Varadarajan Ganesan

Block 7A, Commonwealth Avenue,
Unit No. #16-660,
Singapore, 141007

varadarajan@u.nus.edu
+65-8588 7556

EDUCATION

Master of Engineering (Electrical & Computer Engineering) Singapore
National University of Singapore Jan. 2013 — Dec. 2014

- GPA of 4.13/5 with multiple publications in top-tier conferences
- Research programme focused on statistical methods for obstacle detection and avoidance
- Coursework included neural networks, optimization and stochastic processes

Bachelor of Engineering (Mechanical Engineering, Hons.) Singapore
National University of Singapore Aug. 2008 — Aug. 2012

- GPA of 4.12/5 with specialization in intelligent systems
- Selected to go to Johns Hopkins University for Student Exchange Program
- Coursework included source coding, advanced mathematics and machine learning

EXPERIENCE

Research Engineer Singapore
Acoustic Research Laboratory - National University of Singapore July 2012 — present
Project STARFISH:

- Developed an obstacle detection and avoidance system for autonomous underwater vehicles (AUVs)
- Pioneered the use of a Bayesian filter which incorporates sensor paremeters for underwater obstacle detection and performed with an accuracy of over 80%
- Spearheaded the full cycle development from algorithmic design and simulation to carrying out successful experiments
- Maintained and developed the software system of the AUVs

Project Abyss:

- Analyzed large amounts of data (bathymetry, sediment type, chlorophyll, sediment layer thickness, etc.) that directly affect the abundance of mineral nodules in the Clarion Clipperton Zone
- Implemented a statistical modelling technique which uses a regression algorithm to estimate the nodule abundance using existing information
- Developed a constraint based optimization technique to generate a path to maximize information w.r.t nodule abundance
- The developed algorithm was used by Ocean Mineral Singapore (OMS) as one of the techniques to plan cruises for mineral exploration
- Implemented a deep learning network to predict the nodule abundance from side scan sonar data

Project Self Assembling Robots:

- Developed a novel rule based approach which governs the process of self-assembly in underwater robots
- Formulated rules to assembly different shapes to execute various tasks in underwater environments
- Implemented a statistical dynamics approach to predict the time taken to assemble different shapes

Research Intern Singapore
Singapore MIT Alliance for Research and Technology - Future Mobility group May 2011 — July 2011

- Investigated various route planning algorithms for an autonomous golf cart
- Assisted lead scientists in the team with implementing and testing different localization and autonomous navigation algorithms for the golf cart

ACADEMIC PUBLICATIONS

V. Ganesan, M. Chitre and E. Brekke, "Robust Underwater Obstacle Detection for Collision Avoidance," *International Symposium on Experimental Robotics*, 2014.
V. Ganesan, M. Chitre and E. Brekke, "Robust Underwater Obstacle Detection and Collision Avoidance," *Journal on Autonomous Robots* (First Revision Complete), 2015.
V. Ganesan, and M. Chitre, "Self Assembling Robots in an Underwater Environment," *IEEE/MTS Oceans* (to appear), 2015.
V. Ganesan, and M. Chitre, "On Stochastic Self-Assembly of Underwater Robots ," *IEEE Robotics and Automation - Letters* (First Revision Complete), 2016.

UNIVERSITY PROJECTS

Robust Localization and Navigation of Indoor Mobile Robots

- Implemented a Monte Carlo localization technique to effectively localize a Pioneer P3-DX using a laser sensor in an indoor environment
- Incorporated a StarGazer sensor to reduce the localization error of the robot
- Achieved a very high localization accuracy, within 2 cm of ground truth, by combining information from both laser and StarGazer sensors
- Investigated ARA* (Anytime Repairing A*) and D* algorithms for navigation purposes

Optimization Algorithms for Swarm Behavior

- Formulated a combination of linear least square and stochastic gradient descent algorithm to allow a swarm of robots to localize on a source
- Various parameters of the algorithm determined the performance of the swarm of robots
- Implemented an evolutionary algorithm to obtain the optimal value of the parameters for operation
- The swarm of robots were able to localize the source 23% faster after optimizing the salient parameters

AWARDS

- **Best presentation award, NUS ECE Graduate Student Symposium, 2014**
  Awarded 3rd place for novel work on techniques for underwater obstacle detection and avoidance
- **Singapore finalist, Rohde & Schwarz Engineering Competition, 2013**
  Led an NUS team at a case study competition on radar signal processing
- **NUS Awards for Study Abroad, 2011**
  Recipient of merit scholarship covering expenses for study at Johns Hopkins University for a semester
- **Engineering Dean's List Award, 2008 - 2010**
  Recognized for exceptional scholastic achievement and academic performance amongst the top 5% of cohort

EXTRA-CURRICULAR ACTIVITIES

Mechanical Engineering Class of 2012 — National University of Singapore Singapore
Class Ambassador June 2012 — Present

- Represented the cohort at meetings with faculty, expressing the views of fellow alumni
- Campaign for fund raising at commencement class annual giving programme

NUS Business Incubation of Global Organization Singapore
Operations Executive July 2009 — July 2010

- Organized a business trip for 25 business delegates to Australia
- Led the planning committe of the annual BINGO blood donation drive

NUS Inter Faculty Games Singapore
Member Aug. 2008 — Aug. 2010

- Represented the Faculty of Engineering in soccer at the annual inter faculty games
- Bagged gold and silver medal over two years

TECHNICAL SKILLS

- Software: Matlab, R, SVN, Git, ROS, openGL
- Programming: C/C++, Python, Java, Groovy, SQL
- OS: Linux, Mac OSX, Windows
- Documentation: LaTeX, Microsoft Office