Kevin Robb

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Seeking opportunities to apply knowledge and software skills with autonomous behavior, path planning, navigation, and perception, as well as to expand electrical and mechanical experience.

Education

Northeastern University, Boston, MA 2021–2023

- M.S. Robotics (In Progress)

The University of Oklahoma, Norman, OK 2017–2021

- B.S. Engineering Physics & B.S. Mathematics (Double Major)
- Specialization in Computer Science
- Graduated Summa Cum Laude, ΦBK, and with 3.84 / 4.0 GPA
- Member of the *Robotics, Evolution, Adaptation, and Learning Laboratory (REAL Lab)* with Dr. Dean Hougen
- Letzeiser Senior Honor List 2021
- Award for Outstanding Scholarship, *Dept. of Physics & Astronomy* 2021
- Undergraduate Libraries Research Award and Scholarship. 2020
- Campus Life Award 2020

Skills & Experience

Languages: Python, R, C/C++, Java, LaTeX, Javascript, HTML/CSS, Bash, C#
Tools: Linux, Robot Operating System (ROS), Git, CAD/3D-Printing, Arduino, Raspberry Pi
Machine Learning: Evolutionary Computation, Reinforcement Learning, Neural Networks
Interpersonal: Leadership, Delegation, Developing Buy-In, Organization, Technical Writing

Work Experience

Office of Admissions & Recruitment, Campus Tour Guide, Team Lead 2018–2021

- Gave general & personalized walking tours to prospective students & families.
- As team lead, delegated tasks on shift, oversaw interviews, and trained new guides.

Garmin International, Software Engineering Intern (almost) 2020

- Offer rescinded due to Covid-19, but I was able to attend virtual seminars throughout the summer on topics such as GPS and aviation, and work with a mentor on my own projects.

Robotics Projects - ***Sooner Competitive Robotics (SCR)***

The Aluminum Whale (IGVC), Team Captain 2021

- Won first place in the 2021 Intelligent Ground Vehicle Competition, Auto-Nav Challenge.
- Derived and implemented an Extended Kalman Filter (EKF) to maintain robot localization via sensor fusion of GPS, IMU, and encoder measurements. Built in robustness to maximize functionality if one or more sensors fail, which did happen at the competition.
- Designed CAD assembly of the robot and custom-printed several parts (e.g., the LiDAR mount).
- As captain, managed seven-person team, kept track of competition requirements, handled meetings for funding and support from our university, and made all travel arrangements. I also wrote the bulk of our 15-page design report and planned our oral presentation.

NRC Autonomous Vehicle Competition, Software Lead 2020

- Built for the National Robotics Challenge, but was cancelled due to Covid-19.
- Small autonomous racecar which must complete a known course as fast as possible, with immediate disqualification for crossing boundaries only marked by cones at the vertices.
- As software lead, created overall ROS architecture and ensured all nodes functioned together.
- Designed navigation system to accept a generated trajectory of coordinates, and used Pure Pursuit and a PID controller to publish a commanded heading and velocity.

SCR Software Challenge, Independent Project 2020

- In-house simulated robotics competition that Sooner Competitive Robotics hosted in Summer 2020 due to remote work requirements and cancelled competitions/internships.
- An autonomous robot is given GPS coordinates of the start, end, and three intermediary waypoints, and must hit all waypoints in order while avoiding obstacles. Positions of waypoints and obstacles are randomized at the start of every run.
- I used GPS, IMU, and encoder data to localize and pursue the path to the next waypoint in a queue, publishing commands similarly to my work with NRC.
- A control node receives the command and searches for obstacles with LiDAR. If a potential collision is detected, it forces a halt and a path re-plan; otherwise it executes the command.

Other, less interesting projects:

- *The Rat Van*, personal robot I built when I got my own 3D printer 2021
- *Mercury Remote Robot Challenge*, 2nd Place, Co-Captain 2019
- *RoboGames' Sumobot Competition*, 5th Place, Freshman Team Captain 2018

Research - ***Robotics, Evolution, Adaptation, and Learning Laboratory (REAL Lab)***

Improving Mobile Robot Perception Using a Kalman Filter and Machine Learning 2021

- Year of independent research for my Engineering Physics Senior Design Project.
- Derived and implemented a 4D Kalman Filter to accurately track global position and velocity
- Created several Bash and R scripts to gather and plot generated data automatically.
- Used evolutionary computation methods to optimize KF parameters beyond previous manual tuning and achieve near-perfect localization.

Reinforcement Learning, Nurturing, and the Evolution of Risk Neutrality 2019

- Created Java codebase to simulate an evolving population of agents, and designed a genetic algorithm to explore the progression of risk levels when exposed to changing reward states and the influence of nurturing behavior.
- Published in The Honors Undergraduate Research Journal (*THURJ*).

Hackathon Projects ***Hacklahoma***

Fantasy Dice, "Retro" theme, 2nd Place 2021

- Mobile web-app with D&D character sheet importing, user customization, and streamed video of physical rolling dice. I made the back-end server.

Stemmy, "STEM Education" theme, 3rd Place 2020

- Web-app intended for classrooms to practice addition together in private lobbies.
- I developed the back-end logic and leaderboard system in Python using socket.io.

Bee Clicker, "Save the Bees" theme 2019

- Made a web game designed to instill in the player a care for honeybees.
- Still playable at beeclick.org.