S.R.Manikandasriram

Senior Undergraduate in Electrical Engineering
IIT Madras, Chennai, India

srmanikandasriram@gmail.com
www.ee.iitm.ac.in/~ee11b127/
+91 99625 13029

Research Interests

Artificial Intelligence, Planning and Scheduling, Cyber-Physical systems, Multi-Agent systems, Control

Education

- **Indian Institute of Technology Madras** Chennai, India
  B.Tech & M.Tech in Electrical Engg.(Stream: Communication) CGPA: 8.64/10 Aug. 2011 – Present
  Minor: Industrial Engineering

Publications

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

Research Experience

- **Autonomous 3D Mapping of unknown structures** [Senior Thesis] Chennai, India
  Guide: Prof. 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 using a mobile ground robot carrying a depth-sensing camera.
  - Our algorithm autonomously determines the size and boundaries of the structure by following the perimeter and automatically detects and add missing parts to construct a complete 3D model.

- **FIRA RoboSoccer Competition - Simurosot League** Chennai, India
  Team Saahas, Center for Innovation, IIT Madras Oct. 2014 – May 2015
  - Developed an AI agent capable of playing a simulated 5vs5 RoboSoccer game.
  - Adopted a two level Strategy-Role framework for the decision making and implemented real-time path planning algorithms.
  - Implemented a Case Based Retrieval system for action selection for the defender agents.

- **Controlling LEGO EV3 robots via ROS** Chennai, India
  Guide: Prof. Bharath Bhikkaji, IIT Madras May. 2014 – Nov. 2014
  - Developed a ROS package[2] 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 colored patterns and an overhead camera to correct for the drift in dead reckoning.

- **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 Prof. William Singhose of Georgia Tech with teams from Greece, Hungary and South Korea.
  - Designed and built two small cylindrical robots that can land safely using a parachute, following a rocket launch.
  - Developed algorithms for autonomously navigating the robot to given target coordinates using GPS sensor after detaching from the parachute.

- **ABU Robocon 2013 - Autonomous Robot** Pune, India
  Guide: Prof. Prabhu Rajagopal, IIT Madras Aug 2012 – Mar. 2013
  - Designed and built a robot capable of autonomously navigating a known arena while precisely manipulating cylindrical objects in the least possible time
  - Developed algorithms for communicating with other robots and performing coordinated tasks like transferring objects between them.
  - Won **The Fastest Job Completing Robot** among 80+ teams from across India.

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[1]Video: http://www.ee.iitm.ac.in/ ee11b127/research.html#activeslam
[2]Code: https://github.com/srmanikandasriram/ev3-ros

Teaching Experience

- **Advanced Electrical Engineering Laboratory** Chennai, India
  Guide: Prof. Sridharan K., IIT Madras Aug. 2015 – Nov. 2015
  - Head Teaching Assistant for an undergraduate laboratory course taken by 130+ students
  - Duties included supervising the weekly lab sessions, clearing doubts and helping students understand how the Control Engineering theory is applied to real world systems like Self-balancing robot and Line Following robot.

- **Control Lab using LEGO Mindstorms kits** Chennai, India
  Guide: Prof. Bharath Bhikkaji, IIT Madras May. 2014 – July 2014
  - Designed 3 benchmark control experiments - 1) PID Controller for a DC Motor, 2) Self-balancing robot, 3) Feedback control for a Pendulum on a cart system - using LEGO Mindstorms kits and Simulink.
  - Recorded video lectures for demonstrating and explaining the theory behind the experiments which has been made publicly available to the students [3].

- **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.

Industrial Experience

- **Detecting Corrosion under Insulation in Long Pipe Assemblies** Bangalore, India
  Guide: Dr. Vikram Melapudi, NDE Lab at GE Global Research Center May. 2013 – July 2013
  - Performed a Proof-of-concept study for a novel setup to remotely detect corrosion under insulation in long pipe assemblies and subsequently filed a patent based on the results.
  - Verified the efficacy of our method using Numerical Simulations performed in COMSOL Multiphysics software.

Patent

- Vikram Melapudi, Megha Navalgund, **Manikandasriram S.R.**, Prafull Sharma, *"System and method for detecting an anomaly in pipe assembly"* filed by General Electric (Docket No 273420-1).

Skills

- Programming: C, C++, Python, MATLAB, 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.

Relevant Coursework

- **Artificial Intelligence**: Planning and Constraint Satisfaction, Memory based Reasoning in AI
- **Control**: Allied Topics in Control Systems, Synthesis of Control Systems, Control Engineering.
- **Algorithms**: Multivariate Data Analysis, Data Structures and Algorithms, Computer Simulations, Fundamentals of Operations Research.
- **Mathematics**: Linear Algebra, Math Methods in Systems Engg., Probability, Complex Analysis.
- **Coursera**: Control of Mobile Robots, Artificial Intelligence and Planning, Discrete Optimization, Machine Learning.

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

Technical Projects

- **Lunar Rover Challenge**   Chennai, India
  Shaastra 2014, IIT Madras   Aug. 2013 – Jan. 2014
  - Secured 1st place among 90+ teams in the National level 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
  - Prototyped a differential drive mobile robot capable of learning paths through user input, from a hand-held device, and autonomously returning to any previously saved checkpoint through the shortest route.

- **Wrist-Flexer for specially abled children**   Chennai, India
  National Service Scheme, IIT Madras   Aug. 2011 – April 2012
  - Conceptualized and prototyped a low-cost portable 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

- One of the 750 students from six countries selected for **Mitacs Globalink Research Internship** program for the year 2015
- Secured **All India Rank 8 (State Rank 1)** in 10th 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.

Extra-curricular Activities

- **The WebOps Club IITM** Founded The WebOps club, which has now grown up to become a developer community with over 250 active members.
- **Shaastra**[4] Developed and maintained the Shaastra website and social media publicity tools for Shaastra's Sponsorship and Publicity team.
- **Ericsson Industry Defined Problem** Secured 1st place for developing web and mobile apps that aggregate and prioritize municipal complaints.
- **Wiki-it**[5] Conceptualized and developed a chrome extension which allows for quickly editing and downloading portions of Wikipedia articles.
- **Saarang**[6] Won 1st place in National Group Dance competition - Choreo Night - at Saarang 2012 which is attended by 50000+ students from across the country.
- **LitSoc** Won 2nd place in Inter-hostel dance competition at IIT Madras.

References

Jerome Le Ny	**Bharath Bhikkaji**	**Sridharan K.**
Assistant Professor	Assistant Professor	Professor
Polytechnique Montreal	IIT Madras	IIT Madras
jerome.le-ny@polymtl.ca	bharath@iitm.ac.in	sridhara@ee.iitm.ac.in

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[4]Shaastra(http://shaastra.org/) is the student run technical festival of IIT Madras
[5]Available in Chrome Webstore - https://chrome.google.com/webstore/search/wiki-it
[6]Saarang(http://saarang.org/) is the student run cultural festival of IIT Madras