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Khushhall Chandra Mahajan

Education

2013 – Present **Bachelor of Technology**, *Indian Institute of Technology Bombay*, ***GPA: 3.08/4.00***.

Research Experience

Summer 2015 **Incremental Query Optimization**.
Department of Computer Science, IIT Bombay *Prof. S. Sudarshan*
- Worked on **incremental search algorithm** along with branch and bound pruning of the search space to improvise the Depth First Search approach used in the **Volcano** and **Cascades** Frameworks
- Implemented Fibonnaci heap for the dynamic execution of the Task depending upon the priority
- Improved efficiency of the cost metric in the PyroJ query optimizer to achieve best plan for execution

Winter 2014 **Operations Research**.
Industrial Engineering and Operations Research, IIT Bombay *Prof. Ashutosh Mahajan*
- Used AMPL to model and test linear optimization problems
- Wrote a student companion for the book **A First Course in Linear Optimization** by Jon Lee
- The student companion to be published subsequently by the FOSSEE group, IIT Bombay

Relevant Coursework

Computer Science Data Structures & Algorithms, Software Development for Engineers, Digital Image Processing

Electrical Microprocessors, Digital Systems, Signals & Systems, Electronic Devices & Circuits
Analog Circuits (all courses done along with applicable labs)

Mathematics Calculus, Linear Algebra, Differential Equations, Probability & Random Processes

Projects

Summer 2014 **Swarachakra Bangla**.
Industrial Design Centre, IIT Bombay *Prof. Aniruddh Joshi*
Swarachakra Bangla is a touch-screen keyboard for inputting text in Bengali, the 7^{th} most spoken language by the total number of native speakers. It displays the consonants sequenced according to the logical structure of Bengali script, phonetically grouped and arranged in a grid similar to those found in most school textbooks.
- Improvised the existing Swarachakra code-base to develop a version in Bangla
- Conceptualised the design and layout of the keyboard for a better user experience
- Swarachakra Bangla has attracted over **100,000** downloads on Google Play Store

Spring 2015 **ASC Visualization Kit**.
Software Development For Engineers, AE 425 *Prof. Shankar Balachandran*
- Developed a Django based web application to enable the student community to have a better access to academic data
- Used data scrapping techniques viz. **Selenium** for collecting data from the web
- **Winner** of the **Facebook** hackathon for the best utility project in the institute

Ongoing **Image Recognition Using Class Specific Linear Projection** .
Digital Image Processing, CS 663 *Prof. Ajit Rajwade*
- Implementing an algorithm for face detection, insensitive to lighting direction and facial expression
- Using a training database of human facial photographs, trained an automated system to recognize the identity of a person from a new image of the person
- This algorithm is based upon Fisher's Linear Discriminant

Summer 2014 **Virtual Mouse**.
Institute Technical Summer Project *Electronics Club*
Virtual mouse is a combination of a C++ program and infrared (IR) camera along with IR LEDs which analyzes the video stream from an infrared camera to track user's hand movement and gestures
- Used image processing techniques like background subtraction and contour detection in OpenCV
- Successfully implemented cursor movement and right/left click functions by analyzing gestures
- Utilized *xdotool* linux library to issue mouse commands to the OS

Fall 2015 **Car game on GLCD**.
Department of Electrical Engineering *EE 337 : Microprocessors Laboratory*
- Developed an interactive car racing game using Pt-51 micro controller, AT89c5131 based board
- Used accelerometers to provide motion control to the user and GLCD for displaying graphics

Sping 2014 **Digital Tachometer**.
Department of Electrical Engineering *EE 112 : Introduction to Electronics*
- Used IR LED and Photodiode to integrate a mechanical design with an electronic circuit
- Simulated circuits in LTSpice for preliminary design and testing

Summer 2014 **Virtual Mouse**.
Student Technical Activities Body *Electronics Club*
- Developed a C++ program using OpenCV to analyze video stream from the infrared camera
- Employed image processing techniques like background subtraction and contour detection
- Successful in implementing cursor movement and right/left click functions

Software skills

Tools & Packages LTSpice, GNURadio, gnuplot, ADT, AutoCAD, SolidWorks, Eclipse IDE, AMPL, PULP
Languages C++, MATLAB, ASSEMBLY, VERILOG, shell, LaTeX, JAVA, PHP, mySQL, DJANGO
Others PYTHON, HTML, JAVASCRIPT

Extracurricular Activities

Workshop Attended.
- Introduction to EDIPT framework - The workshop was aimed at introducing innovative methods for solving existing problems in the area of educational research
- Conducted a survey in the institute to collect the relevant feedback. Figured out the problems faced by students in gaining knowledge from various online teaching platforms
- Submitted a report on how to tackle the problem of high attrition rate of students on online teaching platforms

Teaching Assistant.
- TA for the Massive Open Online Course Signals and Systems **EE210X**, run on EdX and IITBombayX online platforms

References

- S. Sudarshan
  Professor
  IIT Bombay
  phone: available on request
  email: available on request

- Shankar Balachandran
  Professor
  IIT Bombay
  phone: available on request
  email: available on request

- Anirudha Joshi
  Professor
  IIT Bombay
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- Ashutosh Mahajan
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