Kalana Ratnayake

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Education

MSc in Computer Science by Research — *Sri Lanka*

University of Moratuwa — *Feb 2020 - Dec 2021*

- Research Title - Navigation planning for a multi robot system exploring an unknown environment supported by volumetric data

BSc Engineering Honours in Computer Science and Engineering — *Sri Lanka*

University of Moratuwa — *Nov 2015 - Jan 2020*

- Specializing in Integrated Computer Engineering(ICE)
- Second Class - Upper Distinction (GPA : 3.65/4.2)
- Dean's List in semester 3, 6, 8

G.C.E. Advanced Level in Physical Science — *Sri Lanka*

Royal College, Colombo 07 — *Jan 2006 - Aug 2014*

- Result : AAA (For Mathematics, Physics and Chemistry)
- District Rank : 76

Publications, Patents and Designs

K. Ratnayake, "Navigation planning for a multi robot system exploring an unknown environment supported by volumetric data", M.S. Thesis, University of Moratuwa, Dec 2021.

K. Ratnayake, S. Sooriyaarachchi and C. Gamage, "OENS: An Octomap Based Exploration and Navigation System," 2021 5th International Conference on Robotics and Automation Sciences (ICRAS), 2021, pp. 230-234, doi: 10.1109/ICRAS52289.2021.9476592.

K. Ratnayake, C. Gamage, S. Sooriyaarachchi, "A Robotic Device for Autonomous Navigation in Unstructured Cluttered Environment", National Patent LK/P/21836, Jun. 28, 2021 (Patent Pending).

S. Sooriyaarachchi, C. Gamage, C. de Silva, S. Pallemulla, S. Dharmaratna, S. Ranathunga, A. Jayasena, **K. Ratnayake** and S. Kahawala, "Computer Vision Based Multi-spectral Automatic Fabric Quality Inspection Machine with Physical Color Referencing", National ID LK/P/13468, Apr. 09, 2021 (Pending).

S. Sooriyaarachchi, C. Gamage, C. de Silva, S. Pallemulla, S. Dharmaratna, S. Ranathunga, A. Jayasena, **K. Ratnayake** and S. Kahawala, "Method and Apparatus for Detecting Surface Defects", PCT International Application PCT/IB2021/052945, Apr. 09, 2021. (Pending).

S. Sooriyaarachchi, C. Gamage, C. de Silva, S. Pallemulla, S. Dharmaratna, S. Ranathunga, A. Jayasena, **K. Ratnayake** and S. Kahawala, "Method and Apparatus for Detecting Surface Defects", National Patent LK/P/21709, Apr 08, 2021.

Work Experience

Software Engineer (FabVis) — *Sri Lanka*

Intellisense Lab, Department of Computer Science and Engineering, University of Moratuwa — *Feb 2021 - Current*

- Designed and implemented client side system for fabric defect detection
- Designed and implemented server side system for model training and data gathering

Research Assistant (FabVis) — *Sri Lanka*

Intellisense Lab, Department of Computer Science and Engineering, University of Moratuwa — *Feb 2020 - Jan 2021*

- Designed and implemented prototype client side defect detection system including process pipeline and user interface

Visiting Instructor *Sri Lanka*

Department of Computer Science and Engineering, University of Moratuwa *Aug 2020 - Feb 2021*

- Module CS4352 - Robotics and Automation
- Prepared and conducted a series of practicals (https://github.com/IntellisenseLab/CS4352-Practicals)

Research Intern *Sri Lanka*

Research Analysis Projection and Development Branch, Sri Lanka Army *Jul 2018 - Dec 2018*

- Developed a physical design and a mathematical model for the quadruped robot using virtual model control

Projects

FabVis : Development of a Machine Vision based Fabric Quality Inspection System

Stack : Python, Tkinter, Spinnaker SDK, Darknet *Feb 2020 - Current*

- Focuses on building a Fabric defect detection machine for detecting localizing and classifying defects
- Contributed by designing and developing the prototype process pipeline, client system and server system
- Funded by Accelerating Higher Education Expansion and Development Operation Research Innovation and Commercialization Grant of World Bank

Navigation planning for a multi robot system exploring an unknown environment

Stack : ROS, Python, C++, PCL, Octomap *Mar 2020 - Dec 2021*

- Focuses on extending the Motion Planner to Explore Unknown Rough Terrain into a multi robot system
- Created a global map and evaluated it to identify unexplored regions and guides the robots explore them

Motion Planner to Explore Unknown Rough Terrain

Stack : ROS, Python, C++, Rpi, Octomap *Jul 2019 - Dec 2019*

- Focuses on building a navigation system that can discover and map a previously unmapped area
- Evaluated the map and calculated a path and velocity commands to explore unexplored regions

Traffic Light System on FPGA

Stack : Verilog, BASYS2, Xilinx ISE *Jan 2019 - Jun 2019*

- Focuses on building four way traffic light system
- Built using Verilog module, simulated on Xilinx ISE and tested on BASYS2 FPGA board

Stealth enabled Evasion possible Robotic Tracking System

Stack : Matlab, Simulink, SolidWorks *Jul 2018 - Dec 2018*

- Focuses on building a quadruped robot
- Designed model using SolidWorks
- Mathematical model was designed as a Virtual Model Controller and built using MATLAB

Smart Gas Monitoring System

Stack : C++, Arduino *Jul 2018 - Dec 2018*

- Focuses on building a Micro Controller based gas leakage monitoring system
- Uses MQ2 sensors to detect LP gas leaks and switches an alarm on as well as turns the gas valve off

Bipedal Robot

Stack : SolidWorks, Python, Arduino *Jan 2018 - Jun 2018*

- Completed as an initiation to robotics and to test out various basic robotics concepts
- Mathematical model used inverse kinematics, implemented using Python and was controlled using Arduino

PanViewer

Stack : Python, C++, OpenCV, Cuda, Visual C++ *Jun 2017 - Dec 2017*

- Focuses on building a panoramic viewer that can view outside of a vehicle
- Captures 3 video streams from 3 cameras and stitches them into a single video in real time

Nano-Processor

Stack : Xilinx ISE, Schematic, Verilog *Jun 2016 - Dec 2016*

- Focuses on building a 4-bit processor on a BASYS2 FPGA
- Designed, simulated and developed using Xilinx ISE and Tested on BASYS2 FPGA

Skills

Programming Languages Python, C++, Verilog

Tools and Technologies ROS, Octomap, PCL, OpenCV, Matlab, Simulink, SoildWorks, Xilinx, GitHub, Arduino

Languages Sinhala (Mother Tongue), English (IELTS score 8.0)

Awards and Certificates

Excellent Oral Presentation of the session

5th International Conference on Robotics and Automation Sciences *2021*

- For the paper titled ”OENS: An Octomap Based Exploration and Navigation System”

Second Class - Upper Division

University of Moratuwa *2020*

- GPA - 3.65/4.2

Dean’s List - Semester 03, 06, 08

University of Moratuwa *2015 - 2020*

- For outstanding performance in academic activities

Distinction Pass - Certificate course in Spoken English(Level 2)

The Institute of Human Resource Advancement, University of Colombo *2014 - 2015*

- For the completion of course with a Distinction pass in the final exam

Class Prizes - Class 12M3 and Class 13M3

Royal College, Colombo 07 *2013 and 2014*

- For achieving 1st place during all 3 terms during years 2013 (Class 12M3) and 2014 (Class 13M3)

Merit - Senior Category

12th Young Computer Scientist Competition *2013*

- For achieving 4th place in the Senior Category of Government School Competition

Achievements

Robotics and ROS webinar series

ACM Student Chapter of University of Moratuwa *2020*

- Webinar series focused on introducing students to Robotics and ROS
- Github repository - https://github.com/IntellisenseLab/ROS-Introduction
- Youtube sessions - https://youtube.com/playlist?list=PLfOXX2viEAvHrDi8QMmOrAGCTWxzGnrt2

Chairperson

CS&ES AGM and Get-Together 2019, Department of Computer Science and Engineering *2019*

- Organized the Annual General Meeting of Computer Science & Engineering Society for the year 2019

Event Coordinator

Night of the Brethren, Department of Computer Science and Engineering *2017*

- Coordinated the welcome night of the junior batch

Organiser

RoboGames 2017, IESL Student Chapter *2017*

- Organized the RoboGames Competition for school students and university undergraduates at Techno exhibition

Department Coordinator

EXMO 2017, University of Moratuwa *2017*

- Coordinated the stalls and department activities during the EXMO 2017 exhibition

References

Eng. Prof. Chandana Gamage

PhD, MEng, BSc Eng Hons, MACM, MIE(SL), CEng

Professor in Computer Science and Engineering
Department of Computer Science and Engineering
University of Moratuwa, Sri Lanka
chandag@cse.mrt.ac.lk

Eng. Dr. Sulochana Sooriyaarachchi

MSc (Moratuwa), BSc Eng (Hons)(Peradeniya), AMIE (SL)

Senior Lecturer
Department of Computer Science and Engineering
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