

Andrew Scheffer

Curriculum Vitae

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"If you only do what you can do, you will never be more than who you are." — Master Shifu, Kung Fu Panda

Education

Aug 2023 - **Master of Science**, UNIVERSITY OF MICHIGAN, Ann Arbor

- Present
- *Major*: Computer Engineering (focus in robotics)
 - *Expected Graduation*: May 2024
 - *Selected Coursework*: Advanced Computer Vision, Navigation and Guidance of Aerospace Vehicles, Robotics Systems Lab

Aug 2020 - **Bachelor of Science in Engineering**, UNIVERSITY OF MICHIGAN, Ann Arbor

- May 2023
- *Major*: Computer Science and Engineering
 - *GPA*: 3.97/4.00 (summa cum laude)
 - *Selected Coursework*: Advanced Autonomous Robotics, Operating Systems, Computer Vision, Natural Language Processing, Algorithms, Probability and Statistics

Work Experience

May 2023 - **NASA Jet Propulsion Laboratory**, Pasadena, California

- Present
- ROBOTICS SIMULATION INTERN
- Deployed software-in-the-loop simulation features relating to downlink command parsing, rover kinematic state, and rover collision modeling for Mars 2020 and Mars Sample Return missions.
 - Worked in a team to develop the initial Mars Sample Return surface simulation stack. This included researching, designing, and implementing a custom deterministic multithreading library in C++ from scratch.
 - Currently developing simulation and uplink systems for the lunar CADRE mission.

Jan 2023 - **University of Michigan, Ann Arbor, Michigan**

May 2023 OPERATING SYSTEMS STUDENT TEACHER

- Taught a 30-student lab section and held office hours for a project-heavy class "Introduction to Operating Systems" (EECS 482). Some concepts included: multithreaded programming, virtual memory paging, and distributed programming.
- Completed inclusive teaching training and cultivated an inclusive learning environment to better serve students and promote academic and social well-being in the CSE community.

May 2022 - **Garmin, Olathe, Kansas**

Aug 2022 AVIATION SOFTWARE ENGINEERING INTERN

- Formulated both modular and fuzz testing schemes in an effort to rigorously certify a new graphics driver to be used in Garmin's aviation products.
- Researched, identified, and developed significant modifications to the automated testing framework by creating new testing tools using libclang, saving two "person-months" of effort.
- Developed an entire graphics pipeline in C++ using the Vulkan API.

Research Experience

March 2022 - **iRaL Morphable Drone Project, Ann Arbor, Michigan**

Present STUDENT RESEARCHER under Prof. Vasileios Tzoumas

- Researched and implemented components of a new geometric controller for quadrotors with extra degrees of freedom. Tested and identified limitations using the RotorS simulator.
- Self-taught a graduate course on the dynamics and control of quadrotors and applied that knowledge to the morphable drone formulation.
- Modified the widely used PX4 flight controller to support geometric controllers for asymptotic quadrotor maneuvers.

Aug 2021 - **Michigan Autonomous Aerial Vehicles, Ann Arbor, Michigan**

Aug 2023 SOFTWARE TEAM LEAD

- Responsible for designing and implementing a completely autonomous software stack for a quadrotor using ROS integrated with the PX4 flight controller.
- Recent projects include designing a Docker environment to support a seamless development environment, implementing a depth camera driver that publishes data to ROS, and designing a visual servoing algorithm for tracking random oscillatory motion.
- Managed the development and integration of path planning, localization, and computer vision algorithms.
- Taught new members fundamentals of robotics and software development (version control, forward/inverse kinematics, ROS, etc).

June 2020 - **MIT Proto Ventures Healthcare Research**, *Virtual*

April 2022 STUDENT RESEARCHER under Luis Soenskin

- Successfully preprocessed hundreds of thousands of images of dermatological diseases employing computer vision algorithms in Python and exported trained model to iOS app with Swift.
- Spearheaded the development of a dataset that differentiates both body parts and Fitzpatrick skin types in images to be used by telehealth systems to provide more equitable care to underrepresented groups.
- Utilized computer vision algorithms such as foreground segmentation, body pose identification, feature matching, and noise filtering to quickly and efficiently preprocess image data.

May 2021 - **AR Architecture and Photogrammetry Project**, *Ann Arbor, Michigan*

Aug 2021 APP DEVELOPER under Dawn Gillipin

- Researched, designed, and programmed an IOS app that allows users to scan white architectural models and make .obj files using 3D feature point placement.
- Worked with EIPC at UofM to create photogrammetry solutions for architectural modeling.

Notable Projects

Sept 2023 - **fLip the Script: Lip Reading with Textual Priors**

Dec 2023 ADVANCED COMPUTER VISION CLASS PROJECT

- Formulated the task of automated lip reading as an ambiguous translation task.
- Fine-tuned large language models conditioned on visual lip embeddings to produce plausible text output.

Jan 2023 - **Depth-appended Tabletop Recycling Algorithm for Segmenting Havoc**

April 2023 DEEP ROBOTIC PERCEPTION CLASS PROJECT

- Recreated results from a popular work in the area of Unseen Object Instance Segmentation (UOIS).
- Extended this research by showing that the addition of a Depth-Prediction Network (DPN) significantly improved results over the standard RGB implementation.

Sept 2022 - **Search And Rescue Autonomous System (SARAS)**

Dec 2022 AUTONOMOUS ROBOTICS CLASS PROJECT

- Developed a robotic teaming system that aimed to localize and assist a stranded "blind-bot" with no access to external sensor information.
- Fully implemented motion controller, particle-filter-based SLAM, high-level planning, and camera calibration/detection.

Awards and Recognitions

Feb 2023 **MHacks Hackathon Winner**, MICHIGAN STATE UNIVERSITY

- In 72 hours, created a disaster safety system that used Augmented Reality to provide accessible location information to users and law enforcement in times of need.

Aug 2021 - **James B. Angell Scholar**, UNIVERSITY OF MICHIGAN

- May 2023 ○ Awarded to students who earn grades of all A+, A, or A- for two or more consecutive terms.

March 2021 **William J. Branstrom Freshman Prize**, UNIVERSITY OF MICHIGAN

- Awarded annually to first-year undergraduate students whose academic achievement during their first Fall term on campus places them in the upper five percent of their college class.

May 2020 **A.H. Nickless Innovation Award**, A.H. NICKLESS FOUNDATION

- A friend and I wrote an IOS App to optimize cost-effective and healthy meal plans for people who are food insecure, especially during the Covid-19 crisis.
- I played a leadership role, created a business plan, and crafted a genetic algorithm and app environment. Our team ended up winning 1st place – securing nearly \$25,000 in scholarships and an award of \$20,000 for our high school.