Kalana Ratnayake

+94 76 559 4071 | kalana.15@cse.mrt.ac.lk | kalanaratnayake.github.io | KalanaRatnayake | kalana-ratnayake

Education

MSc in Computer Science by Research *Moratuwa, Sri Lanka*

University of Moratuwa *Feb 2020 - Dec 2021*

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

BSc Engineering Honours in Computer Science and Engineering *Moratuwa, Sri Lanka*

University of Moratuwa *Nov 2015 - Jan 2020*

- Specializing in Integrated Computer Engineering (ICE)
- Second Class - Upper Distinction (GPA : 3.65/4.2) and **Dean's List** in semester 3, 6, 8
- Final Year Project Title - Motion planner to explore unknown rough terrain

Publications

K. Ratnayake, *Navigation planning for a multi robot system exploring an unknown environment supported by volumetric data*, MSc 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.

Patents and Industrial Designs

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 Approved).

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 Industrial Design Patent LK/P/13468, Apr. 09, 2021. (Submitted).

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. (ISR with 100% novelty).

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, 04 Mar. 2022.

Research Experience

Xavier : Development of a Unmanned Warehouse Management Robot System *IntelliSense Laboratory, UoM*

Supervised by Dr. Sulochana Sooriyaarachchi and Prof. Chandana Gamage *Jan 2022 - Current*

- Project focuses on building a Warehouse Management Robot System that utilizes unmanned ground vehicles to locate, identify and track inventory items.
- Working as a member of the team responsible for developing the navigation system, inventory tracking system, and robot firmware.
- Directly working on developing firmware for low level controller and ROS node for high level controller.
- Contributing to developing the navigation system and inventory tracking system.
- Funded by the startup, Xavier AI (pvt) Ltd.
- Primary author of a national patent for the navigation system.

FabVis : Development of a Machine Vision based Fabric Quality Inspection System *Feb 2020 - Dec 2021*

Supervised by Dr. Sulochana Sooriyaarachchi and Prof. Chandana Gamage *IntelliSense Laboratory, UoM*

- Project focuses on building a Fabric defect detection machine for detecting, localizing and classifying defects on fabrics.
- Worked as a member of the team responsible for designing, building and testing the detection system.
- Contributed by designing the prototype process pipeline, developing camera management system and developing control software with User Interface.
- Funded by Accelerating Higher Education Expansion and Development Operation Research Innovation and Commercialization Grant of World Bank.
- Co-Authored several national patents and a PCT based on the system.

Navigation planning for a multi robot system exploring an unknown environment supported by volumetric data — *IntelliSense Laboratory, UoM*

Supervised by Dr. Sulochana Sooriyaarachchi and Prof. Chandana Gamage — *Mar 2020 - Dec 2021*

- Project focuses on developing a multi robot exploration system based on the academic project, Motion Planner to Explore Unknown Rough Terrain.
- Completed as a Individual project.
- A server was designed to accept data from robots to create a global map to identify unexplored regions and guide the robots explore them.
- Robot system was created to share sensor data with server and to accept new exploration goals from the server and re-plan as necessary.
- First author of a paper accepted by ICRAS 2021.

Academic Projects

Motion Planner to Explore Unknown Rough Terrain

Supervised by Dr. Sulochana Sooriyaarachchi and Prof. Chandana Gamage — *Jul 2019 - Dec 2019*

- Project focuses on building a navigation system capable of exploring an unmapped area
- Generated Octomap of the explored region and evaluated it to calculate a path to explore the unexplored regions.
- Consisted of 3 main components each for exploration, planning and control of robot.
- Implemented on ROS, tested and evaluated using Gazebo simulator.

PanViewer

Supervised by Dr. Sulochana Sooriyaarachchi and Prof. Chandana Gamage — *Jun 2017 - Dec 2017*

- Project focuses on building a panoramic viewer capable of viewing outside of a vehicle using consumer cameras.
- Captured 3 video streams from 3 cameras and stitched them into a single video in real time

Teaching Experience

Visiting Instructor (Module CS4352 - Robotics and Automation) — *Sri Lanka*

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

- Prepared and conducted a series of practicals
- Github repository - https://github.com/IntellisenseLab/CS4352-Practicals

Robotics and ROS webinar series

ACM Student Chapter of University of Moratuwa — *Oct 2020 - Nov 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

Technical Skills

Programming Languages	Python, C++
Middleware and Software	ROS, PlatformIO, MBedOS, Matlab, SoildWorks, GitHub
Libraries	Octomap, PCL, OpenCV, Darknet
Languages	Sinhala (Mother Tongue), English
IELTS Academic	Overall 8.0, Reading 9.0, Listening 9.0, Speaking 7.0, Writing 6.5

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”

Leadership Roles

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

Organiser

RoboGames 2017, IESL Student Chapter — *2017*

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