

Senthurbavan Kirubaharan

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RESEARCH INTERESTS

My research interest revolves around robotics, particularly in navigation, both classical and AI methods, and multi-robot coordination. I am currently working on navigation and have previous research experience on power optimization for ROS-based autonomous mobile robots.

EDUCATION

University of Moratuwa

BSc., Electronic & Telecommunication Engineering with First class Honors

GPA: 3.81/4.2 (3.77/4.0)

Moratuwa, Sri Lanka

Feb. 2016 – Jan. 2020

SKILLS

Languages: English, Tamil

Programming: Python, C/C++, VHDL, MATLAB, L^AT_EX

Libraries: ROS, NumPy, TensorFlow

Microcontrollers: STM32, Atmel, EFM8, Arduino

Others: FPGA design, PCB design

RESEARCH EXPERIENCE

Intellisense Lab, University of Moratuwa

Research Engineer, E-consulate (Pvt) Ltd. Working in collaboration with Intellisense Lab

Supervised by Dr. Sulochana Sooriyaarachchi & Dr. Chandana Gamage

Moratuwa, Sri Lanka

July 2021 – Present

The Intellisense Lab focuses on building mobile robot systems for exploration of an unknown area. I am currently developing robust navigation components, and testing those with the simulation model I created for our custom-made robot in Gazebo simulation. The development is on ROS and C++.

Electronic & Telecom. Engineering Dept., University of Moratuwa

Undergraduate Research, supervised by Dr. Peshala Jayasekara

Moratuwa, Sri Lanka

Feb. 2019 – Jan. 2020

My research was on power optimization of autonomous mobile robot navigation in which I designed and developed hardware-software co-design architecture for optimizing computational power of local planner of ROS navigation stack with FPGA hardware accelerator. The resulting component is consuming less power to a degree of four and faster due to C++ implementation on Linux platform. This research is published at the ACRA 2020 conference, and I presented it as the first author.

WORKING EXPERIENCE

Embedded Research Engineer

SenzMate (Pvt) Ltd

August 2020 – April 2021

Colombo, Sri Lanka

During the pandemic, I worked on an initiative to serve the community by building an AI COVID-19 Wristband. It detects the handwashing pattern of the user using IMU data in real-time and compares it to that of the WHO standard, and reminds the user periodically to wash hands. The implementation was in C and Python.

Research Intern

SenzMate (Pvt) Ltd

June 2018 – December 2018

Colombo, Sri Lanka

We developed a peer-to-peer bidirectional wireless communication module based on the LoRa protocol. The module works as a remote controller and virtual serial link. I was involved in the development of communication protocol for multi-point to multi-point reliable communication and firmware development in C.

UNDERGRADUATE PROJECTS

- EEG Amplifier for Long-Term Brain Monitoring** 2019
- Final year group project supervised by *Dr. Simon Lind Kappel*
 - Developed the digital front-end to acquire signals from the analog-to-digital converter and process them
 - Developed firmware for high-speed signal acquisition, data storage, and Bluetooth communication with a mobile phone for real-time monitoring
- Processor Design for Image Downsampling** 2018
- Designed instruction set architecture for downsampling an image by factor 2
 - Designed the microarchitecture of the processor and implemented it in FPGA
- Automatic Doorbell** 2018
- Designed a PCB with passive infrared sensors to detect heat radiation from humans and to eliminate ambient heat radiations
- GPS Navigated Robot** 2017
- Participated in a robotic competition, and built a robot with a microcontroller that should navigate through obstacles towards a GPS goal location, identify a box and get the ring placed inside
 - Developed obstacle avoidance with 3 ultrasonic range sensors and built navigation component to reach the box
- Analog Line Following Robot** 2017
- Designed a mobile robot solely with analog electronic circuits to follow a white line on a black surface
 - Employed IR emitter and receiver to detect the white line on the black surface
 - Designed a PID controller with operational amplifiers for motor speed control

AWARDS

Dean's List (2016, 2019)
Mahapola Higher Education Merit Scholarship (2016)

PUBLICATIONS

Senthurbavan Kirubaharan, Peshala Jayasekara & Dilan Weerakkody. Low Power FPGA-based Hardware Accelerator for Autonomous Navigation of Mobile Robots. In 2020 *Australasian Conference on Robotics and Automation (ACRA 2020)*. [Paper link](#)

REFERENCE

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