

# Malintha Fernando (Ph.D.)

## Visiting Faculty — Machine Learning, Robotics

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## Overview

I am currently a full-time visiting faculty with the department of Intelligent Systems Engineering of Indiana University. **I teach the Machine Learning for Signal Processing (ENGR-E511).** My research focuses on designing **decentralized autonomy for interacting dynamical systems** to act as a **cohesive** under stochastic observations and communication. I study at the intersection of **game theory**, **graph neural networks**, deep **multi-agent reinforcement learning**, **probabilistic graphical models**, and **motion planning**.

## Education

Indiana University, Bloomington

2017 - 2023

**Ph.D.** in Intelligent Systems Engineering  
**M.S.** in Intelligent Systems Engineering  
**Supervised by:** Prof. Martin Swamy

December 15, 2023  
December, 2021

*Major: Computer Engineering*  
*Minor: Mathematics*

University of Moratuwa, Sri Lanka

2011 - 2015

**B.Sc.(Hons.)** in Information Technology

December 2015

Royal College, Sri Lanka

2002 - 2010

**GCE Advanced Level** (Physical Sciences)  
**GCE Ordinary Level**

2010 (Top 5% Nationwide)  
2007 (10 out of 10 A Passes)

## Work Experiences

Open Robotics  
Mountain View, California

Summer 2019

**Software Engineer Intern**

Mentor: Tully Foote

**Contributions:** Designed a framework for UAV swarm control supporting trajectory optimization and receding horizon planning (RHP).

**Technologies:** Robot Operating System (ROS), PX4, IBM CPLEX, C++, MATLAB.

WSO<sub>2</sub>  
Colombo, Sri Lanka

2014, 2016 - 2017

**Software Engineer**  
**Software Engineer Intern**

January 2016 - July 2017  
January - June 2014

**Contributions:** Enhanced the integration of WSO<sub>2</sub> frameworks with client APIs, web services, and IOT devices.

**Open Source Committer**

**Technologies:** Java, Web Services, Web Security.

**Other Technologies:** Python, PyTorch, Ray Reinforcement Learning Library (RLlib), Deep Graph Library (DGL).

## Teaching

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Indiana University

Associate Instructor

**ENGR-533:** Deep Learning Systems

Fall 2022

**ENGR-210:** Cyber-Physical Systems

Spring 2023, 2022, 2021

**ENGR-321:** Advanced Cyber-Physical Systems

Fall 2021

Co-conducted lectures, designed lecture materials, assignments on linear dynamical systems simulation and control\*.

**ENGR-523:** Internet of Things

Spring 2019

**ENGR-511:** Machine Learning and Signal Processing

Fall 2018

\* Course materials: [Github Link](#).

## Publications

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**Malintha Fernando**, Ransalu Senanayake, Heeyoul Choi, Martin Swany, “Graph Attention Multi-Agent Fleet Autonomy for Advanced Air Mobility”, *Robotics: Science and Systems*, 2023. [\[Paper\]](#)

**Malintha Fernando**, Ransalu Senanayake, Ariful Azad, Martin Swany, “Graphical Games for UAV Swarm Control Under Time-Varying Communication Networks”, *Intelligent Aerial Robotics: From Autonomous Micro Aerial Vehicles to Sustainable Urban Air Mobility and Operations*, ICRA 2022.

**Malintha Fernando**, Ransalu Senanayake, Martin Swany, “CoCo Games: Graphical Game-Theoretic Swarm Control for Communication-Aware Coverage.”, *IEEE Robotics and Automation Letters (RA-L)*, March, 2022, [\[Paper\]](#)[\[Video\]](#)[\[Project Webpage\]](#)

**Malintha Fernando** “Online Flocking Control of UAVs with Mean-Field Approximation.”, *International Conference on Robotics and Automation, (ICRA)*, Xi'an, China, 2021, [\[Paper\]](#)[\[Video\]](#)[\[Code\]](#)

Z. Chen, **M. Fernando** and L. Liu, “A Visual Feature based Obstacle Avoidance Method for Autonomous Navigation,” *IEEE Applied Imagery Pattern Recognition Workshop*, 2019.

**Malintha Fernando**, and Lantao Liu. “Formation Control and Navigation of a Quadrotor Swarm.” *International Conference on Unmanned Aircraft Systems (ICUAS)*, Atlanta, Georgia, 2019. [\[Video\]](#)

**Malintha Fernando**, and Lantao Liu. “Swarming of Aerial Robots with Markov Random Field Optimization”, 2020, [\[arXiv\]](#)

**Fernando Malintha**, Cooray A.V.S, Indeewara T.G.H, Fernando S., “Semi-supervised Learning Framework for Knowledge Extraction in Cricket Domain”, *ITRU research symposium (2015)*, University of Moratuwa, Sri Lanka.

## Open Source Contributions

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### MavSwarm

A Lightweight, ROS-based UAV swarm simulator with low-level control, trajectory optimization, and RHP [\[100+ Stars on Github\]](#).

**Primary Contributor**

### ROSNS3

A *Network Simulator* (NS-3) bridge for ROS to simulate wireless communication aspects of networked robot systems [\[Github Link\]](#).

**Primary Contributor**

### Mozilla Firefox

Contributed by bug fixes and feature improvements to the browser core.

**Contributor, 2013-2014**

## Talks

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Guest Lecture on Multi-Agent Planning and Control - Arizona State University, November 2023

Invited Talk - University of Cambridge, UK, October 2023

Invited Talk - Georgia Institute of Technology, School of Interactive Computing, Atlanta - August 2023

RSS 2023 Workshop on Multi-Agent Planning and Navigation in Challenging Environments - July 2023

IEEE International Conference on Robot & Human Interactive Communication (RO-MAN), August 2022

Invited Talk - University of Sydney, 2022 June

ICRA 2022 Workshop for Intelligent Aerial Robotics: From Autonomous Micro Aerial Vehicles to Sustainable Urban Air Mobility and Operations.

Guest Lecture on “UAV Swarm Simulation and Control”, ENGR-321, Indiana University, 2021.

“Online Flocking Control of UAVs with Mean-Field Approximation” ICRA 2021 [[Video](#)].

Invited talk at Indiana University Executive AI Summit - 2020.

Guest Lecture on “Trajectory Optimization for UAVs”, ENGR-599, Indiana University, 2019.

“Formation Control and Navigation of a Quadrotor Swarm” - ICUAS 2019.

## Professional Service

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### Reviewer

International Journal of Robust and Nonlinear Control

International Conference on Robotics and Automation (ICRA)

International Conference on Intelligent Robots and Systems(IROS)

IEEE Transaction on Robotics (T-RO)

IEEE Robotics and Automation Letters (RA-L)

International Symposium on Multi-Robot and Multi-Agent Systems (MRS)

Learning for Control and Dynamics Conference (L4DC)

### Mentor

#### **Undergraduate Research Opportunities in Computing (UROC) Program**

**Ben Siefers** - Neural Network based Autonomous UAV Navigation 2020

**Eric Tatman** - Simulating UAV Swarm Dynamics 2020

**Zach Seliger** - Trajectory Generation and Control of a Crazyfly Drone 2018

## Volunteering and Leadership

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IEEE Indiana University Student Branch

Founding Chair, 2022/23

<b>IEEE Region 4 (Midwest) Student Activity Committee (SAC)</b> <i>Responsibilities:</i> Evaluating regional student activity award applications.	2019
<b>IEEE Region 10 (Asia/Pacific) Student Activity Committee (SAC)</b> <i>Responsibilities:</i> Evaluating regional student branch activity proposals and allocate funds.	2016
<b>IEEE Sri Lanka Section Executive Committee</b> <i>Responsibilities:</i> Coordinating the activities of student branches, Promoting IEEE activities in Sri Lankan universities. <i>Highlights:</i> Membership numbers increased by 30% during my tenure.	Section Student Representative 2015/16
<b>IEEE Region 10 Student/Young Professional/Women in Engineering Congress</b> <i>Responsibilities:</i> Leading the promotional activities team. <i>Highlights:</i> The congress attracted 200+ foreign student delegates across the region.	Core Organizer, 2015
<b>IEEE University of Moratuwa Student Branch</b> <i>Highlights:</i> The student branch won two IEEE Darrel Chong Awards.	Vice Chair, 2013/14

## Awards

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Luddy Travel Fellowship, Indiana University	2022, 2023
Graduate Student Fellowship, Indiana University	2017 - 2022
United Nations Development Program (UNDP) Hackathon - Sri Lanka	2016, Second Place
Google Summer of Code <i>For contributing to Mozilla Thunderbird's Calendar protocol for updating it to the latest RFC standards.</i>	2014, Mozilla
Institute of Engineers - Sri Lanka (IESL) Hackathon	2014, First Place
State Literary Competition (2009), Sri Lanka, <i>Short Stories Division</i>	2009, Finalist

## References

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Prof. Martin Swany  
Chair, Dept. Intelligent Systems Engineering  
Indiana University  
Bloomington, IN, 47401  
[swany@indiana.edu](mailto:swany@indiana.edu)

Prof. Ransalu Senanayake  
Dept. Computer Science  
Arizona State University  
Tempe, AZ  
[ransalu@asu.edu](mailto:ransalu@asu.edu)

Prof. Minje Kim  
Dept. Intelligent Systems Engineering  
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