SHANE BLINKMAN

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Professional Summary

As a second-year master's student at Stanford University's School of Engineering, I am advancing my studies in mechanical engineering with a concentration in mechatronics. I completed my bachelor's degree in mechanical engineering at Stanford, specializing in dynamic systems and controls, and completed four years as a varsity athlete and captain of the Men's Swim Team.

Throughout my five years at Stanford, I've gained extensive hands-on experience in diverse engineering projects—from designing a wearable rehabilitative device for children with spastic cerebral palsy to building autonomous systems that integrate mechanical, electrical, and software components. My passion lies in robotics and embedded systems, particularly in expanding my knowledge of computer vision, motion planning, and PCB design.

With a robust foundation in dynamic systems mechanics, my technical toolkit spans mechanical (SolidWorks, prototyping, manufacturing), electrical (PCB design, embedded systems, signal processing), and software domains (C/C++, Python, MATLAB).

Career Objective

Seeking to apply my interdisciplinary skill set to innovative, interdisciplinary projects. I thrive in fast-paced environments where team members are empowered to drive projects from conception to completion.

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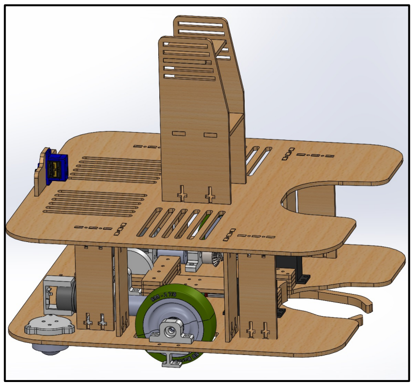
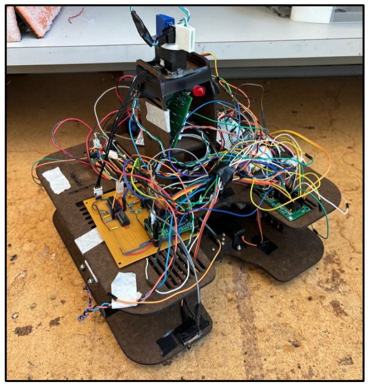
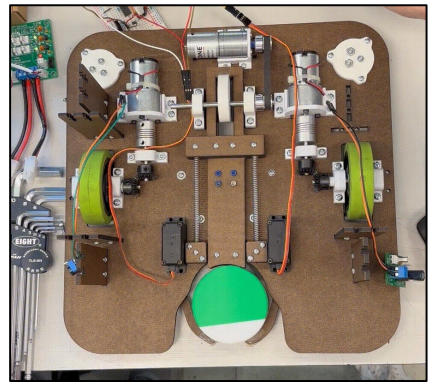
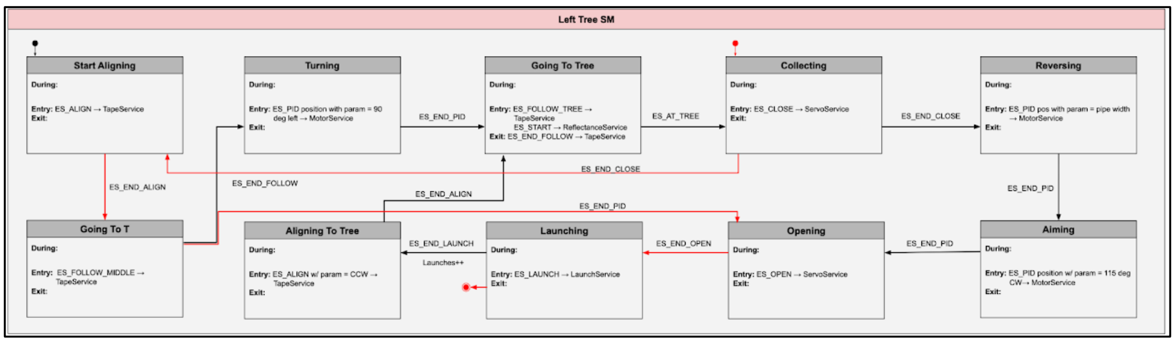
Autonomous Object Handling and Navigation Robot

CAD model of the robot structure alongside the assembled robot with integrated electronics.



Bottom layer of the structure showing the object collection and launching mechanisms.

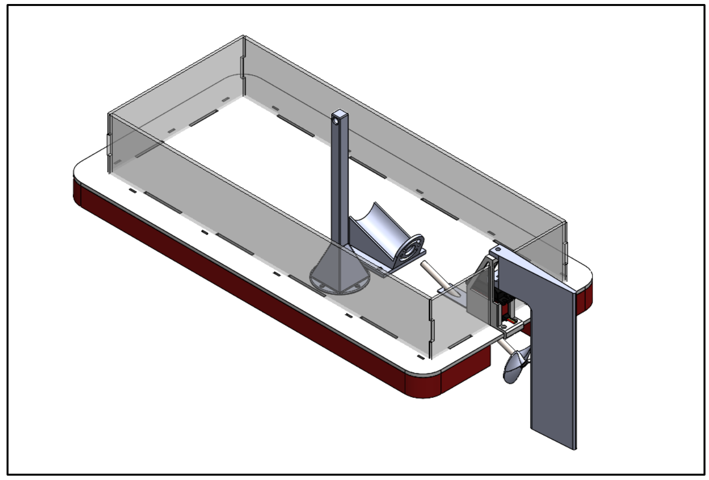


Third layer of the hierarchical state machine (HSM), showing events and services guiding the robot's autonomous navigation to a beacon on the field.

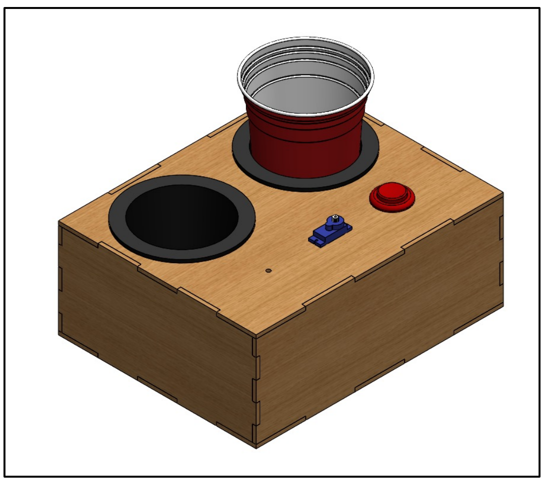
- Designed and built an autonomous robot to navigate, collect, and launch objects in a competitive game setting, with the primary goal of efficiently removing objects from its designated area to outperform an opponent.
- Developed a compact, multi-layer structure with dedicated subsystems for drive, object handling, and navigation.
- Implemented object collection using servo motors and a powerful snail cam-driven launching mechanism.
- Achieved navigation through PID-controlled tape following, IR signal processing, and bumper switches for obstacle detection.
- Faced challenges with tape-following and wall detection due to signal interference, which required extensive troubleshooting and adaptive solutions in field testing.
- The project demanded strong skills in project management, subsystem testing, state machine programming, and advanced debugging to overcome issues and achieve operational functionality.

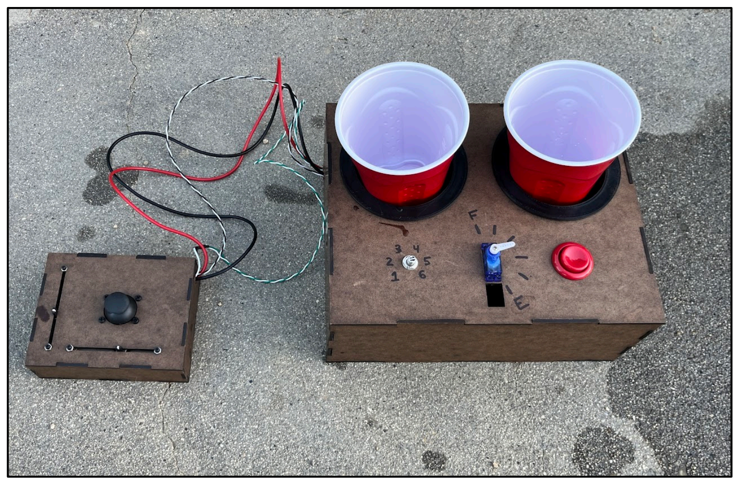
Full report at <u>https://tinyurl.com/ScratPackProject</u>

Remote-Operated Watercraft with Dynamic Control



Physical prototype of the boat constructed from pink foam, laser-cut acrylic, and 3D-printed ABS, alongside the CAD model used for construction guidance.



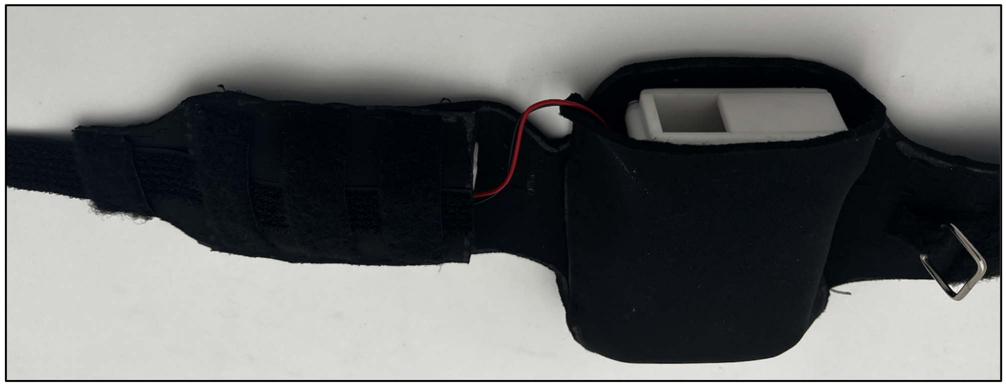


CAD model and physical prototype of the remote operation controller, displaying fuel and connectivity information.

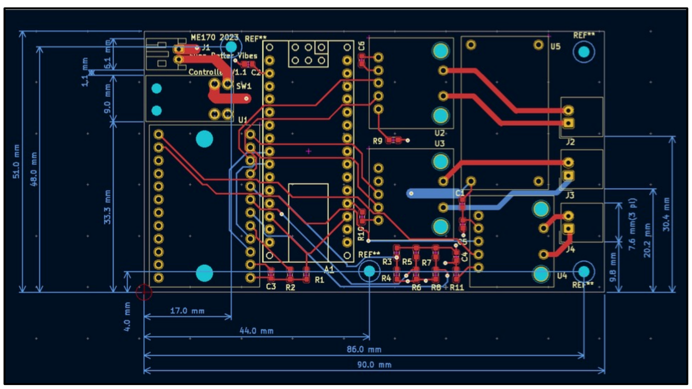
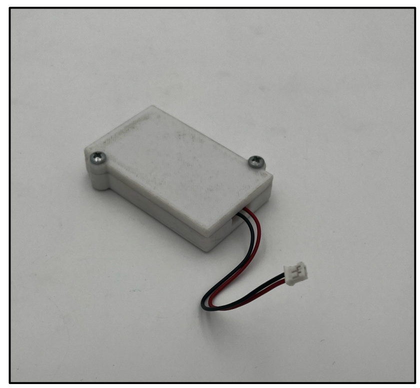
- Designed and integrated custom components for buoyancy, propulsion, and control to create a remote-operated watercraft.
- Coordinated technical subsystems within the controller and the boat to enable reliable radio communication and effective remote operation.
- Conducted iterative testing to guide design improvements, supporting robust system integration and troubleshooting across software and hardware.
- Gained valuable insights from challenges with propulsion efficiency and an unexpected potentiometer failure caused by securing bolts, highlighting adaptability and problem-solving skills.

Full report at https://tinyurl.com/NautiByNatureProject

Wearable Vibration Device for Spastic Cerebral Palsy Gait Therapy

Brace worn on a volunteer's leg, designed for comfort and to securely house the device and battery pack.

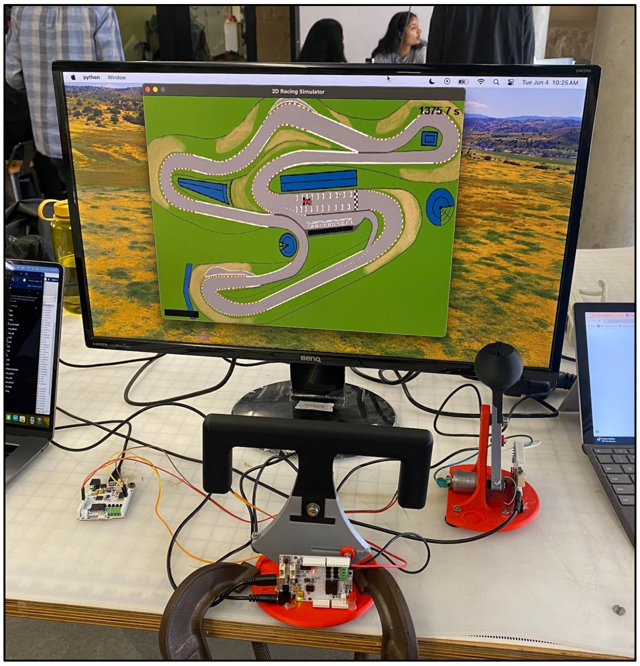



Designed a PCB that reduced weight by 44% and footprint by 48% compared to the previous version, protected by a refined 3D-printed casing.

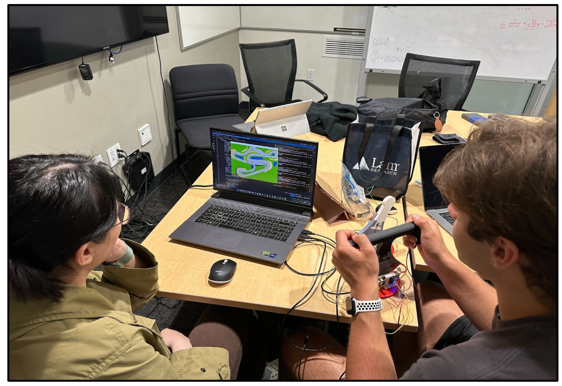
- Developed a lightweight vibrational device for spastic cerebral palsy rehabilitation
- Designed to improve gait by providing vibrational cueing to key muscles during specific phases of the gait cycle.
- The device is aimed at enhancing clinical research and future rehabilitation for spastic cerebral palsy.
- The design includes a custom PCB with integrated gyroscope and machine learning model, housed in a compact, durable casing attached to a neoprene brace, which secures the device on the user's leg and aligns vibration motors to target muscles effectively.
- The device meets high priority requirements for durability, comfort, and secure fit, validated through stress and comfort testing.
- Project learnings include the importance of ethical considerations, including accessibility, cost-efficiency, and device discreteness, all crucial for designing assistive technologies that support user dignity and broad availability.

Full report at https://tinyurl.com/GaitTherapyProject

Racing Simulator with Haptic Feedback and Dynamic Control



Racing simulator set up on demonstration day, showcasing the steering wheel, hand pedal, and racetrack.



A teammate and I testing and iterating on the haptic feedback and track dynamics.

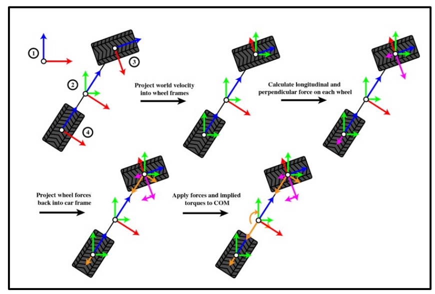


Illustration of the vehicle dynamics derivation, which governed the haptic feedback.

- Developed a haptic steering wheel and 2D racing simulator to study the effects of haptic feedback on driving performance.
- Simulated realistic vehicle dynamics with force and vibration feedback to enhance immersion, with potential applications in future drive-by-wire systems.
- steering, vibration, and speed controls to allow users to experience acceleration forces and off-track tactile feedback.
- Utilized a 2D vehicle dynamics model, a custom steering wheel with embedded vibration motors, and a simulation environment created in Python.
- User testing showed positive feedback on the simulator's realism, though some stability issues emerged during aggressive use.
- Survey results highlighted strong ratings for vibration and torque feedback, with suggested improvements including hardware upgrades and additional track options.

Full report at https://tinyurl.com/HapticRacingSimulatorProject