

# Panagiotis Liampas

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## Education

**Massachusetts Institute of Technology**, Cambridge, MA May 2028

Candidate for Bachelor of Science in Electrical Engineering with Computing

GPA: N/A

Relevant Coursework: Introduction to Computer Science Programming in Python, Mathematics for Computer Science, Calculus II, Physics II

**Mandoulides High School**, Thessaloniki Greece May 2023

High School Diploma

SAT: 1550, GPA: 19.8/20.0

## Work Experience

**Epsilon Orosimo Software**, Thessaloniki, Greece September 2023 - October 2023

Junior Software Developer

- Converted and developed custom extension modules for the **Pylon ERP software**, using **C#**, from another software, enhancing the capabilities and integrating custom operations with regards to the **UI, logic and backend**.

**Alpha Systems**, Thessaloniki, Greece August 2022 - October 2022

Embedded Systems Intern

- Implemented an **IoT weather station**, which is connected using LoRaWAN to the **TTN Network and the Tago.io platform** and presents the data in a dashboard.
- Cooperated with the Nokia technical team** to integrate it with the **Nokia IOC platform**.

## Research Experience

**BlueDot Impact AI Safety Fundamentals Alignment Course**, Remote May 2024 – June 2024

Independent Research [Certificate](#), [GitHub](#), [Article Part 1](#), [Article Part 2](#)

- Conducted a review of various state-of-the-art **Distributional Reinforcement Learning** methods, as well as **risk measures** that can be integrated into the optimization operators of **Q-Learning**, using knowledge of the **distribution of the possible rewards** at a specific state of the agent.
- Evaluated their **effectiveness in decreasing the risk and ensuring the safety of self-driving cars** at worst-case scenarios, by **training a Machine Learning model** in a **simulated highway environment** and capturing the results.

**Non-Trivial Fellowship**, Remote July 2023 - October 2023

Independent Research [Preprint](#)

- Invented “Risk-averse Batch Active Inverse Reward Design”, an approach improving upon “Active Inverse Reward Design” in terms of **safety and robustness of AI models** and **reducing uncertain, potentially dangerous behaviors** after deployment, using **Reinforcement Learning from Human Feedback**. Specifically, I implemented a process that finds the intended reward function by asking queries to the human, and repeating that process on real-world data, allowing its adaptability to new environments and improving its efficiency. It also takes the actions that are the most certain, increasing the safety and control over the process.

**Dr. Kevrekidis (Johns Hopkins)**, Remote July 2023 - October 2023

Research Collaborator [GitHub](#)

- **Trained a Neural Network** (using TensorFlow) to **predict the behavior** of the Reduced MSP Model, from the **dynamical system** described in the paper: “On the parameter combinations that matter and on those that do not”, based on data derived from time integration of the system with various parameters and start states using the Runge-Kutta method.

**Dr. Koumoutsakos (Harvard)**, Remote

August 2023 - October 2023

Research Collaborator

[GitHub](#)

- Implemented a **simulated environment for Braitenberg vehicles**, to examine their interactions with each other, sources of various types, and certain “constrained” areas where the vehicles cannot be in.

## Awards & Accomplishments

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### Greek Mathematics Team

Silver Medal (1 place from Gold), International Mathematical Olympiad, Chiba, Japan July 2023

Silver Medal, International Mathematical Olympiad, Oslo, Norway July 2022

Silver Medal (1 place from Gold), Balkan Mathematical Olympiad, Antalya, Turkey July 2022

Silver Medal, Balkan Mathematical Olympiad, Agros, Cyprus July 2022

### Greek Astronomy Team

Bronze Medal, International Olympiad in Astronomy and Astrophysics, remote November 2021

### Greek Informatics Team

Bronze Medal, Balkan Olympiad in Informatics, Maribor, Slovenia October 2023

Participation, International Olympiad in Informatics 2021, 2022, 2023

Honorable Mention (2 places from Bronze), Balkan Olympiad in Informatics, remote October 2023

**Non-Trivial Fellowship** July 2023 – September 2023

Third Prize (4<sup>th</sup> – 8<sup>th</sup> place), for designing “Risk-Averse Batch Active Inverse Reward Design”

## Personal Projects

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### SLAM Bot

November 2023 - February 2024

Individual project

[Article](#), [GitHub](#)

- Engineered a **3D printed robot**, including its chassis, moving mechanisms, and electronics, that uses the **Robot Operating System (ROS 2)** and **Simultaneous Localization and Mapping (SLAM)** algorithms to **map, locate itself, and navigate around an unknown area**.

### Rover Hand

December 2022 - February 2023

Individual project

[GitHub](#)

- Programmed an autonomous robot that can **detect objects, track, and catch them** with its **robotic hand**, using **computer vision and machine learning**.

### Parking Detection

August 2022 - January 2023

Individual project

[GitHub](#), [Municipality Website](#)

- Implemented a system which uses machine learning to automatically **detect empty parking lots and highlight them on a website**, which was given for **use by the municipality and the local community** to solve the problem of the difficulty finding parking spaces.

### Plant Watering

July 2022 – November 2022

Individual project

[GitHub](#)

- A system that **measures the humidity of the soil under some plants** and **sends the data to a website** to be used to **determine the amount of irrigation needed**.

### Rover Sensors

July 2018 – August 2019

Individual project

[GitHub](#)

- Implemented a **remotely controlled prototype of a rover** with **integrated sensors** that can potentially be used to determine the habitability of a planet and **show the data, the results and the rover's route in a website, an android app and a windows app**.

## Activities & Extracurriculars

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<b>MIT Arcturus Autonomous Robotics</b> , Autonomy subteam	September 2024 – present
<ul style="list-style-type: none"><li>Implemented a ROS node that computes a sequence of buoy pairs, as well as a preferable region (center &amp; radius) in between them, that the autonomous boat should go through to follow a specific path, based on an obstacle map that's provided as an input.</li><li>Working on the fusion of LiDAR and Camera data to improve the accuracy and robustness of the perception system of the robot on detecting buoys on the water.</li></ul>	

## Programs/Courses

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<b>The Knowledge Society Global Innovate</b> , Remote Completion	September 2023 – June 2024
<ul style="list-style-type: none"><li>Studied a broad range of areas and recent developments in various fields.</li><li>Acquired a comprehensive understanding of the methods used to solve global problems, from examining their root causes to refining a concrete idea and plan for their mitigation, and applied them in internal challenges and hackathons.</li><li>Conducted a review wrote an article about the fundamentals of Simultaneous Localization And Planning. <a href="#">Article</a></li><li>Built a robot that applies the knowledge I acquired from studying the field of autonomous navigation.</li><li>Conducted a review and wrote an article about state-of-the-art methods of LiDAR-Camera fusion, their characteristics and their limitations. <a href="#">Article</a></li></ul>	
<b>Hellenic Institute of Advanced Studies AI Summer School 2024</b> , NCSR Demokritos, Athens Attendance	July 2024
<ul style="list-style-type: none"><li>Gained a comprehensive understanding of the fundamentals and state-of-the-art methods of Machine Learning, as well as their applications in a wide range of areas and ethical implications.</li></ul>	
<b>MITx's Circuits and Electronics XSeries Program</b> , remote	July 2024
Circuits and Electronics 1: Basic Circuit Analysis	
Circuits and Electronics 2: Amplification, Speed, and Delay	<a href="#">Certificate</a>
<ul style="list-style-type: none"><li>Gained a comprehensive understanding of fundamental circuit concepts, analysis techniques, design methods, and applications in various real-world devices, acquiring the tools to be able to apply those in diverse situations and use cases.</li></ul>	

## Online Publications

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<b>A review of LiDAR-Camera fusion for robust perception in complex environments</b> Medium	July 2024 <a href="#">Article</a>
<ul style="list-style-type: none"><li>Examining how Autonomous Mobile Robots navigate in unstructured environments, using multiple sensors to improve robustness and accuracy and mitigate collisions and false positives.</li></ul>	
<b>Risk-Sensitive Reinforcement Learning with Applications in Autonomous Driving</b> Medium	June 2024 <a href="#">Part 1</a> , <a href="#">Part 2</a>
<ul style="list-style-type: none"><li>An exploration of how Distributional Reinforcement Learning and appropriate risk measures can be used to improve safety, evaluated in a simple highway environment.</li></ul>	
<b>Building a 3D-printed robot that uses SLAM for autonomous navigation</b> Medium	January 2024 <a href="#">Article</a>
<ul style="list-style-type: none"><li>A thorough step-by-step writeup of the design and building process of a 3D-printed autonomous robot that uses Jetson Nano, Arduino, and the Nav2 package in Robot Operating System (ROS) 2.</li></ul>	
<b>Using SLAM to Autonomously Navigate in Unknown Environments</b> Medium	October 2023 <a href="#">Article</a>

- A review of Simultaneous Localization and Mapping, consisting of an understanding of its sensor/hardware and algorithmic/software aspects, its applications, but also limitations and anticipated developments in the field.

## Teaching Experience

**Mandoulides High School**, Thessaloniki, Greece

December 2022 - March 2024

Olympiad Preparation Teaching Assistant

- Prepared students at Mandoulides High School for Mathematics and Informatics Olympiads.

**Mandoulides High School**, Thessaloniki, Greece

November 2022 - February 2023

Olympiad Preparation Teaching Assistant

- Mentored the robotics team of Mandoulides High School for their participation in the Greek FIRST LEGO League.

## Leadership & Service

**Greenpeace Greece**, Thessaloniki, Greece

September 2023 – August 2024

Project Coordinator

- Organized initiatives to identify all the public water taps of Thessaloniki.
- Organized and participated in awareness campaigns, increase the use of water taps by citizens to refill their bottles.
- Increased the interest and capacity of the team by presenting the project to new members and facilitating their onboarding.
- Got in touch with and convinced certain municipalities to fix the malfunctioning water taps, resulting in their improved state and increased use in many areas.
- Developed the dashboard/map where the usable water taps are presented, including their location, status, and additional information.

**Arcturos Wildlife Shelter**, Thessaloniki, Greece

September 2023 – August 2024

Volunteer

2 weeks, 8 hours/day

- Took care of ~20 Greek Shepherds, by feeding and walking them daily.
- Contributed to various operations of the Bear Sanctuary and the Wolf Sanctuary.

## Skills & Knowledge

**Language:** English (Certificate of Proficiency in English, CEFR C2 level), French (Delf, CEFR B1 Level)

### Technology

Building & programming **autonomous robots** and **electronics devices/embedded systems**, using **Arduino (C++) & Raspberry Pi (mostly Python, runs on Linux)** and **custom PCB** circuit boards designed with **Fritzing** and **EasyEDA**, including the integration of **sensors, motors, batteries/solar panels** and **custom power management circuits**, as well as **3D-printed mechanical parts & moving structures** designed using **Fusion 360**. Those are connected to an ecosystem of **websites and databases**, with which data is transmitted (**LoRaWAN, Wi-Fi, or GSM modules**) & processed using **JS, PHP, and SQL**, and accessed/used via a **web app/dashboard** using **HTML, CSS (& Bootstrap)**, or **Android (Android Studio & Java)** and **Windows UWP or .NET applications (Visual Studio & C#)**.

Knowledge in **Robotics, Localization, Mapping and Planning**, read “**Probabilistic Robotics**” by **Sebastian Thrun**, and practical experience in using the **Robot Operating System (ROS 2)**, specifically publishing/subscribing to topics, working with various frames & transforms, implementing a **perception/localization/planning/navigation stack** using the respective packages and related nodes, using

the **ROS 2 Control framework**, and designing drivers (hardware components) that use **Arduino for communication between the Raspberry Pi and the motors/servos**.

Integration of **Computer Vision and Machine Learning** technologies in autonomous systems, using **Python**-based frameworks like **OpenCV, TensorFlow, Keras, and PyTorch**, theoretical and practical knowledge of **Q-Learning** and related decision-making algorithms used for determining the optimal policy for a **Markov Decision Process**, including the design, implementation, and evaluation of **risk-averse methods in the field of Reinforcement Learning from Human Feedback**, and ability to design and apply **inverse kinematics and control loop (PID)** mechanisms in an autonomous robot. Have also studied various methods used to fuse LiDAR (point cloud) and Camera (RGB/RGBD image) data, to improve accuracy and robustness of Autonomous Mobile Robots ([Article](#)).

Knowledge in **Dynamical Systems** and predicting their evolution, read “Nonlinear Dynamics And Chaos” by Steven H. Strogatz, as well as usage of **Neural Networks for fitting an ordinary differential equation**.

Knowledge in **Braitenberg Vehicles** and their properties, as well as their connection to human psychology, read “Vehicles: Experiments in Synthetic Psychology” by Valentino Braitenberg, and ability to **design physics simulations using Unity**.