

# Kalana Ratnayake

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## Education

### MSc in Computer Science by Research

UNIVERSITY OF MORATUWA

Sri Lanka

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

UNIVERSITY OF MORATUWA

Sri Lanka

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

ROYAL COLLEGE, COLOMBO 07

Sri Lanka

Jan 2006 - Aug 2014

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

## Publications and Patents

### K. Ratnayake, "Navigation planning for a multi robot system exploring an unknown environment", M.S. Thesis, University of Moratuwa, 2021.

MASTER THESIS

2021

- Awaiting approval of supervisors for submission

### 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.

CONFERENCE PAPER

2021

- Accepted

### 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 (Patent Pending).

PCT INTERNATIONAL APPLICATION

2021

- Submitted

### 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 Patent LK/I/13468, Apr. 09, 2021 (Patent Pending).

NATIONAL PATENT

2021

- Submitted

### K. Ratnayake, C. Gamage, S. Sooriyaarachchi, "A ROBOTIC DEVICE FOR AUTONOMOUS NAVIGATION IN UNSTRUCTURED CLUTTERED ENVIRONMENT", National Patent LK/I/21836, Jun. 28, 2021 (Patent Pending).

NATIONAL PATENT

2021

- Submitted

## Work Experience

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### Software Engineer (FabVis)

INTELLISENSE LAB, DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING, UNIVERSITY OF MORATUWA

Sri Lanka

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)

INTELLISENSE LAB, DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING, UNIVERSITY OF MORATUWA

Sri Lanka

Feb 2020 - Jan 2021

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

### Visiting Instructor

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING, UNIVERSITY OF MORATUWA

Sri Lanka

Aug 2020 - Feb 2021

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

### Research Intern

RESEARCH ANALYSIS PROJECTION AND DEVELOPMENT BRANCH, SRI LANKA ARMY

Sri Lanka

Jul 2018 - Dec 2018

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

## Projects

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### 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 - Current

- 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

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**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

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### 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

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### 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

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### Eng. Lt. Col. Dr. Chandana Gamage

PHD, MENG, BSc ENG HONS, MACM, MIE(SL), CENG

Senior Lecturer

Department of Computer Science and Engineering

University of Moratuwa

Sri Lanka

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### Eng. Dr. Sulochana Sooriyaarachchi

MSC (MORATUWA), BSc ENG (HONS)(PERADENIYA), AMIE (SL)

Senior Lecturer

Department of Computer Science and Engineering

University of Moratuwa

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