S.R.Manikandasriram

Senior Undergraduate in Electrical Engineering

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Research Interests

Planning and Scheduling, Multi-Agent systems, Artificial Intelligence and Control for Robotics.

Education

- **Indian Institute of Technology, Madras** — Chennai, India
  B.Tech in Electrical Engg. with M.Tech in Communication; CGPA: 8.64/10 — Aug. 2011 – Present
  - **Minor**: Industrial Engineering
  - **GRE**: 168/170 (Quant); 163/170 (Verbal); 5/6 (AWA).
  - **TOEFL**: 118/120 (R-30, L-30, S-28, W-30)
- **Sri Sankara Sen. Sec. School** — Chennai, India
  Scored 95.8% in Class XII AISSCE exam, and 95.4% in Class X AISSE Examination — 2009,2011

Publications

- **Manikandasriram.S.R**, Jerome Le Ny, *"Motion Planning Strategies for Autonomously Mapping 3D Structures"*[1]. To be submitted to IEEE Transactions on Automation Science and Engineering (T-ASE) 2015.

Research Experience

- **Motion Planning Strategies for Autonomous 3D Mapping** [Senior Thesis] — Chennai, India
  Guide: Dr. Jerome Le Ny, Polytechnique Montreal — May 2015 – Present
  - Developed novel active sensing strategies for autonomously building a 3D model of a specific structure with no prior information.
  - Our algorithm autonomously determines the size and boundaries of the structure and subsequently explores the cavities in the structure to provide a complete 3D model.[2]
- **FIRA RoboSoccer Competition - Simurosot League** — Chennai, India
  Team Sahaas, Center for Innovation, IIT Madras — Oct. 2014 – May 2015
  - The competition involves developing an AI agent capable of playing a simulated RoboSoccer game.
  - Adopted a two level Strategy-Role framework for the AI agent and used RRT algorithm for path planning.
  - Implemented a Case Based Retrieval system for action selection for the defender agents.
- **Controlling LEGO EV3 robots via ROS** — Chennai, India
  Guide: Dr. Bharath Bhikkaji, IIT Madras — Aug. 2014 – Nov. 2014
  - Developed a ROS package[3] for controlling LEGO EV3 robots using the ROS Navigation stack thereby creating a low-cost testing platform for Robotics research.
  - Developed an indoor localization system using multiple coloured patterns and an overhead camera to correct for the drift in wheel odometry.
- **ARLISS ComeBack competition 2013** — Black Rock Desert, NV, USA
  Guide: Prof. Mahesh Panchagnula, IIT Madras — Mar 2013 – Sept. 2013
  - Represented IIT Madras in an international collaboration lead by students of Dr. William Singhose of Georgia Institute of Technology with teams from Greece, Hungary and South Korea.
  - The competition involved building a small robot that can land safely using a parachute following a rocket launch.
  - Developed algorithms for autonomously navigating the robot to a given target location using GPS sensor after detaching from the parachute.

[1] Link to Arxiv:put-link-here
[2] Video : http://www.ee.iitm.ac.in/ẽe11b127/
[3] Source code is available in GitHub Repository. https://github.com/srmanikandasriram/ev3-ros

- **ABU Robocon 2013 - Autonomous Robot** Pune, India
  Guide: Prof. Prabhu Rajagopal, IIT Madras Aug 2012 – Mar. 2013
  - The competition involved autonomously navigating a known arena while precisely manipulating cylindrical objects in the least possible time
  - Developed algorithms for performing coordinated tasks with other robots like transferring objects.
  - Won **The Fastest Job Completing Robot** among 60+ teams from across India.

Work Experience

- **Detecting Corrosion under Insulation in Subsea pipelines** Bangalore, India
  Guide: Vikram Melapudi, NDE Lab at GE Global Research Center May. 2013 – July 2013
  - Co-invented **System and method for detecting an anomaly in pipe assembly (Patent application filed)**, using a novel setup to perform Time-domain Reflectometry techniques for remotely detecting corrosion under insulation in long pipe assemblies.
  - Verified the efficacy of our method using Numerical Simulations performed in COMSOL Multiphysics software.

Teaching Experience

- **Control Lab using LEGO Mindstorms kits** Chennai, India
  Guide: Dr. Bharath Bhikkaji and Dr. Sridharan, IIT Madras May. 2014 – July 2014
  - Designed 3 benchmark control experiments using LEGO Mindstorms kits and Simulink for an undergraduate control lab course.
  - Recorded video lectures for demonstrating and explaining the theory behind the experiments which has been made available to the students through YouTube[4].
- **The WebOps Club IITM** Chennai, India
  Center for Innovation, IIT Madras Aug 2013 – Apr 2014
  - Regularly organized sessions for teaching various web technologies to first and second year students
  - Provided guidance and technical support for enthusiastic freshers for undertaking hobby projects
  - Mentored an elite team of 5 students and helped them complete 3 industry projects.

Relevant Coursework

- **Key courses**: Planning and Constraint Satisfaction, Memory based Reasoning in AI, Allied Topics in Control Systems, Synthesis of Control Systems, Multivariate Data Analysis, Data Structures and Algorithms, Control Engineering, Microprocessors, Fundamentals of Operations Research, Linear Algebra, Complex Analysis
- **Online Courses**: Control of Mobile Robots, Artificial Intelligence and Planning, Discrete Optimization, Machine Learning.

Technical Projects

- **Lunar Rover Challenge 2014** Chennai, India
  Shaastra 2014, IIT Madras Aug. 2013 – Jan. 2014
  - Won 1^{st} place among over 90 teams in the National Lunar Rover Challenge competition which involved building a rover capable of live video transmission, collision avoidance and flag detection while negotiating an artificial lunar surface.
- **Smart Navigation** Chennai, India
  Summer Project under iBot Club, Center for Innovation, IIT Madras May 2012 – July. 2012
  - Conceptualized and prototyped a differential drive navigation system capable of learning paths through user input, from a hand-held device, and autonomously returning to any previously saved *checkpoint* through the shortest route as a Summer Project under iBot Club of IIT Madras.

[4] http://www.ee.iitm.ac.in/ ee11b127/research.html#lego2

- **Wrist-Flexer for cerebral palsy children** Chennai, India
  National Service Scheme Sept. 2011 – Mar 2012
  - Conceptualized and prototyped a low-cost portable easy-to-use device to stabilize fine wrist movements.
  - The elastic powered device, which can be made from products available at home, helps in rehabilitation in early stages of extensor muscle problem.
  - Successfully tested under the supervision of a pediatrician who provided a positive feedback.

Scholastic Achievements

- Awarded a fully funded 12 week research internship in Canada under Mitacs Globalink program and subsequently nominated for the *Mitacs Award for Outstanding Innovation - Undergraduate* for exceptional performance.
- Secured **All India Rank 8 (State Rank 1)** in 10^{th} National Cyber Olympiad 2011.
- Placed in the **National Top 1%** among 40000 students in National Standard Examination in Physics 2010.
- Placed in the **Statewise Top 1%** in the National Standard Examination in Chemistry 2010.
- Placed in the **Top 5%** in the Zonal Informatics Olympiad 2010.

Skills

- Programming: C, C++, Python, MATLAB/Octave, LabView, LaTeX
- Libraries: ROS, PCL, OpenCV
- Softwares: Gazebo, Git, COMSOL Multiphysics, Simulink
- Embedded Systems: Jetson TK1, Arduino, AVR Microcontrollers, ARM-based processors.
- Full stack web developer from server management and data modeling to design of user experience.

Positions of Responsibility

- **Founder - The WebOps Club IITM** May 2013 – Apr. 2014
  - Centre for Innovation(CFI)[5] is a student run lab which nurtures technical creativity and provides guidance and resources for the students of IIT Madras to pursue their endeavours in engineering.
  - Founded The WebOps club (under Center for Innovation) which has now grown up to become a developer community with over 200 active members.
- **Web Operations Coordinator - Shaastra[6] 2013** Apr. 2012 – Jan. 2013
  - Developed and maintained the Shaastra website which received 10 million+ cumulative hits with over 15,000 unique visitors.
  - Created the first ever Facebook application for Shaastra for improving user experience.
  - Developed social media publicity tools for Shaastra's Sponsorship and Publicity team.

Extra-curricular Activities

- **Ericcson Industry Defined Problem** Placed 1^{st} place for developing web and mobile apps that aggregate and prioritize municipal complaints.
- **Wiki-it** Conceptualized and developed a chrome extension which allows for quickly editing and downloading portions of wikipedia articles.
- **Chore Night** Won 1^{st} place representing IIT Madras in National Group Dance competition among 60+ teams.
- **LitSoc** Won 2^{nd} place in Inter-hostel dance competition at IIT Madras.

[5] http://cfi.iitm.ac.in/