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Research Interests

Machine Learning, Computer Vision, Human-Robot Interaction, Sensor Integration and Robotics

Education

- **Indian Institute of Technology Madras, Chennai, India** *Aug'11 - Present*
  Bachelor of Technology, Major: Mechanical Engineering, CGPA: [8.43/10].
  Minor: System Engineering, CGPA: [9.0/10]

Technical Skills

- **Programming Languages:** C, C++, Python, MATLAB/Octave, R, LaTeX
- **Micro Controller/Processor:** Arduino/Atmega, Raspberry Pi
- **Scientific Software:** Eagle, Pro E/Creo, SolidWorks, AutoCAD, Microsoft Visual Studio
- **Image Processing:** MATLAB and C++ (OpenCV library)
- **Machine Learning:** MATLAB including Deep Learning
- **Sensors:** Implementation and Integration
- **Robot:** Electrical circuiting and Programming of robots

Research experience

- **Generic method for Online Character Synthesis** *Aug'14 - present*
  Mentor: Dr.Srinivasa Chakravarthy.V, Computational Neuroscience Lab, IIT Madras
  - Created a novel method to synthesis online characters, irrespective of the language.
  - Incorporated noise to resemble handwritten character.
  - Expanded training set for developing online character recognition engines.

- **Developing Character recognition Engine** *Aug'14 - present*
  Guide: Dr.Srinivasa Chakravarthy.V, Computational Neuroscience Lab, IIT Madras
  - Developed two engines for Online Character Recognition engines using SVM and Deep Belief Network (DBN).
  - SVM engine was developed using SVMTorch and achieved 98.3% accuracy.
  - With Deep Belief Neural Network, 85.2% accuracy was achieved (Ongoing).

- **Improved Model Predictive Control Algorithm for UAVs** *May'14 - Aug'14*
  Guide: Dr.Alejandro Ramirez-Serrano, AR2S Lab, Univ. of Calgary, Canada
  - Decreased the Computational time of MPC navigation algorithm by 6.5 times over the existing one, which manoeuvres complex shaped UAVs through confined 3D environment.
  - For increasing speed while maintaining accuracy separate methods were developed, for the cases low SNR and high SNR range sensor data.
  - For low SNR, geometrical approximation by RANSAC, and for high SNR, efficient data structure were used to reasonably approximate the cost function faster.

- **Drivable Road area detection** *Oct'13 - May'14*
  Guide: Dr.P.V.Maninvannan, IIT Madras
  - Surveyed literature and implemented different methods in supervised and unsupervised learning for segmenting drivable road area.
  - In supervised learning, modified version of Eigenface method was created for segmentation.
  - In unsupervised learning, different features like Color space (RGB, HSB, ATan) and Texture (Haralick and Laws energy measure) were used, for GMM clustering.

- **Autonomous Robot: International Robotics contest, ABU Robocon'13** *Aug'12 - Apr'13*
  Guide: Dr. Prabhu Rajagopal, CFI, IIT Madras
  - Designed and developed an autonomous robot capable of navigating accurately through a known terrain, while picking and placing cylindrical objects, as part of the International Robotics Contest, ABU Robocon 2013.
  - Developed strategies to communicate with other robots in the field while performing coordinated tasks and transferring objects between them.
  - Won **Fastest Job Completion Award** for the year 2013 in National level ABU Robocon.

- **Algorithm development for Dead reckoning** *May'12 - Jul'12*
  Guide: Dr. Mahesh V Panchagnula, CFI, IIT Madras
  - Designed and developed a robot(0.6m×0.6m) capable of following specified path accurately, while halting at specified check points within distance of 0.03m.
  - Designed the circuit and implemented PID control system.
  - Implemented Dead Reckoning with two wheel encoder, while carrying weights of varying Center of mass.

Technical Projects

- **Mini Rover: National level Shaastra Lunar Rover Challenge** *Oct'13 - Jan'14*
  IIT Madras
  - Developed a small robot(0.25m×0.25m) capable of performing the tasks of a rover like communication, live video transmission, collision avoidance and detecting appropriate flags, in an artificial lunar surface.
  - Placed **Second in National level** among over 90 teams.

- **Software Development for CAD/CAM software** *Dec'13 - Jan'14*
  Mentor: Mr.Elisha Madhu Kumar Karyamsetty, CTO, Amada Soft India,
  - Rendered many fonts from different languages, for use in CAD/CAM softwares.
  - Fonts were represented using B-splines using information from font TTF file, in C++.
  - Worked with data structures and templates in C++ extensively.

Relevant University Course work

- **Computer Science:** Computational Engineering, Reinforcement learning*
- **Systems Minor:** Process Optimization, Multivariate Data Analysis, Time Series Analysis
- **Control:** Control and Instrumentation, Non-linear geometric control
- **Robotics:** Robotics and Application, Machine Vision and Application*
- **Computational Methods:** Computer Methods in E.E., Computer Methods in M.E.
- **Other courses:** Basic Electrical Engineering, Decision Modelling*
- **Mathematics:** Differential Equations, Single and Multi Variable Calculus, Linear algebra and Numerical Analysis
  *Courses to be taken in Spring 2014

Independent Course Work

- **Introduction to Artificial intelligence**, *by Dr.Peter Norvig and Dr.Sebastian Thrun.*
- **Artificial Intelligence for Robotics**, *by Dr.Sebastian Thrun.*
- **Machine Learning**, *by Dr.Andrew Ng.*
- **Neural Networks for Machine Learning**, *by Dr.Geoffrey Hinton.*

Scholastic Achievements & Awards

- One of the 500 students from six countries, selected for Mitacs Globalink Research Intern Program in Canada for the year 2014.
- Awarded **Kishore Vaignayik Protsahan Yojana** (KVPY) Fellowship in 2010 by the Dept. of Science and Technology, Govt. of India.

Extra-Curricular Activities

- **Teaching:** Conducted technical club sessions for over 60 freshman on basic Robotics and Micro-controller coding during 2012-2013.
- **Community service:** Worked for AID India in 2012, taught basic maths to over 25 students from three rural villages, evaluated local government schools and suggested methods for improvement.
- **Sports:** Member of hostel Hockey team in 2011-2012.
- Won Fastest Job Completion award, in National level ABU Robocon'13 among over 80 teams.