Sant Kumar | **110070024**
Electrical Engineering | **UG Third Year (B.Tech.)**
Indian Institute of Technology Bombay | **Male**
Specialization: None | **DOB: 14th Sept 1994**

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2014	8.65
Intermediate/+2	Central Board (AISSCE)	Adwaita Mission High School	2011	92.00
Matriculation	Central Board (AISSE)	D.A.V Public School	2009	94.00

AWARDS AND ACHIEVEMENTS

- **Institute Technical Color of the Year 2012-13** by IIT Bombay (11 out of 7000 students)
- **Institute Technical Freshman of the Year 2011-12** by IIT Bombay (2 out of 900 1st year student)
- **Best Student of the Year Award 2008-09** by D.A.V. Public School Managing Committee in 10th Grade
- State Top 1% Merit Certificate in **National Standard Examination in Astronomy** (NSEA-2010)
- National Top 0.1% Merit Certificate in Mathematics by CBSE (2011)
- Certificate of Distinguished Performance with 98.4 percentile in Mathematics ASSET Test 2008
- Pursuing **Minor** in **Computer Science and Engineering**

- LAB/INDUSTRIAL VISITS and LECTURES ATTENDED:
  Visited Institute for **Dynamic Systems and Control** (ETH Zurich), **Automatic Control Laboratory** (ETH Zurich) during **European Control Conference 2013** (ecc13); Visited **Seabotix** Inc. Headquarters, San Diego (seabotix); Attended lectures on **Neural Networks** (Neural Nets) by Prof. Rolf Pfeifer (UZH, Zurich)

INTERNSHIP EXPERIENCE

Artificial Intelligence Laboratory, University of Zurich **Zurich, Switzerland**
Guide: Prof. Dr. Rolf Pfeifer, Director, Artificial Intelligence Laboratory, UZH *(May – July 2013)*
Research Intern: Development of a mobile and intelligent robotic toy platform with application in multimodal human-robot interaction and autism therapy research

- Designed the **mechanical** and **electronic hardware architecture** of the mobile robot integrating **35 different sensors and actuators** including visual, tactile, temperature, inertial and distance sensors.
- Developed the **firmware and embedded software stack** on a Linux platform enabling to store and process the various sensor readings and initialize actuations accordingly.
- Implemented some **pre-conceived movements and expressions** of the toy reacting to certain actions of the autistic child under therapy with further **scalability for advanced artificial intelligence**
- As its first application in medical research, it will be used by **Prof. Irini Giannopulu, Cognitive Neuroscience, UPMC & Catholic University of Paris, France.**

Lazy8 Games Pvt. Ltd. **Mumbai/Coimbatore, India**
Technical Trainer in Robotics and Android App. Development *(December 2012)*

- Conducted a week long practical training session and workshop on Robotics, Embedded Systems and PID Control Algorithms at SRIT, Coimbatore.
- Developed the Robotic Modules and Android App. Development course contents for the workshop.

PROJECTS

1. Automatic Panoramic Image Stitching using Invariant Features *(September 2013 - ongoing)*
Guide: Prof. Ajit Rajwade (Computer Science)

- Image alignment and matching using **SIFT** (Sift Invariant Feature Transform)
- Implementing **Fast Gaussian Transform** for Image matching
- Introducing **gain compensation** and **automatic straightening steps**
- Sequencing of unordered images for panoramic view

2. AUVSI's International Robosub Competition, San Diego, California *(November 2011-ongoing)*
Guide: Prof. Hemendra Arya (Aerospace) and Prof. Leena Vachhani (Systems and Control)

www.auv-iitb.org

*Designing and developing an unmanned **autonomous underwater vehicle (AUV)** that localizes itself and performs realistic missions based on feedback from visual, inertial, acoustic and depth sensors using thrusters and pneumatic actuators*

Robosub 2013:

- **Founding member** of a 22 membered 4 tier team constructing a state of the art AUV at an annual budget of **2.1 million INR**
- Modeled the blueprint of the **Electronic Architecture** for maximizing power efficiency and a well-planned communication between SBC, Power management board, Motion controller board and various other sensors.
- Designed **Power Management** and **Motion Controller** Boards along with developing the **embedded software** for the control and operation of the vehicle on a modular and scalable platform.
- **Represented India at Robosub 2013**, the AUV qualified for the semi-finals and was ranked **overall 10th out of 33 participating international teams**.

Robosub 2014:

- **Head of Electronics Division** of the Team
- Currently working on the **Acoustic Localization System** for the next version of the AUV;
  Developing the **navigation and localization algorithms** to estimate range and bearing with respect to static beacons; right from conditioning the analog output of hydrophones to processing and reconstructing the analog signals using an on-board **Digital Signal Processor (DSP)**

3. Gravity sensitive Digital cum Analog Watch *(IIT-Bombay Electronic Systems Design Workshop)*
Hosted by : Learning Labs (Prof. Mihir Ravel, Olin University, Boston) *(July 2012)*

- Worked on a state-of-the-art mobile design platform containing the latest RISC processor and configurable logic technologies (Device Details)
- Programmed a virtual dialed watch on a LCD and using **RTC and SDL APIs.**
- Incorporated **Accelerometer** with the watch, making it Gravity sensitive **like a spirit level.**

4. Two Wheeled Self Balancing Robot *(Institute Technical Summer Project)* *(May-June 2012)*
*An **autonomous** two wheeled single axis self balancing robot*

- Designed the **Electronic Hardware along with Control Algorithms** of the robot in two member team.
- Initially used two Sharp Analog Distance Sensor but due to its feedback delay time, finally used Accelerometer maximizing the stability of the robot.

5. Self-Motivated and Lab Projects:

- Fully generic **AVR Atmega644 Development Board** *(Self Motivated, August 2012)*
- **Electronic Weighing Balance** with a **least count of 10 grams,** based on **IR light absorption principle** (Analog Lab, February 2013)
- **Oscilloscope Snake Game,** implemented on **Complex Programmable Logic Device(CPLD),** programmed in **Verilog Hardware Description Language(HDL)** (Digital Lab, March 2013)

SKILLS

Electrical: Analog, Digital and Power Systems design/interfacing/integration, Microcontroller interfacing (Atmel AVR, Arduino, 8051, 8085, ARM Cortex M-series), PCB design, Embedded Protocol (CAN, I2C,SPI,UART), FPGA, CPLD, Logic Analyser

Computers and Programming Languages: Advanced C/C++, Python, Verilog, VHDL, SolidWorks, Eagle CAD, MATLAB, OpenCV, LTspice, LabView, Logisim, StellarisWare IDE, Eclipse IDE, Keil IDE, Quartus, Assembly Language for 8051/8085

Operating Systems: Linux, MS Windows, Mac OS

Mechanical: PCB Fabrication, 3D Printing