionable insights and Individualized insights in real time for patients and Doctors to support treatment decisions., We need a Patient Centred Platform for integrating EHR Data, Patient Data, Prescriptions, Monitoring, Clinical research and Data. This paper proposes a generic architecture for enabling AI based healthcare analytics Platform by using open sources Technologies Apache beam, Apache Flink Apache Spark, Apache NiFi, Kafka, Tachyon, Gluster FS, NoSQL- Elasticsearch, Cassandra. This paper will show the importance of applying AI based predictive and prescriptive analytics techniques in Health sector. The system will be able to extract useful knowledge that helps in decision making and medical monitoring in real-time through an intelligent process analysis and big data processing.

1. Introduction

As with the change in the time and advancements in the technology, there is a need to make a systematic change to health systems to improve the quality, efficiency, and effectiveness of patient care. Chronic diseases like heart disease, stroke, cancer, and diabetes are considered as the most common, expensive, and preventable health problems but due to the poor health care systems, patients can't able to take good care of the problems.

The strategic aim of value based Health Care is to ensure that everyone can use the health services they are needed for their good health and well-being. The focus on value-based care corresponds to an increased concentration on patient-centric care. By focussing on technologies and healthcare processes on patient results, a doctor, hospitals, and health insurance need to work with each other to personalize care that is effective, transparent in its delivery and billing, and measured based on satisfaction of the patient.

Suppose a patient is suffering from ache or pain and need to visit a physician. After listening to patient symptoms, Physician inputs them into the computer, which helps to show the latest research that is needed to know about how to diagnose and treat the problem. Patient has an MRI or an x-ray and a computer helps to detect a problem that could be too small for a human to see. Finally, a computer monitors at patient medical records and family history and compares both with the most recent research to suggest a treatment for a patient that is specifically personalized to his needs.

Nowadays, Patients need an affordable and high quality of healthcare. According to the Health Data, most of the information is not in structured, relational format. About 80% information is in an unstructured format. Due to the limited structured data about the patient's health conditions is available and patients have only very limited opportunities to actively involved in the process. It is very difficult to use this massive unstructured amount of data from different sources to take the right decision for the right patient at the right time by the doctors. This will slow down the personalized

1

Robust Energy-Aware Task Scheduling For Scientific Workflow In Cloud Computing

Priya Kumari
School of Computer Science
and Engineering
Lovely Professional University
Phagwara, India
Email: parrypriya101@gmail.com

Avinash kaur
School of Computer Science
and Engineering
Lovely Professional University
Phagwara, India
Email: avinash.14557@lpu.co.in

Parminder Singh
School of Computer Science
and Engineering
Lovely Professional University
Phagwara, India
Email: parminder.16479@lpu.co.in

Dr. Manpreet Singh
Department of Information Technology
Guru Nanak Dev Engineering
College, Ludhiana, India
Email: mpreet78@gmail.com

Abstract—Cloud computing is an advanced computing model using which several applications, data and countless IT services are provided over the Internet. Task scheduling plays a crucial role in cloud computing systems. The issue of task scheduling can be viewed as the finding or searching an optimal mapping/assignment of a set of subtasks of different tasks over the available set of resources so that we can achieve the desired goals for tasks. In the proposed research methodology, the researcher has extended this technique using dynamic voltage fluctuation system (DVFS). By using DVFS, if further migration is not possible or the number of tasks running on the machine is going to compete, then migration further reduces the performance. In DVFS, the voltage given to under load machines has been reduced which further optimize the energy consumption to the next level. In the research, DVFS has improved the energy consumption without violating the SLA

I. INTRODUCTION

The usage of Internet and new technologies is part of todays world. Any kind of information is available throughout the world at any instance of time. All these kinds of things were not available a few years back. Lot of possibilities have arisen for accessing the public and private information like speedy access of Internet [1]. To make a connection to Internet by sitting anywhere in the world has led to a lot of development. Nowadays collaborative documents are being written through web browsers, online mails are consulted through web-mail clients, virtual albums are created for uploading the photographs of holidays. The applications are executed and data are stored in servers that are located not on their own computer but on the internet somewhere. The only thing that the user needs to learn to begin to use the internet services is entered in the web page. By this the user is able to make usage of services that share the confidential and private information which reside on the remote server [2]. These kinds of services are termed as cloud computing services. That name is given because of the metaphor about the Internet.

A. Scientific Workflow

A scientific workflow is a specification of process to streamline automates and represents the schedule of integration, dataset selection, analysis and computation for the final presentation and visualization [3]. Scientific disciplines are knowledge driven with the help of data analysis and discovery pipeline. The series of data intensive and computationally intensive tasks are designed composed and executed. The grid and cloud computing infrastructure attracts the scientist community the features such as sharing of computation, storage and software licenses. Multidisciplinary fields such as Bioinformatics, cheminformatics, Geoinformatics etc. doing large investment in IT infrastructure. The communities of scientists are interested in robust middleware which could afford the requirements of scientific tasks.

B. Scientific Workflow Management System

To perform the execution of computational tasks in cloud environment the scientific workflow management system. The scientific community has vision to perform high computation task on the distributed system with large computations and data intensive applications. The front end can be enabled by many server side languages to input the task to the environment.

1) Operational Layer: This layer consists of the cloud services and resources. It provides the widest range of homogeneous and heterogeneous resources, tools and services to manage the scientific workflow.

2) Task Management Layer: Task management layer handles the data product. The data product consists of heterogeneous data. Isolation of operation layer and task management layer defined in the reference model. The abstraction is provided by the task management layer.

3) Workflow Management Layer: This layer is responsible for the monitoring and execution of the scientific workflow. This is an important layer of scientific workflow management

Heuristic Data Placement and Replication For Scientific Workflow in Cloud Computing

Vishali
School of Computer Science
and Engineering
Lovely Professional University
Phagwara, India
Email: vishalivishi123@gmail.com

Parminder Singh
School of Computer Science
and Engineering
Lovely Professional University
Phagwara, India
Email: parminder.16479@lpu.co.in

Avinash kaur
School of Computer Science
and Engineering
Lovely Professional University
Phagwara, India
Email: avinash.14557@lpu.co.in

Dr. Manpreet Singh
Department of Information Technology
Guru Nanak Dev Engineering
College, Ludhiana, India
Email: mpreet78@gmail.com

Abstract—Cloud computing has turned up as an emerging platform for individual or personal computing. In order to improve overall performance of cloud data placement is an important task. Data placement is a prime issue which aims at minimizing the cost of inter node transfers of data in the cloud, the performance of the entire cloud system get improved by eradicating this issue. Many authors have proposed different techniques for optimizing the data placement strategy in scientific workflow. The strategy used for one application may not used for another application. The appropriate data placement strategy reduces the scheduling overhead, the cost of data processing, availability of data becomes high, bandwidth will be less consumed, scalability will be improved and fault tolerance will be increased. It is impossible to satisfy all the conditions to place the datasets at appropriate position where all tasks can access data with the minimum data transfer cost and fulfillment of SLA.

I. INTRODUCTION

The cloud computing is growing technology and helping other technologies to grow simultaneously [1]. Scientific disciplines are knowledge driven with the help of data analysis and plines are knowledge driven with the help of data analysis and discovery pipeline. The series of data intensive and computationally intensive tasks are designed composed and executed. The grid and cloud computing infrastructure attracts the scientist community the features such as sharing of computation, storage and software licenses. Multidisciplinary fields such as Bio-informatics, cheminformatics, Geoinformatics etc. doing large investment in IT infrastructure [2]. Scientific disciplines are knowledge driven with the help of data analysis and discovery pipeline. The series of data intensive and computationally intensive tasks is designed composed and executed. The grid and cloud computing infrastructure attracts the scientist community the features such as sharing of computation, storage and software licenses. Multidisciplinary fields such as Bio-informatics, cheminformatics, Geoinformatics etc. doing large investment in IT infrastructure [3].

A. Scientific Workflow Management System

To process the computational tasks, the scientific workflow management system deployed in cloud environment. The four layer architecture for cloud computing has been implemented by researchers and scientist for the scientific workflow. The detail working with SFMS layers is:

1) Operational Layer: This layer provides the hardware and software resources. This feature is provided dynamically by the cloud services. The Amazon EC2 [4], Google provides the cloud services. The interface is provided by the cloud providers.

2) Task Management Layer: This layer is providing the various components to manage the task and related data required for the application management. Data product management arranges and manage the data required for the scientific workflow management system. Provenance management look after the resources required for the specific task in a cloud environment.

3) Workflow Management Layer: This layer plays a major role in the scientific workflow management system. It contains the workflow engine that is input the scientific workflow in the form of XML file and arranges the task in the workflow system. The monitoring of the workflow engine task is done by the workflow monitoring system. The failure of task is rescheduled and this is monitored by the workflow monitoring.

4) Presentation Layer: This layer provides the GUI interface through which user can input the scientific workflow. The interface can be browser specific or it can be consoling or window applications [5].

B. Data Placement of Scientific Workflow

A data placement is a mechanism in which abundant datasets used to enhance the throughput or performance and it also includes the study of data movement cost. In scientific cloud workflows, a giant number of applications demand data to be deposited in distributed data centers. A data manager
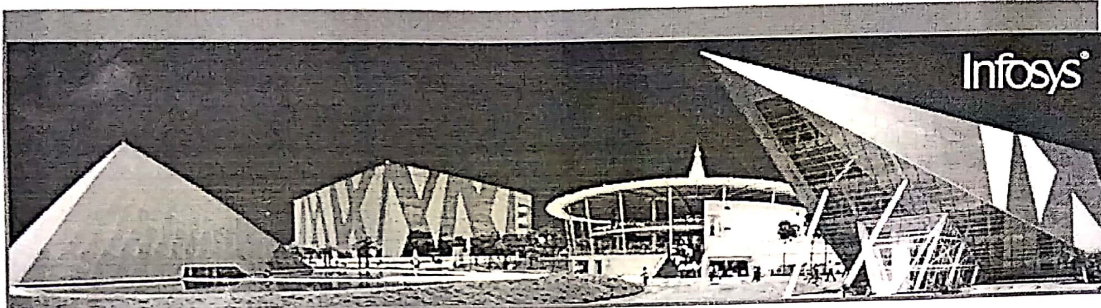
42. Sukhdeep Kaur, Kanav Jain, Twinkle

Subject	**Infosys Limited : Final Semester Internship Program 2017**
From	Gaurav Mahajan05 <Gaurav_Mahajan05@infosys.com>
To	TPO@gndec.ac.in <TPO@gndec.ac.in>, Mannkulvinder@yahoo.com <Mannkulvinder@yahoo.com>
Cc	Pramod_MV <Pramod_MV@infosys.com>
Date	2016-12-14 09:05

- Internship Registration 2016-17 – Student Details.xlsx (~14 KB)

FINAL SEMESTER INTERNSHIP PROGRAM

Dear Dr. Kulvinder Singh Mann Sir,

Greetings from Infosys Limited !

At Infosys, it's been our continuous endeavor to attract the best talent from reputed institutions across the country, and to enable them to become high performing, customer-centric and value-driven individuals. Towards this, we have created a holistic training and facilitation program, which is designed to be amongst the best in the world. We believe that best-in-class talent trained in a best-in-class environment will produce best-in-class professionals.

To augment the same, and to strengthen the Infosys - academia partnership, we present an opportunity to your students, who have been selected by Infosys through campus placements, to spend their final semester with us at one of our world class campuses in the country. We shall determine the specific campus and inform at an appropriate time.

Through this platform, not only will the students get the opportunity to work on a mandatory project; which is a curriculum requirement, but also work under the guidance of our project managers. Entry level training shall also be provided to these students to equip them with an understanding to undertake the project and handle its complexities.

DETAILS OF THE INTENSHIP PROGRAM

Duration:

The program will be scheduled for a period of 16 weeks at any of the Infosys Development Centers in India. The program typically commences in the month of January.

Benefits:

- Stipend of INR 10,000 per month for the duration of the internship
- Free Accommodation at the Infosys campus
- Life Insurance and Personal Accident Insurance
- Hospitalization coverage

GURU NANAK DEV ENGINEERING COLLEGE
An Autonomous College u/s [2(f) and 12(B)] of UGC Act 1956
Training and Placement Cell

Ref.:   Dated:

SEMESTRIAL TRAINING EVALUATION PERFORMA (INDUSTRIAL TRAINING)

Name: Snehdeep Kaur   Branch: CSE

Roll No: 1410982   Date of Evaluation: 22/03/2017

Company Name: Infosys Limited   Address: #350, Infosys Limited, Hootagalli, Hebbal Electronics City, Mysore - 570027

Authorised person from Industry: IWA ALANKRIT

Designtaion of Authorised Person: Iwa Manhid

A. Assessment By Industry Official:

Attendence		Practical Work		Remarks	Seal and Singnature
Marks Obatained	Max Marks	Marks Obataind	Max Marks	Retest pending	Iwa Manhid
50	50	—	100		

Attendence	Range of Marks	Project Assesment	Range of Marks
Above 90%	90-100%	Excellent	90-100%
75-90%	70-90%	Good	70-90%
Below 75%	50-70%	Fair	50-70%

B. Assessment By Visiting College Faculty (Name:_____):

Assessment		Remarks	Singnature
Marks Obatained	Max Marks		
	150		

Student should be evaluated based on following parameters proportionally:
1. Knowledge Acquistion.
2. Problem Identification.
3. Implementation of knowledge to solve required problem.

Dr. K.S.Mann
Dean, Training and Placement

GURU NANAK DEV ENGINEERING COLLEGE
An Autonomous College u/s [2(f) and 12(B)] of UGC Act 1956
Training and Placement Cell

Ref.: Dated:

SEMESTRIAL TRAINING EVALUATION PERFORMA (SOFTWARE TRAINING)

Name: Kanav Jain Branch: IT

Roll No: 1411388 Date of Evaluation: 22|03|2017

Company Name: Infosys Limited Address: #350, Infosys Limited, Hootgali, Hebbal Electronics City, Mysore - 570027

Authorised person from Industry: IWA ALANKRIT

Designtaion of Authorised Person: Iwn Alankrit

A. Assessment By Industry Official:

Attendence		Practical Work		Remarks	Seal and Singnature
Marks Obatained	Max Marks	Marks Obatained	Max Marks	Retest Pending	Iwa Alankrit
24	25	—	75		

Absent for 1 day

Attendence	Range of Marks	Project Assesment	Range of Marks
Above 90%	90-100%	Excellent	90-100%
75-90%	70-90%	Good	70-90%
Below 75%	50-70%	Fair	50-70%

B. Assessment By Visiting College Faculty (Name:_____):

Assessment		Remarks	Singnature
Marks Obatained	Max Marks		
	50		

Student should be evaluated based on following parameters proportionally:
1. Knowledge Acquistion.
2. Problem Identification.
3. Implementation of knowledge to solve required problem.

Dr. K.S.Mann
Dean, Training and Placement

Contact Us At:
Address: Training and Placement Cell, GNDEC, Gill Road, Ludhiana-141006
E-mail: tpo@gndec.ac.in and mannkulvinder@yahoo.com
Telefax: +91-161-2501106 Cell:+91-9915507920 Phone No.:0161-5064510,5064511

GURU NANAK DEV ENGINEERING COLLEGE
An Autonomous College u/s [2(f) and 12(B)] of UGC Act 1956
Training and Placement Cell

Ref.:   Dated:

SEMESTRIAL TRAINING EVALUATION PERFORMA (SOFTWARE TRAINING)

Name: Twinkle   Branch: CSE

Roll No: 1311154   Date of Evaluation: 22/03/2017

Company Name: Infosys Limited   Address: #350, Infosys Limited, Hootagali, Hebbal Electronic City, Mysore - 570027

Authorised person from Industry: IWA ALANKRIT

Designtaion of Authorised Person: Iwa Alankrit

A. Assessment By Industry Official:

Attendence		Practical Work		Remarks	Seal and Singnature
Marks Obatained	Max Marks	Marks Obatained	Max Marks	No Restest till now.	Iwa Alankrit
25	25	—	75		

Attendence	Range of Marks	Project Assesment	Range of Marks
Above 90%	90-100%	Excellent	90-100%
75-90%	70-90%	Good	70-90%
Below 75%	50-70%	Fair	50-70%

B. Assessment By Visiting College Faculty (Name:_____):

Assessment		Remarks	Singnature
Marks Obatained	Max Marks		
	50		

Student should be evaluated based on following parameters proportionally:
1. Knowledge Acquistion.
2. Problem Identification.
3. Implementation of knowledge to solve required problem.

Dr. K.S.Mann
Dean, Training and Placement

43. Muskan Garg

Dear Muskan Garg ,

Welcome to WeP Solutions Ltd.

With reference to your application and subsequent test and interview, we are pleased to inform you that you have been selected in the company on the following terms and conditions.

We are glad to have you with us and look forward to a long and mutually rewarding association.

Date of Appointment
We have pleasure in appointing you at *WeP Solutions Ltd* as *Trainee*. Your date of appointment will be communicated to you in the month of April.

After successful completion of training period, your will be given an Appointment Letter. Details of your joining will be communicated shortly via mail.

Probation Period
You will be on **probation for a period of six months** from the date of joining. The company reserves the right to extend the probation for a **further period of six months**. At the end of the probation period, subject to your satisfactory performance, your services will be confirmed in writing. During probation, your employment may be terminated by either party with 30 days' notice in writing or payment of 30 days salary in lieu of notice.

Salary during Training Period
During the training period, you will be entitled to fixed stipend of **Rs 10,000/-** per month.
Appointment after successful completion of Probation or Training Period (in case found suitable)

After the successful completion of training period and being found medically fit, if you are found suitable by the company, you will be confirmed in your appointment on a salary (CTC) of **Rs 3,60,000/- PA.**

If you for any reason whatsoever decide to exit from the company **before one year starting from the date of your appointment** the training cost will be recovered from you. If you are not found suitable for the post, your appointment might get terminated at the discretion of the company and in case of such termination you will have no right or claim against the company.

In accordance to acceptance of the offer letter you agree to the below term and condition.
1. The location of posting can be anywhere across India.
2. The Job Profile can be anything as per company requirement.
3. You can be placed in any subsidiary of WeP Solutions Ltd.
4. During the Training period you wouldn't be allowed to take leaves, however under special cases leave will be granted after discussion.
5. Periodic tests would be conducted and you are required to pass each test with minimum 70%, failing which candidate will not be inducted in WeP.

44. Prabhjot Singh

Cybage
Delivering Value. Significantly.

Letter of Offer

Dear PRABHJOT SINGH

Further to your interview dated October 7, 2016, we are pleased to offer you the position of Trainee- QA Engineer with our organization.

On joining the company, you will be on training for a minimum period of 3 months. The monthly stipend during your training period will be Rs. 18,000/- (including Provident Fund & deductions will be as applicable).

Subject to successful completion of the training, your employment will be confirmed as QA Engineer.

Please refer to the attached Annexure-1 for your salary structure and an explanation of its components.

The date of joining and location will be informed to you by June, 2017.

Upon joining, you will be subject to the employee policies and practices of the Company. A summary of the present policies is included as Annexure-2 to this letter of offer for your reference. Also refer Annexure-3 for the list of documents to be submitted.

You are required to successfully complete the Bachelor's degree before the date of confirmation.

Cybage reserves the right to defer or cancel this offer at any time before or after your join in case any information furnished by you is found incorrect or misleading.

We look forward to your joining at Cybage and wish you a successful career with us.

Sincerely,
For Cybage Software Pvt. Ltd

Elston Pimenta
Head – HR

Region of Interest based Contrast Enhancement Techniques for CT images

Anureet Kaur
Deptt.of CSE
Guru Nanak Dev Engg. College,
Ludhiana, India
er.anureetarora@gmail.com

Akshay Girdhar
Deptt.of IT
Guru Nanak Dev Engg. College,
Ludhiana, India
akshay1975@gmail.com

Navdeep Kanwal
Deptt.of CE
Punjabi University,
Patiala, India
navdeepkanwal@gmail.com

Abstract- Medical imaging refers to an approach through which radiographers diagnose the human body using X-rays, CT, ultrasound, and magnetic resonance techniques. It is widely used safe imaging system in medical field that assists in extracting and visualizing the fine details from the image. In order to extract the details from an image, it should be of high quality, but presence of noise in images makes the image unclear and due to this the image enhancement is referred to as the most significant matter of concern in image processing. Every time when the patient is diagnosed, who is suffering from one or the other kind of disease, using techniques of medical imaging, a tumour is located in their body. This tumour can be called as the affected area in the patient's body. To locate this region of interest, various techniques like Otsu method are already available. The intensity difference between the tumour and the other body parts is either low or high but the major problem in detecting the tumour arises when the intensity difference between the tumour and the other organs is very low. Therefore, in order to extract the region, there is a need to enhance the contrast of affected region, so as to distinguish them from other parts. Region of interest based contrast enhancement is a technique to generate and extract the region based on the image contrast of the image. The primary objective of the work is to design a novel algorithm for extracting the affected region. A technique based on level set evolution is described for extracting the region. The proposed technique provides better image quality and contrast to noise ratio. The main focus in the proposed work is on contrast enhancement of CT images based on un-sharp mask filter as a necessary pre-processing. The results thus obtained have been compared with the existing state-of-the-art techniques and the outcomes show that the results are very promising.

Keywords - Contrast Enhancement; ROI marking; Un-sharp masking; Level set function; CT Images.

I. INTRODUCTION

Image enhancement refers to a process of enhancing the image through various methods that helps in improving the quality of an image. It helps in improving the appearance of an image either by increasing dominance of a number of features presents in the image or by decreasing the vagueness between the different regions of the image [1]. The reason behind enhancing the image is to get an output image which gives better results than the original image for a specific application. In the medical literature, speckle has been treated as a distracting artifact as it tends to degrade the resolution and the object detectability [8]. In medical field to extract and

visualize the fine details from the image; medical imaging system is generally used and is considered as the safest imaging system. Processing of various medical images is very much helpful to visualize and extract more details from the image [11]. In the present work, the medical imaging modality used is computed tomography (CT). This imaging technique utilizes X-rays in conjunction with computing algorithms to image tissues in the body [6]. In CT images, the tumours are detected and these are defined as the affected area in the body of the patient. The main reason of tumour in the body is the production of unwanted cells and because of this, bulk of additional flesh may develop which leads to tumour. The detection mechanism of tumours is through the use of CT, scanner. During CT scan the tumour is identified by intensity difference which may be higher or lower than that of the background image. CT images are generally of low contrast [5]. The current effort is to propose a method in detecting the affected area or the tumour that is known as region of interest (ROI). Region based approaches of contrast enhancement depend largely upon the method of region selection [12]. Earlier, the method proposed by Nugroho [2] also focuses on the contrast enhancement of CT images. If liver CT images consist of tumour, then it is very difficult to identify it as there is a little difference in the contrast between the tumour and the liver. The detection of tumour is even more difficult because there are certain organs present in the body whose dimensions and intensity level is comparable to that of tumour [2]. Therefore, in order to identify the affected area, pixels that do not belong to that area which is desired region of interest are excluded and for this Otsu method has been used. The histogram that is undergoing Otsu method, thresholds using the maximum, minimum and median intensity of the ROI and hence, ROI is segmented. Then histogram manipulation is used to enhance the contrast of the tumour and liver. But the major disadvantage of this technique is indiscrimination that may lead to increase the contrast of background noise and at the same time decrease the contrast of required part of image.

In order to overcome the disadvantage associated with histogram manipulation, the proposed method makes use of un-sharp mask filter. Once the ROI is marked after applying level set function, un-sharp filter is used to enhance the contrast of marked region.

60

3

RMI Approach to Cluster Based Cache Oblivious Peano Curves

Sachin Bagga
Department of
Information Technology
Guru Nanak Dev Engineering
College, Ludhiana
sachin8510@gmail.com

Akshay Girdhar
Department of
Information Technology
Guru Nanak Dev Engineering
College, Ludhiana
akshay1975@gmail.com

Munesh Chandra Trivedi
Department of Computer
Science and Engineering
ABES Engineering College
Ghaziabad
Munish.Trivedi@gmail.com

Yingzhi Yang
Department of Mechanical
Engineering
University of California
San Diego,USA
dep21.ed@gmail.com

Abstract— There are number of problems that are so complex/large that it becomes impractical or even in some cases impossible to solve these problems on a single machine. As compared to the serial computation, parallel computation is much result oriented for understanding, simulating of number of complex and real world physical process. The cache oblivious(CO) model helps us in designing the algorithms which are cache alert. Moreover these algorithms will be independent of the given system's cache size. A matrix multiplication based upon the Peano curves helps in designing of the cache oblivious algorithms. The distributed environment is being developed using RMI(Remote Method Invocation). In this setup the Master system will decompose a large size matrix into the smaller (ones depending upon the system available).The slave systems will perform the computations as per the equations based upon space filling Peano curves which are cache oblivious in nature. As a result we are able to reuse the matrix elements again and again which leads to decrease in number of cache misses and increasing the overall execution time of whole cluster. At the master system actual partitioning is done to generate submatrix and the virtual partitioning into size of 3x3 is being done at the slave systems for implementing multiplication based upon Peano curves(PC). PC algorithmic approach provides spatial locality which is a basic requirement for increasing the overall system efficiency.

Index Terms— Peano Curves , RMI, Cache Oblivious, SIMD, Multithreading, Cluster formation

I. INTRODUCTION

Modern Computers have a memory organization in which the registers work at the lowest level possible and then came the different number of caches [1][2] like L1, L2, L3, Primary memory and secondary memory. Although the memory size is increasing as we are moving upward but the accessing time of an element is decreasing. This constraint generates the requirement that the algorithm must be designed so that the accessing of the data must be in a contiguous manner. Also before writing back the data into the memory lower in hierarchy, the concerned data must have been used as much as possible. Although in todays world the microprocessor speed has increased a lot but at the same time the memory access has not increased comparatively. The increase in the expensive cost for accessing the data from hierarchy of memory has provided research work in which the reordering of the various computations are done to effectively make use of cache [20]memory. The cache conscious (CC) algorithms are those algorithms which are machine dependent. As the working of these algorithms depends upon the cache size[20] of the system. Although the concerned system efficiency can be increased by making use of these algorithms but moving ahead this constraint has to be removed. The CO algorithms are machine independent and work independent of the cache size or cache line's length [1][2]. The number of cycles of computer system for accessing the element increases, as we are moving in a hierarchy upwards. Typically a penalty of about 50 cycles[2][3] can occur if L1, L2 cache miss occur and we have to bring data from the main memory. The large sized matrices are very much prone to cache miss if our algorithm is not taking consideration into the temporal and spatial locality.For the purpose of communication between different systems in the cluster RMI(Remote Method Invocation) [4]is being used which makes use of the Java Remote Method Protocol(JRMP).The working of JRMP is over TCP/IT and with the help of this we can refer to the remote objects.But the constraint that JRMP provide is that we can only refer to the java objects i.e. the working of RMI[20] is technology dependent.RMI has a provision that it can even pass to the firewalls , even if both the master and slave system are behind the firewall.RMI has its own working protocol in which makes use of the number of layers for providing reliable connection to the different systems. The layers included are application, proxy, remote reference , transport layer.RMI[20] has a provision that it can re establish the connection, if a connection is lost during communication. By making use of the rebind (), bind () method the slave systems ensures the *rmiregistry* that they can provide these particular services. The master system can make use of the lookup() method of the DriverManager class in order to start communication with the other system by mentioning the IP address of that particular system.Rmiregistry can be started on any port as per the requirements , if omitted by default it will work on 1099.In the present work matrix multiplication [5] is being implemented on the distributed[12] system using RMI [20] by taking in to consideration also the cache levels .The given algorithmic approach reuses each element as earlier as possible so that number of cache miss [1][2] can be

RMI Approach to Cluster Based Cache Oblivious Peano Curves

Sachin Bagga
Department of
Information Technology
Guru Nanak Dev Engineering
College, Ludhiana
sachin8510@gmail.com

Akshay Girdhar
Department of
Information Technology
Guru Nanak Dev Engineering
College, Ludhiana
akshay1975@gmail.com

Munesh Chandra Trivedi
Department of Computer
Science and Engineering
ABES Engineering College
Ghaziabad
Munish.Trivedi@gmail.com

Yingzhi Yang
Department of Mechanical
Engineering
University of California
San Diego.USA
dep21.ed@gmail.com

Abstract— There are number of problems that are so complex/large that it becomes impractical or even in some cases impossible to solve these problems on a single machine. As compared to the serial computation, parallel computation is much result oriented for understanding, simulating of number of complex and real world physical process. The cache oblivious(CO) model helps us in designing the algorithms which are cache alert. Moreover these algorithms will be independent of the given system's cache size. A matrix multiplication based upon the Peano curves helps in designing of the cache oblivious algorithms. The distributed environment is being developed using RMI(Remote Method Invocation). In this setup the Master system will decompose a large size matrix into the smaller (ones depending upon the system available).The slave systems will perform the computations as per the equations based upon space filling Peano curves which are cache oblivious in nature. As a result we are able to reuse the matrix elements again and again which leads to decrease in number of cache misses and increasing the overall execution time of whole cluster. At the master system actual partitioning is done to generate submatrix and the virtual partitioning into size of 3x3 is being done at the slave systems for implementing multiplication based upon Peano curves(PC). PC algorithmic approach provides spatial locality which is a basic requirement for increasing the overall system efficiency.

Index Terms— Peano Curves , RMI, Cache Oblivious, SIMD, Multithreading, Cluster formation

I. INTRODUCTION

Modern Computers have a memory organization in which the registers work at the lowest level possible and then came the different number of caches [1][2] like L1, L2, L3, Primary memory and secondary memory. Although the memory size is increasing as we are moving upward but the accessing time of an element is decreasing. This constraint generates the requirement that the algorithm must be designed so that the accessing of the data must be in a contiguous manner. Also before writing back the data into the memory lower in hierarchy, the concerned data must have been used as much as possible. Although in todays world the microprocessor speed has increased a lot but at the same time the memory access has not increased comparatively. The increase in the expensive cost for accessing the data from hierarchy of memory has provided research work in which the reordering of the various

computations are done to effectively make use of cache [20]memory. The cache conscious (CC) algorithms are those algorithms which are machine dependent. As the working of these algorithms depends upon the cache size[20] of the system. Although the concerned system efficiency can be increased by making use of these algorithms but moving ahead this constraint has to be removed. The CO algorithms are machine independent and work independent of the cache size or cache line's length [1][2]. The number of cycles of computer system for accessing the element increases, as we are moving in a hierarchy upwards. Typically a penalty of about 50 cycles[2][3] can occur if L1, L2 cache miss occur and we have to bring data from the main memory. The large sized matrices are very much prone to cache miss if our algorithm is not taking consideration into the temporal and spatial locality.For the purpose of communication between different systems in the cluster RMI(Remote Method Invocation) [4]is being used which makes use of the Java Remote Method Protocol(JRMP).The working of JRMP is over TCP/IT and with the help of this we can refer to the remote objects.But the constraint that JRMP provide is that we can only refer to the java objects i.e. the working of RMI[20] is technology dependent.RMI has a provision that it can even pass to the firewalls , even if both the master and slave system are behind the firewall.RMI has its own working protocol in which makes use of the number of layers for providing reliable connection to the different systems. The layers included are application, proxy, remote reference , transport layer.RMI[20] has a provision that it can re establish the connection, if a connection is lost during communication. By making use of the rebind (), bind () method the slave systems ensures the *rmiregistry* that they can provide these particular services. The master system can make use of the lookup() method of the DriverManager class in order to start communication with the other system by mentioning the IP address of that particular system.Rmiregistry can be started on any port as per the requirements , if omitted by default it will work on 1099.In the present work matrix multiplication [5] is being implemented on the distributed[12] system using RMI [20] by taking in to consideration also the cache levels .The given algorithmic approach reuses each element as earlier as possible so that number of cache miss [1][2] can be

Virtualization Approach to Cluster Based Winograd's Variant of Strassen's Method using RMI

Sachin Bagga
Department of
Information Technology
Guru Nanak Dev Engineering
College, Ludhiana
sachin8510@gmail.com

Akshay Girdhar
Department of
Information Technology
Guru Nanak Dev Engineering
College, Ludhiana
akshay1975@gmail.com

Rajun Yan
Yuming Senior High School
, Dalian,
Liaoning China
jamaz792@yahoo.com

Zihan Lin
Dalian American
International School
Dalian , China
mkmk96530@yahoo.com

Abstract— **Virtualization helps a lot in handling critical applications in a highly availability manner, stream lining in applications deployment, application migrations etc. It is because of the virtualization that users are able to reduce the extra requirements of hardware , power consumption , trimming the space requirements, air conditioning requirements etc. Server consolidation, disaster recovery, dynamic load balancing, testing and deployment, virtual desktops, improved system reliability all these facilities are being provided by the virtualization techniques. Our given proposal of work uses the same for implementing cluster programming in order to implement Winograd's variant of Strassen's matrix multiplication. An API known as RMI(Remote Method Invocation) is being used with the help of which programmer can create distributed applications so that objects which are residing on the different systems can interact with each other in an efficient manner. The divide and conquer approach of the Winograd's variant method is the main factor which helps us in distributed computing. Partitioning a given matrix into sub matrix is done at the master side and at each slave the logical partitioning into 2*2 matrixes has been done for implementing given algorithm. For the purpose of analysis of the given proposed work various performance metrics like excessive parallel overhead speed up, efficiency, and total execution time are being used.**

Index Terms— **RMI, Winograd Variant, SIMD, Multithreading, Cluster formation**

I. INTRODUCTION

In the virtualization technique a new layer known as virtualization layer is being added between the operating system and the hardware. This virtualization layer helps in concurrent running of the multiple operating system instances on a single machine. Dynamic partitioning, sharing of the physical resources such as I/O devices, NIC (Network Interface Card), Memory(Primary and Secondary)[3], CPU are some of the key facilities that are being provided by the virtualization. Two types of architects hosted or a hypervisor are being used for the virtualization approach. A VMM(Virtual Machine Monitor) has two partition and share the various resources in the hypervisor architecture approach. In order to virtualize the CPU for handling sensitive and privileged instructions three alternative techniques are being used. First one is Full

virtualization [9] which use the Binary Virtualization. Second is Paravirtualization (OS assisted virtualization) Third one is hardware assisted virtualization. Not only the CPU also memory, device and I/O virtualization are also available with which we can create virtual networks between virtual machines using virtual NICs and switches. The virtual devices have the capability to emulate the hardware and then translating the request for virtual machine to the system hardware in the proposed work VMware Workstation has been used. The workstation is desktop software with the help of which we can run number of x86 compatible server and desktop operating systems on a single system with no partitioning requirement of hard drive or rebooting. As a result more time can be efficiently devoted ,towards running demos, testing, deploying, and teaching. Excessive overheads [1] like configuring; procuring can be easily avoided using workstation. Testing new multitier applications, OS patches on a single PC are very easy task now. Client Server based architecture is being used in this research in which the load distributer known as master system has a given task to be performed. It divides this task into number of subtasks and send them to the other virtual systems on a given machine. Use of RMI [7] has been done for creating the given client server application. By the efficient use of the resources using virtualization as it is done in the given work we can avoid lots of e-wastage as results produced using virtualization are better than a non-virtualized environment. For referencing and looking up the remote object RMI makes use of the JRMP(Java Remote Method Protocol) which is a stream based protocol. There is a technology constraint that JRMP can work only with Java i.e only the Java Objects can be referred using JRMP. RMI provides the reliable connection as a request can even pass through the firewall using HTTP POST request. HTTP port 80 with CGI (Common Gateway Interface)RMI makes use of the various layers for providing services these are transport layer, remote reference layer, proxy layer, application layer. A service known as RMI registry provides a bootstrap naming service. Using the bind (), rebind() the objects are binded with the registry. The systems who want to avail this service use the lookup (). Registry keeps on working at the background without any interruption [2], use of *ps* command can be done for getting

Virtualization Approach to Cluster Based Winograd's Variant of Strassen's Method using RMI

Sachin Bagga
Department of
Information Technology
Guru Nanak Dev Engineering
College, Ludhiana
sachin8510@gmail.com

Akshay Girdhar
Department of
Information Technology
Guru Nanak Dev Engineering
College, Ludhiana
akshay1975@gmail.com

Rajun Yan
Yuming Senior High School
Dalian,
Liaoning China
jamaz792@yahoo.com

Zihan Lin
Dalian American
International School
Dalian , China
mkmk96530@yahoo.com

Abstract— **Virtualization helps a lot in handling critical applications in a highly availability manner, stream lining in applications deployment, application migrations etc. It is because of the virtualization that users are able to reduce the extra requirements of hardware , power consumption , trimming the space requirements, air conditioning requirements etc. Server consolidation, disaster recovery, dynamic load balancing, testing and deployment, virtual desktops, improved system reliability all these facilities are being provided by the virtualization techniques. Our given proposal of work uses the same for implementing cluster programming in order to implement Winograd's variant of Strassen's matrix multiplication. An API known as RMI(Remote Method Invocation) is being used with the help of which programmer can create distributed applications so that objects which are residing on the different systems can interact with each other in an efficient manner. The divide and conquer approach of the Winograd's variant method is the main factor which helps us in distributed computing. Partitioning a given matrix into sub matrix is done at the master side and at each slave the logical partitioning into 2*2 matrixes has been done for implementing given algorithm. For the purpose of analysis of the given proposed work various performance metrics like excessive parallel overhead speed up, efficiency, and total execution time are being used.**

Index Terms— **RMI, Winograd Variant, SIMD, Multithreading, Cluster formation**

I. INTRODUCTION

In the virtualization technique a new layer known as virtualization layer is being added between the operating system and the hardware. This virtualization layer helps in concurrent running of the multiple operating system instances on a single machine. Dynamic partitioning, sharing of the physical resources such as I/O devices, NIC (Network Interface Card), Memory(Primary and Secondary)[3], CPU are some of the key facilities that are being provided by the virtualization. Two types of architects being provided by the virtualization. Two types of architects being provided or a hypervisor are being used for the virtualization hosted or a hypervisor are being used for the virtualization approach. A VMM(Virtual Machine Monitor) has two partition and share the various resources in the hypervisor architecture approach. In order to virtualize the CPU for handling sensitive and privileged instructions three alternative techniques are being used. First one is Full

virtualization [9] which use the Binary Virtualization. Second is Paravirtualization (OS assisted virtualization) Third one is hardware assisted virtualization. Not only the CPU also memory, device and I/O virtualization are also available with which we can create virtual networks between virtual machines using virtual NICs and switches. The virtual devices have the capability to emulate the hardware and then translating the request for virtual machine to the system hardware in the proposed work VMware Workstation has been used. The workstation is desktop software with the help of which we can run number of x86 compatible server and desktop operating systems on a single system with no partitioning requirement of hard drive or rebooting. As a result more time can be efficiently devoted ,towards running demos, testing, deploying, and teaching. Excessive overheads [1] like configuring; procuring can be easily avoided using workstation. Testing new multitier applications, OS patches on a single PC are very easy task now. Client Server based architecture is being used in this research in which the load distributer known as master system has a given task to be performed. It divides this task into number of subtasks and send them to the other virtual systems on a given machine. Use of RMI [7] has been done for creating the given client server application. By the efficient use of the resources using virtualization as it is done in the given work we can avoid lots of e-wastage as results produced using virtualization are better than a non-virtualized environment. For referencing and looking up the remote object RMI makes use of the JRMP(Java Remote Method Protocol) which is a stream based protocol. There is a technology constraint that JRMP can work only with Java i.e only the Java Objects can be referred using JRMP. RMI provides the reliable connection as a request can even pass through the firewall using HTTP POST request. HTTP port 80 with CGI (Common Gateway Interface)RMI makes use of the various layers for providing services these are transport layer, remote reference layer, proxy layer, application layer. A service known as RMI registry provides a bootstrap naming service. Using the bind (), rebind() the objects are binded with the registry. The systems who want to avail this service use the lookup (). Registry keeps on working at the background without any interruption [2], use of *ps* command can be done for getting

82

Rank Aggregation Using Multi Objective Genetic Algorithm

Manjeet Kaur*, Parneet Kaur† and Manpreet Singh‡

* CSE Department, ACE and AR, Devsthali, Ambala, Haryana, India manjeetkaur292@gmail.com
†Assistant Professor, CSE Department,ACE and AR, Devsthali, Ambala, Haryana, India,kaur.parneet@gmail.com
‡ Assistant Professor,IT and CSE Department, GNDEC,Ludhiana, Punjab,India, mpreet78@gmail.com

Abstract—Rank Aggregation is needed to combine many different rank orderings on the same set of alternatives, or candidates, in order to obtain a better ordering. The aim of this field is to somehow merge a number of ranked lists in order to build a single superior ranked list. Various methods exist for dealing with the problem of Rank Aggregation problem. In this paper, Rank Aggregation is implemented using Genetic Approach. Multiple objectives have been achieved using genetic approach. So, this approach is called Multi-Objective Genetic Algorithm. The results of the genetic Approach are compared with that of Stuart method and Mean Method. From the experiments, It is concluded that Performance of GA lies between the Sturat and Mean method. In most cases, Stuart method gives better results than GA and GA gives better results than Mean method.

Keywords: Rank Aggregation, GA, Stuart, Mean

I. INTRODUCTION

Today Internet is increasingly becoming an important part of our daily life. Now the web is used not only to find information on particular topics but to carry out different tasks. As the users are getting more sophisticated, their queries are becoming more challenging for the web search engines. When user enters a query, the search engine returns a set of results containing thousands of links to different websites, but it is impossible for the user to go over all of them and thus, the user opens only few of them to find the answers to his query. The rest are just useless for the user. So, the search engines must provide the best results at the top so that the user can get the answers to his query within those top results. Every search engine uses some criteria to rank the pages according to their importance with respect to the users query. It is well known that the Search engines have a very low overlapping in terms of data coverage. So, the users will get a different ranked list from different search engines for the same query. Now, there arises the need for rank aggregation to find the best ranked list.

A. Rank Aggregation

Rank Aggregation is a method that is used to combine many different rank orderings on the same set of candidates, or alternatives, in order to get a better rank ordering basically used in the field of voting [11,13]. The aim of Rank Aggregation is to somehow merge a number of ranked lists in order to build a single superior ranked list. The concept of Rank Aggregation is mainly required in the situations where the task of ranking a list of several alternatives based on one or more criteria is encountered. In such situations, one of the goals of Rank Aggregation is to identify the best alternative. Rank aggregation is needed to provide the users with the best search results for their queries by combining the ranked lists of different search engines because the web users totally depends on the top list of results provided by the search engines. A number of meta search engines are used now a day which are based on the idea of Rank Aggregation Technique. A Meta search engine fetches the top results related to a query from the databases of different search engines and hence provides the users with the result combined from different search engines.

B. Rank Aggregation as an Optimization Problem

The problem of Rank Aggregation is concerned with finding a consensus ranking list that represents and reflects the combined rankings of many different search engines and will be as close as possible to all the individual ranked lists simultaneously [1]. Finding such a consensus list of rankings is an NP-Hard problem because it cannot be said that the obtained aggregated list is the best list. The aggregated list will be the optimized list at that time. For solving the NP-Hard problems, optimization techniques are used. So, Optimization techniques can also be used for solving the Rank aggregation problem [1, 3]. Genetic algorithm approach is one of the optimization techniques that play an important role for solving NP-Hard problems. In this paper, Genetic Algorithm approach is used for implementing Rank Aggregation problem. This approach is routinely used to generate useful solutions to optimization and search problems.

II. RELATED STUDY

Lot of research has been going on in this field in order to provide user with a genuine, filtered and relevant list as per the query. Some of the major contributions done in this field are given below. The paper [3] proposed the work of combining ranking results from different sources. They developed a set of techniques for rank aggregation and compare their performance to that of other well-known methods. Their aim was to design a rank aggregation technique that can result in the reduction of spam, a very serious problem in web searches. They studied the rank aggregation problem in the context of the web. In paper [7] described a polynomial time algorithm to compute the footrule optimal aggregation for full lists. They applied the parallel genetic algorithm for the rank aggregation. Two approaches can be used for this. In the first approach, each

Review of Recent Load Balancing Techniques in Cloud Computing and BAT Algorithm Variants

Sinha Sheikh Abdhullah
Lovely Professional University
Punjab, INDIA
Email ID: jinthaabdhullah@outlook.com

Kiran Jyoti
Guru Nanak Dev Engineering College
Punjab, INDIA
Email ID: kiranjyotibains@yahoo.com

Shabnam Sharma
Lovely Professional University
Punjab, INDIA
Email ID: shabnam09sharma@hotmail.com

U.S. Pandey
School of Open Learning
Delhi University, Delhi, INDIA
Email ID: uspandey1@gmail.com

Abstract – Along with the advancement in the field of IT and Cloud Computing, load balancing has become the most promising research area. Under-utilization and Over-utilization of resources is the major concern, in cloud computing environment. The main goal of this research is to study various load balancing algorithms that are in use, now a days. Nature inspired algorithms are applicable in every aspect of technology. In this work, the review of a meta-heuristic technique, namely, BAT Algorithm is carried out. The comparison of all the load balancing techniques and BAT algorithm techniques are described in this paper.

Keywords – Bat Algorithm;Cloud Computing; Load Balancing;

I. INTRODUCTION

Cloud is a storage mechanism in which one can store, process data on demand. Cloud based on service oriented architecture is known as service oriented cloud computing architecture. It is completely internet based demand service that allows users for the shared resources, software applications and any other kind of information. It is also a large pool or an illusion of infinite and easily usable virtualized resources such as hardware, development platform or services, which are exploited by pay-per-usage model. This model enables on-demand network access into the cloud for the resources. In this model the guarantees are offered by the service provider via Service Level Agreement. It is also sometimes called parallel field to distributed computing over the network. Cloud computing offers an advanced featured for resource sharing to achieve scale economies over the large scale of networked systems. The major goal of cloud computing is to grant users to use all the technologies without guidance of any certain expert or a supervisor. Load Balancing is used to distribute load to multiple virtual machines, optimize the resources utilization,

minimize the response time and avoid the overflow on any virtual machine. Load balancing approach is used to distribute load dynamically among the all the nodes in the cloud. Load balancing avoids the occurrence of such a situation where some virtual machines are heavily loaded or in ideal situation. It helps to achieve resource utilization and improving overall system performance. It also grantee resources distributed fairly. When any virtual machine fails, load balancer offers fair-over load to each virtual machine.

II. SERVICES OFFERED IN CLOUD COMPUTING

Based on the abstraction level of the capabilities provided, the services provided are Infrastructure as a service, Platform as a service, and Software as a service. These services are accessed and managed through Virtual Infrastructure Manager, Cloud Development Environment and Web Browser respectively. Based on deployment of cloud, the cloud can be classified as Public, Private and Hybrid.

III. RELATED WORK OF LOAD BALANCING TECHNIQUES

In this research work, various load balancing techniques are reviewed, including: Fuzzy Logic based Load balancing technique, Fuzzy and Glow-swarm optimization based load balancing technique, ant colony based load balancing and hybrid approaches to achieve optimization in load balancing in cloud computing environment. In [18], author has described the basics of cloud computing and authentication technique applied for security purposes. In the below given table, reviewed techniques are compared and advantages and disadvantages of each technique, along with the methodology is given.

TABLE I.   COMPARISON OF LOAD BALANCING TECHNIQUES:

Load Balance Technique	Methodology	Advantage	Dis Advantage
ACO Based Load Balancing	This proposal based on the	After a every search the ants	Time delay occurred, every

Review of Recent Load Balancing Techniques in Cloud Computing and BAT Algorithm Variants

Sinha Sheikh Abdhullah
Lovely Professional University
Punjab, INDIA
Email ID: jinthaabdhullah@outlook.com

Kiran Jyoti
Guru Nanak Dev Engineering College
Punjab, INDIA
Email ID: kiranjyotibains@yahoo.com

Shabnam Sharma
Lovely Professional University
Punjab, INDIA
Email ID: shabnam09sharma@hotmail.com

U.S. Pandey
School of Open Learning
Delhi University, Delhi, INDIA
Email ID: uspandey1@gmail.com

Abstract – Along with the advancement in the field of IT and Cloud Computing, load balancing has become the most promising research area. Under-utilization and Over-utilization of resources is the major concern, in cloud computing environment. The main goal of this research is to study various load balancing algorithms that are in use, now a days. Nature inspired algorithms are applicable in every aspect of technology. In this work, the review of a meta-heuristic technique, namely, BAT Algorithm is carried out. The comparison of all the load balancing techniques and BAT algorithm techniques are described in this paper.

Keywords – Bat Algorithm; Cloud Computing; Load Balancing;

I. INTRODUCTION

Cloud is a storage mechanism in which one can store, process data on demand. Cloud based on service oriented architecture is known as service oriented cloud computing architecture. It is completely internet based demand service that allows users for the shared resources, software applications and any other kind of information. It is also a large pool or an illusion of infinite and easily usable virtualized resources such as hardware, development platform or services, which are exploited by pay-per-usage model. This model enables on-demand network access into the cloud for the resources. In this model the guarantees are offered by the service provider via Service Level Agreement. It is also sometimes called parallel field to distributed computing over the network. Cloud computing offers an advanced featured for resource sharing to achieve scale economies over the large scale of networked systems. The major goal of cloud computing is to grant users to use all the technologies without guidance of any certain expert or a supervisor. Load Balancing is used to distribute load to multiple virtual machines, optimize the resources utilization,

minimize the response time and avoid the overflow on any virtual machine. Load balancing approach is used to distribute load dynamically among the all the nodes in the cloud. Load balancing avoids the occurrence of such a situation where some virtual machines are heavily loaded or in ideal situation. It helps to achieve resource utilization and improving overall system performance. It also grantee resources distributed fairly. When any virtual machine fails, load balancer offers fair-over load to each virtual machine.

II. SERVICES OFFERED IN CLOUD COMPUTING

Based on the abstraction level of the capabilities provided, the services provided are Infrastructure as a service, Platform as a service, and Software as a service. These services are accessed and managed through Virtual Infrastructure Manager, Cloud Development Environment and Web Browser respectively. Based on deployment of cloud, the cloud can be classified as Public, Private and Hybrid.

III. RELATED WORK OF LOAD BALANCING TECHNIQUES

In this research work, various load balancing techniques are reviewed, including: Fuzzy Logic based Load balancing technique, Fuzzy and Glow-swarm optimization based load balancing technique, ant colony based load balancing and hybrid approaches to achieve optimization in load balancing in cloud computing environment. In [18], author has described the basics of cloud computing and authentication technique applied for security purposes. In the below given table, reviewed techniques are compared and advantages and disadvantages of each technique, along with the methodology is given.

TABLE I.   COMPARISON OF LOAD BALANCING TECHNIQUES:

Load Balance Technique	Methodology	Advantage	Dis Advantage
ACO Based Load Balancing	This proposal based on the	After a every search the ants	Time delay occurred, every

2428

26

Research & Analysis of Advancements In BAT Algorithm

Shabnam Sharma
Lovely Professional University
Phagwara, India
shabnam09sharma@hotmail.com

Ashish Kr. Luhach
Lovely Professional University
Phagwara, India
ashishluhach@acm.org

Kiran Jyoti
Guru Nanak Dev Engineering College
Ludhiana, India
kiranjyotibains@yahoo.com

Abstract – Optimization is defined as finding the alternate solutions to a problem, under the given constraints. Maximizing the performance level is one of the objectives of optimization, which can be achieved by satisfying desirable factors and minimizing the undesirable ones. When a problem cannot be solved in polynomial time or consumes long time to solve, then alternative solutions of the problem will be explored and near optimal solution is accepted. To tackle these types of problems, one of the three approaches are used: Heuristics, Meta-Heuristics and Hyper-Heuristics. BAT algorithm is one of the meta-heuristic algorithms, which optimizes the solution using echolocation and applicable in solving various combinatorial problems. In this research work, analysis of various BAT variants is done and further research areas are explored, in the field of meta-heuristic approaches.

Keywords – BAT Algorithm, Exploration, Exploitation, Heuristic, Meta-Heuristic

NOMENCLATURE

ABO: Artificial Bear Optimization
ABC: Artificial Bee Colony
ACO: Ant Colony Optimization
BA: BAT Algorithm
BSO: BAT Swarm Optimization
PSO: Particle Swarm Optimization
RLF: Recursive Largest First

I. INTRODUCTION

Heuristics provide faster convergence rate, but may stuck in local optima. To implement heuristic approach, one must have domain specific knowledge. Unlike heuristics, Meta-Heuristic approaches do not require domain knowledge, so can be used to solve all type of problems. Its convergence rate is slower than heuristic approach but will not get stuck in local optimal solution. Hyper-Heuristics suggests in which sequence Meta-heuristics approaches should be used to solve the problem. Meta-Heuristic approaches are classified into various categories, based on the origin of the algorithms (namely Nature-Inspired and Non-Nature Inspired algorithms), whether algorithm work on a single solution or on multiple, at the same time (namely Population Based and Single Solution Search), based on modification of objective function during the search process (namely Static and Dynamic Objective Function), based on usage of memory (namely Memory based and Memory less)[6].

Various meta-heuristic algorithms are proposed, modified and the enhanced versions are used in combination with other heuristic and meta-heuristic techniques, to solve the optimization problems in better way. This work mainly focuses on the advancements that are introduced in one of the population based meta-heuristic approach, namely Bat algorithm.

II. RELATED WORK

In all the variants of Bat Algorithm, motive of the researcher is to either increase the convergence rate or to avoid being trapped in local optima or the initialization of parameters, to improve the performance of algorithm. In [19], based on natural behavior of real bat, feature selection technique is proposed. Binary Bat Algorithm, based on sigmoid function, used to maximize the accuracy of algorithm, feature selection technique is used along with echolocation behavior of bat. The motive of the research in [1], is to find the best system configuration while minimizing the loss rate. In order to achieve this objective, there is a need to select proper state of switches. Here, optimal selection of state of switches is accomplished using Bat Algorithm. In this [30], author has proposed meta-heuristic approach, based on the echolocation behavior of bats, with few assumptions. Time- Delay estimation, directional echolocation, convergence rate improvement and identification of object using bat behavior are the research areas that yet to be explored. Balance between different search capabilities, dispersion of solutions and more focus on exploitation are the three advancements introduced. In this work [25], author has used the concept of only two bats to achieve the optimal solution. These bats exchange their responsibilities of exploration and exploitation from time to time. 'Movement direction of bat is considered here. In the

Performance Analysis of Secure Localization Techniques in Wireless Sensor Network

Deepak Prashar[1,2]
Lovely Professional University
I.K.G Punjab Tech University
Jalandhar, Punjab
deepak.prashar@lpu.co.in

Dr. Dilip Kumar
SLIET
Punjab
dilip.k78@gmail.com

Dr.Kiran Jyoti
GNDEC
Punjab
kiranjyotibains@yahoo.com

ABSTRACT

Wireless Sensor Networks (WSNs) has now become one of the important area of research in present time. A WSN is developed by deploying sensor nodes in adhoc manner. Sensors that are deploy in various tough, crucial and in remote areas are most of the times remain unattended .So security of these nodes become the main challenge once the network is deployed. This makes the secure localization as the main objective and challenge in wireless sensor network. This research paper presents the analysis of various localization techniques with simulation results. Analysis has been done under various parameters like time and localization error under different scenarios and results are evaluated on their basis.

Keywords

ADLA, HirLoc, RSS, RAL, SerLoc, TDOA, TOA.

1. INTRODUCTION

Wireless Sensor Networks (WSNs) is one of the important areas of research in the present scenario. A WSN is formed by deploying sensor nodes in adhoc manner. Most of the time nodes remain unattended once they are deployed in the remote environment which makes the security of these nodes challenging and troublesome. Some of the characteristics of sensor networks are their small size, low energy consumption, less storage requirement and limited processing power. All these characteristics make the sensor network one of the interesting areas for research.

WSN has unlimited applications in day to day activities ranging from [1] fire detection, health monitoring to object tracking in military operations etc. But in all these applications, one thing is common and important i.e., the very location of sensor nodes. This makes the localization of nodes as a major factor for proper functionality of the

networks.

Localization of nodes is one of the major challenges in WSN because if the location is not known or does not compute correctly, the information transferred via nodes will have no value. Location information is very important as the devices need to know where they are in the present environment. Besides, the security of the nodes is also very important because reliability of nodes information is totally based on its authenticity. So there is a high requirement to find the various location estimation methods with the considerations of security aspects [2] along with it. Secure localization methods must stop the sensor nodes to provide false information if there are malicious nodes present in same environment.

WSNs are comprised mainly of two components, sensor nodes and the base station. The chief factors that affect the design and performance of wireless networks are localization, deployment, clustering, coverage, QoS, security and energy efficiency etc. This research focus will be on localization of nodes integrated with security which is one of the essential factors. So there is a need to understand the localization process along with the techniques which are used in the localization process

2. LOCALIZATION PROCESS

Localization [3] is the path of finding the locations of the sensor nodes deployed in a particular environment. Hence the technique of location computation is called localization. Localization process basically is divided in two phases.

1. Ranging Phase   2. Localization Phase

In the Ranging phase, distance or angle is to be measured between the known points and objects whose positions are to be located. In the Localization phase, all measurements are combined to find the exact location of the object. Following are the brief descriptions of important phases and techniques with their functionality.

Ranging phase includes the following techniques:

Received Signal Strength Indicator (RSSI). This approach is based on the calculating strength of received signal at receiver's end. It depends on the basic

Performance Analysis of Secure Localization Techniques in Wireless Sensor Network

Deepak Prashar[1,2]
Lovely Professional University
I.K.G Punjab Tech University
Jalandhar, Punjab
deepak.prashar@lpu.co.in

Dr. Dilip Kumar
SLIET
Punjab
dilip.k78@gmail.com

Dr.Kiran Jyoti
GNDEC
Punjab
kiranjyotibains@yahoo.com

ABSTRACT

Wireless Sensor Networks (WSNs) has now become one of the important area of research in present time. A WSN is developed by deploying sensor nodes in adhoc manner. Sensors that are deploy in various tough, crucial and in remote areas are most of the times remain unattended .So security of these nodes become the main challenge once the network is deployed. This makes the secure localization as the main objective and challenge in wireless sensor network. This research paper presents the analysis of various localization techniques with simulation results. Analysis has been done under various parameters like time and localization error under different scenarios and results are evaluated on their basis.

Keywords

ADLA, HirLoc, RSS, RAL, SerLoc, TDOA, TOA.

1. INTRODUCTION

Wireless Sensor Networks (WSNs) is one of the important areas of research in the present scenario. A WSN is formed by deploying sensor nodes in adhoc manner. Most of the time nodes remain unattended once they are deployed in the remote environment which makes the security of these nodes challenging and troublesome. Some of the characteristics of sensor networks are their small size, low energy consumption, less storage requirement and limited processing power. All these characteristics make the sensor network one of the interesting areas for research.

WSN has unlimited applications in day to day activities ranging from [1] fire detection, health monitoring to object tracking in military operations etc. But in all these applications, one thing is common and important i.e., the very location of sensor nodes. This makes the localization of nodes as a major factor for proper functionality of the

networks.

Localization of nodes is one of the major challenges in WSN because if the location is not known or does not compute correctly, the information transferred via nodes will have no value. Location information is very important as the devices need to know where they are in the present environment. Besides, the security of the nodes is also very important because reliability of nodes information is totally based on its authenticity. So there is a high requirement to find the various location estimation methods with the considerations of security aspects [2] along with it. Secure localization methods must stop the sensor nodes to provide false information if there are malicious nodes present in same environment.

WSNs are comprised mainly of two components, sensor nodes and the base station. The chief factors that affect the design and performance of wireless networks are localization, deployment, clustering, coverage, QoS, security and energy efficiency etc. This research focus will be on localization of nodes integrated with security which is one of the essential factors. So there is a need to understand the localization process along with the techniques which are used in the localization process

2. LOCALIZATION PROCESS

Localization [3] is the path of finding the locations of the sensor nodes deployed in a particular environment. Hence the technique of location computation is called localization. Localization process basically is divided in two phases.

1. Ranging Phase   2 . Localization Phase

In the Ranging phase, distance or angle is to be measured between the known points and objects whose positions are to be located. In the Localization phase, all measurements are combined to find the exact location of the object. Following are the brief descriptions of important phases and techniques with their functionality.

Ranging phase includes the following techniques:

Received Signal Strength Indicator (RSSI). This approach is based on the calculating strength of received signal at receiver's end. It depends on the basic

59. Ashima, Richa Singhal

Infosys®

POWERED BY INTELLECT
DRIVEN BY VALUES

HRD/FINALSEMTRG/16/10781218

Ashima ,

Guru Nanak Dev Engineering College

Dear Ashima,   December 23, 2015

This is in reference to the Program (as defined in the Training Agreement) as per the Training Agreement signed on **21 Jan 2016** between you ("**Trainee**" hereafter) and Infosys Limited("**Infosys**" hereafter), a corporation organised and existing under the laws of India and having its primary place of business at Electronics City, Hosur Road, Bangalore 560 100, India. The details of the Program are as follows:

1. Program Date   :   **January 25, 2016**
2. Duration of the program   :   **16 Weeks**
3. Location   :   **Mysore, India**

Please note that you will be required to make your own arrangements for travel to Mysore (or any other Infosys location that may be communicated to you by designated Infosys personnel) and back to your university upon completion of the Program. Additionally, should you be required to travel between the Infosys offices located in different cities as part of your project, Infosys shall bear the cost of such travel. Your entitlements shall be communicated to you at that time.

A break-up of the benefits that you are eligible for is mentioned below:

Accommodation	**Provided by the Company at no charge for the entire duration of the Program**
Stipend	**Rs.10,000/- per month**

You would also be covered under the Personal Accident Insurance and Hospitalization Insurance of Infosys for the duration of your Program. If you require additional coverage, you would need to obtain this in your personal capacity.

If you are required to use the bus, library and fitness facilities (if any), you shall be provided access during the period of your Program in accordance with Infosys policies.

For the duration of the Program, you will be required to adhere to certain policies / practices that are applicable to employees of Infosys, including but not limited to the Trainee's obligations as per the Training Agreement. Additionally, you may be required to sign agreements with Infosys, at the sole discretion of Infosys, relating to protection of Infosys confidential and proprietary information. Infosys disclaims all liability and responsibility for acts or omissions by you that are in violation of any law, guideline, rule or regulation.

Digitally signed by LOBO RICHARD
Date: 2015.12.23 14;31;42 +05:30
Reason: Training Offer Letter
Location: Bangalore

Infosys®

POWERED BY INTELLECT
DRIVEN BY VALUES

HRD/FINALSEMTRG/16/10780973

Richa Singal

Guru Nanak Dev Engineering College

Dear Richa,   December 23, 2015

This is in reference to the Program (as defined in the Training Agreement) as per the Training Agreement signed on _24th Jan 2016._ between you ("Trainee" hereafter) and Infosys Limited("**Infosys**" hereafter), a corporation organised and existing under the laws of India and having its primary place of business at Electronics City, Hosur Road, Bangalore 560 100, India. The details of the Program are as follows:

1. Program Date   :   **January 25, 2016**
2. Duration of the program   :   **16 Weeks**
3. Location   :   **Mysore, India**

Please note that you will be required to make your own arrangements for travel to Mysore (or any other Infosys location that may be communicated to you by designated Infosys personnel) and back to your university upon completion of the Program. Additionally, should you be required to travel between the Infosys offices located in different cities as part of your project, Infosys shall bear the cost of such travel. Your entitlements shall be communicated to you at that time.

A break-up of the benefits that you are eligible for is mentioned below:

Accommodation	**Provided by the Company at no charge for the entire duration of the Program**
Stipend	**Rs.10,000/- per month**

You would also be covered under the Personal Accident Insurance and Hospitalization Insurance of Infosys for the duration of your Program. If you require additional coverage, you would need to obtain this in your personal capacity.

If you are required to use the bus, library and fitness facilities (if any), you shall be provided access during th period of your Program in accordance with Infosys policies.

For the duration of the Program, you will be required to adhere to certain policies / practices that ar applicable to employees of Infosys, including but not limited to the Trainee's obligations as per the Trainin Agreement. Additionally, you may be required to sign agreements with Infosys, at the sole discretion o Infosys, relating to protection of Infosys confidential and proprietary information. Infosys disclaims all liability and responsibility for acts or omissions by you that are in violation of any law, guideline, rule or regulation.

Digitally signed by LOBO RICHARD
Date: 2015.12.23 14:31:35 +05:30
Reason: Training Offer Letter
Location: Bangalore

60. Tarunveer Singh

IT - 12609091244028

d infogain

Ref. No: GDC/HR/OFFER/16/211   Date: 4th April 2016

Tarunveer Singh
67-D, Kitchlu Nagar
Ludhiana

Dear Tarunveer ,

A Silicon-Valley headquartered company, Infogain is a global business oriented IT consulting provider of front-end, customer-facing technologies, processes and applications, leading to a more efficient and streamlined customer experience. We want our clients' interactions with their customers to be fast, efficient, and cost effective. With close to 4,000 employees in the United State, India, the Middle East, the UK, Singapore and Malaysia, we service 5 of the world's largest 50 companies, and 24 of the Fortune 500.

- We extend you an offer to join Infogain as "**Software Engineer Trainee".**
- You will be on training for a period of Nine (9) months. However in the event Company feels that your performance after nine month's training is unsatisfactory, then this training period shall be increased at the sole discretion of the Company. On completion of every two (2) months, your performance will be evaluated and based on your performance your training period will be continued. The Company shall impart extensive classroom and on the job training to you during the said period of training and/or extended period in state of the art and cutting edge latest technologies, which the Company has developed and/or developing since last more than one and a half decades to make you updated in all the fields at a very high cost to the Company.
- Till such time that you are intimated in writing, you shall continue to be on training.
- Your absorption at Infogain is after meeting our stringent performance standards and will be further based on Company's business needs and as such accepting you as a trainee is in no way a commitment that you would be offered an employment with Infogain.
- During training, you would be paid a monthly stipend of **Rs, 15,100/- (Rupees Fifteen Thousand one hundred).**
- Your appointment will be subject to your successful completion of your BE/B.Tech/MCA/M.Sc/M.Tech degree. This offer will stand automatically withdrawn if your final aggregate percentage in BE/B.Tech/MCA/M.Sc/M.Tech is less than the current aggregate. Upon successful completion of the training period, you shall be appointed as Software Engineer on an Annual gross salary of **Rs. 3, 50, 000/- (Rupees Three Lakhs Fifty Thousand) to Rs. 4,00,000/- (Rupees four lakhs) depending upon your performance during the training period.** In addition, you would be entitled for benefits like Mediclaim /Accidental Insurance coverage and food subsidy as per Company Policy.
- You agree that by offering you a possible employment opportunity as Software Engineer Trainee and subsequent conformation, you will be required to serve the Company for a minimum period of 24 months after your confirmation as Software Engineer. You shall be required to sign necessary agreements with the Company and complete various formalities, in order to secure the interests of the Company and also your performance and adherence to the all terms, conditions, rules and regulation of the Company, at the time of joining the Company as Software Engineer trainee.
- You shall be required to submit a bank guarantee of Rs. 1, 00,000/- (Rs. One Lakh), issued by any scheduled bank, as security, at the time of joining the Company, securing that you will work with the Company for a period of 24 months after the completion of your training. The initial term of the bank guarantee shall be for 33 months. The draft of bank guarantee shall be supplied by the Company.
- The Company will expect you to work with a high standard of initiative, efficiency and economy. However, during the training period, Company reserves the right to terminate the traineeship any time, if your performance not found satisfactory or for misconduct, without compensation or notice.
- In the event of your leaving the services, you will have to give 60 days' notice during training and upon confirmation 90 days' notice period for winding up the assignments/tasks, you were handling. However, the Company may relieve you before the completion of stipulated time period.
- On your joining day, you are required to submit the documents for our records, as mentioned in the list enclosed.
- Your initial place of posting will be at A-16, Sector 60, NOIDA 201 301.
- You are requested to report for your duties on **6th July 2016.**

As we welcome you to "Infogain", we are confident that you will strive to contribute to your potential and add value through your roles and strengthen the spirit of Infogain- "The Customer Knowledge Company".

61. Charu Shikha, Prince, Daljeet Kaur, Babita Rattan, Virpal Kaur, Amrinder Pal Singh, Tanya Dhand, Swaraj Prince

CMC Limited

Your IT Partner

C-11, Community Centre
Janakpuri,
New Delhi 110058
Telefax : 91 11 2562 4211

05 February 2015

The Training & Placement Incharge
Guru Nanak Dev Engineering College, Ludhiana

<u>**Sub: Confirmation for Industrial Training**</u>

Dear Sir/Madam,

This is to inform you that **Ms. Tanya Dhand**, a **B.Tech** student of your Institute, has registered for Industrial Training with CMC Limited.

The referred student is undergoing a project training in **JAVA** technology from 03 January 2015.

This is for your information & records.

Thanking You,

Yours truly,

Manager
Education & Training

116068
I.T.

CMC

A C A D E M Y
CREATING GLOBAL PROFESSIONALS
(A **TATA** Enterprise)

March 16th, 2015

To,
The TPO
Guru Nanak Dev Engineering College
Ludhiana, Punjab.

<u>**Sub: Confirmation for Industrial Training**</u>

Dear Sir/Madam
With reference to the above I would like to state that **Mr.Swaraj Prince B.Tech(IT)** has joined 6 Months Industrial Training with CMC Limited.

At the end of the training student is expected to submit a well documented Project Report to CMC Limited.

The above is for your reference.

Thanking you.

Shumaila Anees
(Centre Manager)
CMC LTD Noida(A TCS Subsidiary)
D-108 Sec:2 Noida:201301
9266625607

CMC Limited

CMC

A TATA Enterprise

To,
The TPO   Nov 8th 2014
Guru Nanak Dev Engineering College
Ludhiana

Sub : Confirmation for Industrial Training

Dear Sir/Madam,

With reference to the above I would like to state that Ms. Charu Shikha B.Tech(IT) has joined 6 Months Industrial Training in Android (Jan 2015 to June 2015) with CMC Limited.

At the end of the training student is expected to submit a well documented Project Report to CMC Limited.

The above is for your reference.

Thanking you.

P/z consider for submission

8/4/15

Shumaila Anees
(Centre Manager)
CMC Noida(A TCS Subsidiary)
D-108 Sec:2 Noida:201301
9266625607

CONFIRMATION LETTER

Dear Prince,

With reference to interview we are pleased to inform you that you have been selected for the position of Android Trainee .The training period will be up to 6 MONTHS

Your training will be commencing from January to June, 2015. During training you will be provided writing accessories and personal system as per requirement.
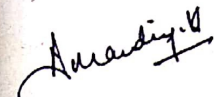
TERMS AND CONDITIONS

1. The management shall have authority to terminate all agreements with you in case of nonperformance, insubordination, indiscipline, dishonesty and negligence of training.
2. 100% attendance is mandatory if it will found less than 75% then college will be informed about it. We don't entertain verbal communication so candidate is supposed to write an application for any leave or changes.

Acceptance

I hereby accept the terms and conditions mentioned above in the offer letter.

Date: 12/01/2015

CMC Academy Mohali

Student Signature

CMC
A C A D E M Y
CREATING GLOBAL PROFESSIONALS
An Initiative of CMC Limited

A **TATA** Enterprise

CONFIRMATION LETTER

Dear Daljeet Kaur,

With reference to interview we are pleased to inform you that you have been selected for the position of Trainee. The training period will be up to 6 MONTHS

Your training will be commencing from December-January, 2015. During training you will be provided writing accessories and personal system as per requirement.

TERMS AND CONDITIONS

1. The management shall have authority to terminate all agreements with you in case of nonperformance, insubordination, indiscipline, dishonesty and negligence of training.
2. 100% attendance is mandatory if it will found less than 75% then college will be informed about it. We don't entertain verbal communication so candidate is supposed to write an application for any leave or changes.

Acceptance

I hereby accept the terms and conditions mentioned above in the offer letter.

Date: 20/11/2014

CMC Academy Mohali

Student Signature

CMC
Authorised Training Centre
C-127, Phase-8, Industrial Area, Mohali – 160 070 Punjab
Tel: 0172-4020323 / 4051218 Mobile: +91-9872401560
Email: cmcmohali1@gmail.com

CMC Limited

A TATA Enterprise

Nov 8th 2014

To,
The TPO
Guru Nanak Dev Engineering College
Ludhiana

Sub : Confirmation for Industrial Training

Dear Sir/Madam,

With reference to the above I would like to state that Ms. Babita Rattan Bharg B.Tech(IT) has joined 6 Months Industrial Training (Jan 2015 to June 2015) with CMC Limited.

At the end of the training student is expected to submit a well documented Project Report to CMC Limited.

The above is for your reference.

Thanking you.

Shumaila Anees
(Centre Manager)
CMC Noida(A TCS Subsidiary)
D-108 Sec:2 Noida:201301
9266625607

CMC
A C A D E M Y
CREATING GLOBAL PROFESSIONALS
An Initiative of CMC Limited

A **TATA** Enterprise

CONFIRMATION LETTER

Dear Virpal Kaur,

With reference to interview we are pleased to inform you that you have been selected for the position of Trainee in Android. The training period will be up to 6 MONTHS

Your training will be commencing from December-January, 2015. During training you will be provided writing accessories and personal system as per requirement.
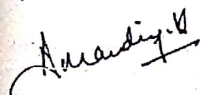
TERMS AND CONDITIONS

1. The management shall have authority to terminate all agreements with you in case of nonperformance, insubordination, indiscipline, dishonesty and negligence of training.
2. 100% attendance is mandatory if it will found less than 75% then college will be informed about it. We don't entertain verbal communication so candidate is supposed to write an application for any leave or changes.

Acceptance

I hereby accept the terms and conditions mentioned above in the offer letter.

Date: 26/12/2014

CMC Academy Mohali

Student Signature

CMC
Authorised Training Centre
C-127, Phase-8, Industrial Area, Mohali – 160 070 Punjab
Tel: 0172-4020323 / 4051218 Mobile: +91-9872401560
Email: cmcmohali1@gmail.com

CMC
ACADEMY
CREATING GLOBAL PROFESSIONALS
An Initiative of CMC Limited

A **TATA** Enterprise

<u>**CONFIRMATION LETTER**</u>

Dear Amrinder Pal Singh,

With reference to interview we are pleased to inform you that you have been selected for the position of Android TraineeThe training period will be up to 6 MONTHS

Your training will be commencing from January to June, 2015. During training you will be provided writing accessories and personal system as per requirement.

TERMS AND CONDITIONS

1. The management shall have authority to terminate all agreements with you in case of nonperformance, insubordination, indiscipline, dishonesty and negligence of training.
2. 100% attendance is mandatory if it will found less than 75% then college will be informed about it. We don't entertain verbal communication so candidate is supposed to write an application for any leave or changes.

Acceptance

I hereby accept the terms and conditions mentioned above in the offer letter.

Date: 12/01/2015

CMC Academy Mohali

Amrinder Pal Singh
Student Signature

CMC
Authorised Training Centre
C-127, Phase-8, Industrial Area, Mohali – 160 070 Punjab
Tel: 0172-4020323 / 4051218 Mobile: +91-9872401560
Email: cmcmohali1@gmail.com

62. Prabhleen Kaur

GURU NANAK DEV ENGINEERING COLLEGE, LUDHIANA
(TRAINING AND PLACEMENT CELL)
PUNJAB GOVERNMENT AIDED STATUS
An Autonomous college under UGC Act- 1956 [2(f) and 12(B)] - NBA Accredited
(http://www.gndec.ac.in)

Ref.No. PTP/20 14 / 02   Dated: 19/11/2014

To
HR MANAGER G.S. AUTO

SUBJECT: REQUEST FOR INDUSTRIAL TRAINING OF B.TECH 7th/8th SEMESTER STUDENTS

Sir,

Greetings from GNDEC, Ludhiana.

Guru Nanak Dev Engineering College has emerged as one of the most prestigious engineering institute of North India over the 55 years of its inception and is conducting B.Tech. in seven disciplines as well as M.Tech., MBA and PhD. for meeting the research requirement of technical field.

Since practical training is equal in importance to theoretical foundation, the course curriculum is so designed that the students get exposure to practical aspects of their respective engineering branch. We are in a process of enrolling the final year students of our institute for various Industrial Organisations for INDUSTRIAL TRAINING (ATLEAST 12 WEEKS) which is an essential component of their four year B.Tech programme.

The programme will be as under:

- To get familiar with the setup and working of the organisation.
- Preparation and submission of synopsis.
- Working on the given project- provided by the company.
- Submission of Mid Term and Final Report.
- Submission of Daily Diary at the end of training maintained & checked by the company representative.

We recommend our graduating student Mr./Ms. PRABHLEEN KAUR   Roll no.
1144725   of B.Tech (Branch) IT   Email id prabh.kaur678@gmail. Phone no.
9814130612   to undergo industrial training in your esteemed organization starting from

(* Exact date of joining may be intimated at a later stage. An early and favourable response will be highly appreciated.)
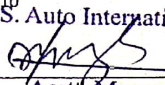
We would highly appreciate if the student can be accommodated for the training programme. Our students are sincere and hard working and we are sure that they will put in their best efforts during the training program. Looking for the confirmation from your side.

Yours Sincerely

Dr. K.S Mann
Dean (Training & Placement)

Allowed for Trg.

For G.S. Auto International Ltd.

Asstt. Manager- P&A.

Ref. No. TCC/547   Dated 21.01.2015

To
Training & Placement Officer.
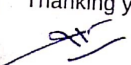Guru Nanak Dev Engineering College,
Ludhiana

Sub.: Confirmation of Six Month Training

Sir,

This is to confirm the following students of Guru Nanak Dev Engineering College, Ludhiana have been enrolled for Six Month Training.

Sr. No.	Name of Students	Branch	College Roll No.
1	Hitesh Sofat, Guru Nanak Dev Engineering College, Ludhiana	IT	116117
2	Piyush Kapoor S/o Sh.Rakesh Kapoor Guru Nanak Dev Engineering College Ludhiana	IT	116069
3	Manmeet Singh S/o S. Mohanbir Singh Guru Nanak Dev Engineering College Ludhiana	IT	116100
4	Ramandeep Singh S/o Sh. Ravinder Singh, Guru Nanak Dev Engineering College, Ludhiana	IT	116091
5	Mr. Sukhdeep Singh, S/o. S. Jaspal Singh, Guru Nanak Dev Engineering College Ludhiana	CSE	115301
6	Ms. Seem Barda D/o Sh. Sham Lal, Guru Nanak Dev Engineeing College, Ludhiana	CSE	115099
7	Mr. Rajandeep Singh S/o S. Harinder Singh, Guru Nanak Dev Engineeing College, Ludhiana	CSE	115375

Thanking you,

(Dr. H.S. Rai)
Dean Testing & Consultancy

64. Arunditi Thakur

MTS a step ahead

final

(154)

Date: May 15, 2014

Arunditi Thakur

Guru Nanak Dev Engineering College,

Ludhiana,

Dear Arunditi,

We are pleased to advise that you have been assigned a project on "IT" with Sistema Shyam Teleservices Ltd., Delhi Circle (MTS India) as a "Trainee" in Delhi on following terms & conditions:

1. You will be required to complete the project in 6 Month time starting 23rd Jun 2014 to 23rd Dec 2014.
2. The above assignment is being carried out by you to enable you to submit a project report to your esteemed institution as a requirement of your course curriculum. You will not be entitled to any compensation, whatsoever, for carrying out the above assignment.
3. All the expenses incidental to the project including travel/conveyance expenses shall be borne by you.
4. This assignment does not confer any right to claim permanent employment in Sistema Shyam Teleservices Ltd. & its associate companies.

Kindly sign a copy of this letter to convey your acceptance of the above assignment.

Regards,

Aditi Nehra

Head, Human Resource Department

Human Resource & Admin Function, Delhi UCO

65. Anu Hooda

GOVERNMENT OF INDIA
MINISTRY OF COMMUNICATIONS AND
INFORMATION TECHNOLOGY
DEPARTMENT OF INFORMATION TECHNOLOGY
NATIONAL INFORMATICS CENTRE
New Haryana Secretariat Sector-17 Chandigarh
Tel : 2700275
Mob : 9872227027
E-mail:- duggal.ss@nic.in

S.S Duggal,
Senior Technical Director
& Addnl SIO

No : NIC/SW2/60

Dt : 8.5.14.

To

TPO
Guru Nanak Dev. Engineering College
Ludhiana, Punjab

Sub : Acceptance of Anu Hooda for training.

Sir,

This Office confirms acceptance of Ms Anu Hooda B. Tech (Information Technology, Pre Final Year)**Guru Nanak Dev. Engineering College Ludhiana, Punjab for 6 Months training at our Office. She shall not be paid any TA/DA or stipend.**

Yours faithfully,

(S S Duggal)

Senior Technical Director
& Addnl SIO

66. Anurag, Dhruv Bakshi

17

116089

August 20, 2014

Dear Anurag,

Mr. Anurag Sharma

Further to your application for Summer Training in our organization, we are pleased to offer you training in the Network team under the guidance of **Mr. Sandeep Mehta** for a project on **"IPMS reconciliation with backbone Network".**

The terms and conditions of your training are as follows:

1. Your training shall begin on **August 20, 2014** and shall complete at close of working hours on **November 20, 2014.** You will not be provided any stipend for this training.

2. You will be assigned a project that you shall be required to complete in the stipulated time frame agreed upon. Also, you shall be required to submit a report covering the scope, findings, analysis and your recommendations within three days, post completion of the project.

3. When traveling out of your base station on work, with prior permission of your project guide, you will be reimbursed your travel, boarding and lodging expenses as applicable to employees at our officer level.

4. During the continuance of your training with us, you shall not be engaged, concerned or interested directly or indirectly in any other training/project whatsoever, but shall devote your whole time, attention and abilities exclusively to the performance of your duties. You shall not, during your training with the company, discuss, divulge or communicate to any person or persons any information of a confidential nature relating to the trade or business of the company.

5. This training does not entitle you to a permanent employment with the organization.

6. Upon completion of your project you are required to submit a **soft** copy of your report to your project manager, post which you will be issued a training completion certificate (* Certificates to be collected on Friday of each week only).

During your training period, you will be located at Bharti Airtel Ltd. NEC, Building, CP-5, Sec-8, Manesar, Gurgaon-122050.

Regards,

For Bharti Airtel Ltd
HR- UNOC & SNG

Training at Gurgaon →

AIRCEL

⊗483

10 July 2014

Head-Training & Placement,
Guru Nanak Dev Engineering College,
Ludhiana.

Sub: Summer placement for Dhruv Bakshi.

Ref: Your letter dated 10/7/2014.

Dear Sir/Mam,

We are in receipt of your captioned letter through which you have requested us for providing practical Training to your students.

We wish to inform you that we have accepted your request and are ready to provide training to Dhruv Bakshi in our organization for a period of 4-6 months in Network function.

Dhruv should report at the below mentioned address on 14th July'14 and will be in this organization for 4-6 months as a summer trainee.

During his tenure, he will have to make his own stay arrangement and no stipend or allowances will be paid to him.

Thanking You.

Yours faithfully,
For Aircel Limited

Vivek Kumar
Circle HR Head

67. Karunveer Singh Ghuman, Madhav Nagpal

V & A VENTURES LLP   116078

Head Office (Telecom & IT Projects) Plot Number 701, Udyog Vihar, Phase V, Gurgaon- 122016, Haryana
Phone : + 91-124-4019343 Fax : +91-124-4019343

July 15th 2014   (486)

Letter of Appointment – Internship Trainee

Mr. Karunvir Singh Ghumman
76-C, BRS Nagar, Ludhiana.

Dear Mr. Karunvir,

Further to your application for Internship, we are pleased to accept and appoint you as Trainee in our Company.

You will be posted at Mohali, on training for a period of 06 months effective from 5th July 2014.

Whilst welcoming you to the V&A Ventures LLP, we wish you good luck and a very bright career with us.

With best regards,

For V&A Ventures LLP

Training at PCL chowk Mohali:
Reliance Building
Mohali

Phase-
Sector 71

V & A VENTURES LLP

116083

Head Office (Telecom & IT Projects) Plot Number 701, Udyog Vihar, Phase V, Gurgaon- 122016, Haryana
Phone : + 91-124-4019343 Fax : +91-124-4019343

July 15th 2014

Letter of Appointment – Internship Trainee

Mr. Madhav Nagpal
B1715, Stree # 2-A, Kailash Nagar, Faizlka.

Dear Mr. Madhav,

Further to your application for Internship, we are pleased to accept and appoint you as Trainee in our Company.

You will be posted at Mohali, on training for a period of 06 months effective from 5th July 2014.

Whilst welcoming you to the V&A Ventures LLP, we wish you good luck and a very bright career with us.

With best regards,

For V&A Ventures LLP