Patrik Dominik Pördi

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Work Experience

Robotics & Drone Engineer   Salt Lake City, United States
ARK Electronics   June-2024 -
 – Designed and delivered ROS2 tutorials for custom PX4 flight modes, presented at ROSCon.
 – Developed embedded software for GPS and IMU drivers, integrated PX4 on NVIDIA Jetson and Raspberry Pi carrier boards on Linux, and implemented secure log encryption in PX4.
 – Collaborated with a two-member intern team to support drone and drone test development, conducted flight tests, and assisted with drone assembly, repair, and logistics operations.

Teaching Assistant in Robot Programming Classes   College Park, United States
University of Maryland   August-2023 to June-2024
 – Led Python/C++ ROS2 labs and exercises, held office hours.
 – Assisted with class setup, graded assignments/projects, and oversaw a TurtleBot maze competition.

UAV Engineer   Trondheim, Norway
Aviant AS   June-2023 to August-2023
 – Data extraction & analytics from Ulog regarding control & measurement accuracy.
 – Enabling delivery in densely populated areas is achieved by implementing an RTK GPS solution.
 – Development of a computer vision-based object detection to track the package deflection during winching.

Electrical Engineer   Budapest, Hungary
Evosoft Hungary Kft. member of Siemens AG   July-2020 to August-2021
 – Designed a CNC cyber-physical system via OPC UA.
 – Developed test environment and handled PLC programming of Siemens drive systems using TIA Portal.

Education

University of Maryland, College Park   College Park, Maryland, May 2024
Master of Engineering in Robotics - GPA: 3.85/4.0
 – Specialization in Autonomous Robotics
 – Projects: Stochastic control of Drones, Geometric decentralized Drone swarms

Budapest University of Technology and Economics |BME   Budapest, Hungary, May 2023
Master of Mechatronics Engineering - GPA: 4.51/5.0
 – Specialization in Cyber-Physical Systems
 – Thesis: Design and implementation RMS and Industry 4.0 into a CNC manufacturing system
 – Exchange semester online at University Technology of Sydney   Sydney, Australia, June 2022
 – Exchange year at Arctic University of Norway   Narvik, Norway, June 2022

Bachelor of Mechatronics Engineering - GPA: 4.48/5.0   Budapest, Hungary, May 2023
 – Specialization in Cyber-Physical Systems
 – Thesis: Implementation of CNC lathe digital twin simulation using Siemens tools
 – German bilingual program: exchange at Karlsruhe Institute of Technology   Karlsruhe, Germany, February 2020

Skills

Languages: English | non-native fluent, German | non-native fluent, Hungarian | native

Software: C, C++, Python, PX4, MATLAB & Simulink, Wolfram Mathematica, Linux CLI, Git, OpenCV, PLC, PyTorch3D

Modeling: Solidworks, AutoCAD, Visual Components, ROS/ROS2, Siemens Software, Gazebo

Expertise: Data Science, Robot Kinematics, Digital Twin Simulations, Programming, Machine Learning, Computer & 3D Vision

Research experience & activities

Competing in NIST 2023 First Responder UAS 3D Mapping Challenge   Maryland, United States
Autonomous micro air vehicle (AMAV) team, UMD   September 2023-
 – Implementing 3D mapping solutions on the drone.

Research on STEP file-based automatic production time estimation   Budapest, Hungary
Department of Manufacturing Science and Engineering, BME   January 2020-June 2022
 – A software application was created using Python and regular expressions (RegEx) that can extract machining features from any provided STEP file and then estimating production-related measurements.

Research on Reconfigurable Manufacturing Systems with Robotics concentration — Narvik, Norway
Department of Industrial Engineering, UiT — January 2022-June 2023
- Multiple versions of RMS were developed for oil industry scenarios using Python and Visual Components.

Engineering student project team member — Budapest, Hungary
BME Mechatronics Student Society — January 2018-June 2022
- Investigated software and hardware development for projects, such as line-follower mini car, jumping robot, closed chain mechanism with inverse kinematics simulation.
- Held consultations in programming, manufacturing, and robot modeling subjects.

Scholarships & Honors

Rosztoczy Foundation Scholarship Program - Hungarian Scholarship	2023
Hungarian American Coalition Dr. Elemér and Éva Kiss Scholarship	2022, 2023
Second Place, Hungarian National Round of the Conference of Student Research	2023
Presented a paper on STEP file-based automatic production time estimation	
Fulbright Scholar Award for Master's Studies in the United States	2022
First Place, Conference of Student Research at BME (Budapest University of Technology and Economics)	2021
Qualified for the National Student Research Conference with a paper on STEP file-based automatic production time estimation	
Professional Scholarship for Exceptional Members of the BME German Bilingual Class	2019
BME Study & Sport Scholarship	2020
Outstanding Achievements in Hungarian Handball Championships	2020
Third Place, Hungarian University - College National Handball Championship	2020

Related Coursework

Modeling, Simulation and Path Planning

3D Path Planning for VTOL Drones
Implemented the A* algorithm on a 3D NumPy array representing complex terrain, ensuring climb and descend constraints were met, and smoothed the path for realistic drone delivery scenarios.

Path Planning Algorithms (Dijkstra, A*, RRT, RRT*, RRT-EP*, RRT-CONNECT, RRT-EP)
Implemented path planning algorithms for point and non-holonomic mobile robots, using priority queues and dictionaries for optimal path planning using Python.

ROS & ROS2
Implemented open and closed-loop control for an AGV and demonstrated pick & place scenarios with a robot arm using C++ and Python.

Control Theory

System Identification & Off-board Control (MODAL AI Drone)
Developed C++ application to implement MAVROS communication for acceleration, velocity, and position control, analyzing and visualizing data using Python and MATLAB.

LQR and LQG Controller Design (Double Pendulum)
Modeled nonlinear system dynamics, and performed simulation, and state estimation using MATLAB, including Luenberger observer, Kalman filter, LQR, and LQG controllers.

Ball Trajectory Estimation & Catching (Quadcopter)
Developed a State Machine in C++ using ROS packages to catch a ball with a quadcopter, integrating Kalman filtering using VICON for trajectory prediction and coordinate system transformations.

Stochastic Systems
The project involved analyzing and controlling an MAV system using a PD control strategy, it aimed to determine steady-state variances of angle and torque, optimize control gains to minimize variances, design compensator transfer functions, and employ LQR and LQG controllers to mitigate noise and disturbances in the system.

Computer Vision & AI

3D Mesh, Point Cloud, and Voxel Single-View Predictions
Implemented supervised and unsupervised AI models for predicting 3D structures, including mesh, point cloud, and voxel representations, from single- and multi- view images using computer vision techniques. Implemented image processing, object detection, and deep learning algorithms to generate accurate 3D reconstructions from 2D image