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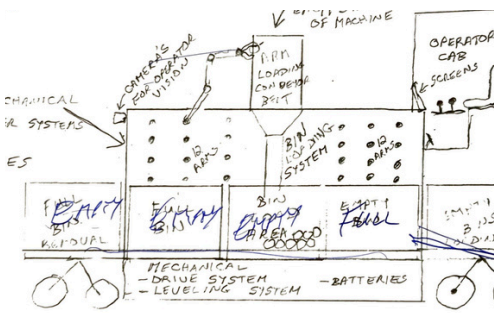
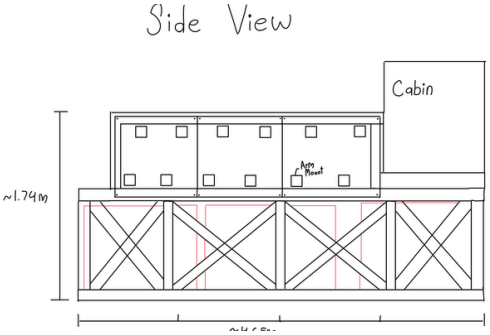
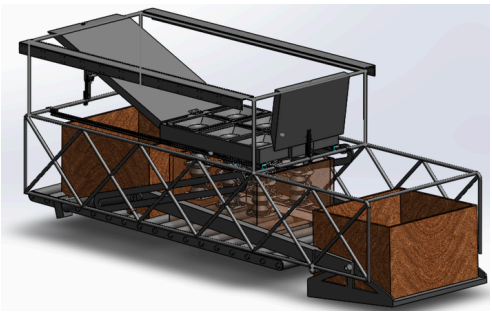
PICKASAURUS - CAPSTONE







What?

- Worked in a team to design aspects of an autonomous vehicle capable of picking apples in an orchard
- Modeled and designed proof of concept based on research and continued development

How?

- Used **SolidWorks** to 3D model the design
- **Simulated** weight constraints to ensure the design met **Safety requirements**

Results

- Delivered a functional proof of concept for the frame, bin-loading, and apple-loading aspects of the project

VIDEO GAME - PERSONAL PROJECT

What?

- Designed and developed a top-down 2D wave-based combat game set in a medieval environment.
- Implemented engaging core gameplay mechanics, including player movement, combat, and health systems.

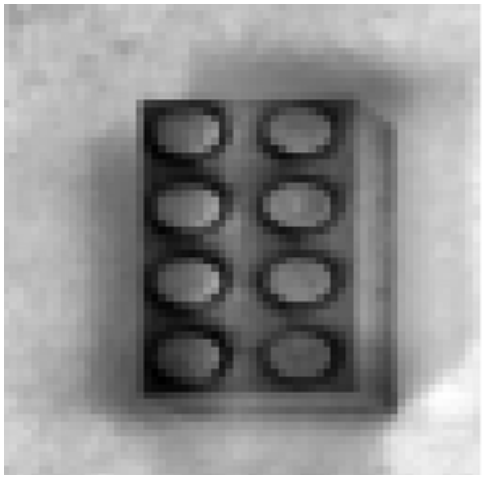
How?

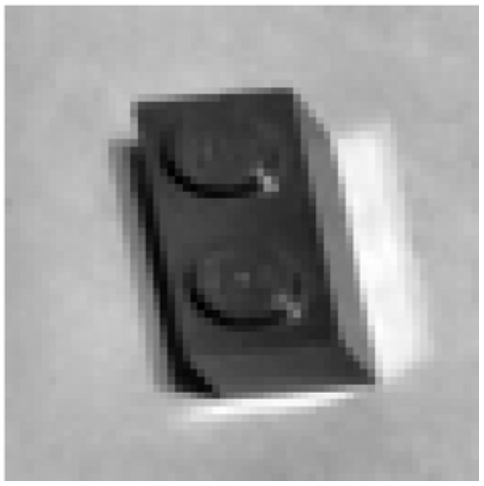
- Utilized **Unity** for game development, integrating 2D assets and animations.
- Wrote modular **C#** scripts to handle enemy AI, wave spawning, and collision detection.

Results

- Delivered a functional and polished game demo showcasing core mechanics.
- Published the game on **itch.io**, receiving positive feedback on gameplay and design.
- Demonstrated proficiency in Unity and C# game development to enhance portfolio visibility.

LEGO CLASSIFICATION (MACHINE LEARNING)- ENGR 418





What?

- Developed a **Python** program to classify LEGO pieces by type using input images.
- Addressed challenges in image-based classification, such as inconsistent lighting and rotation.

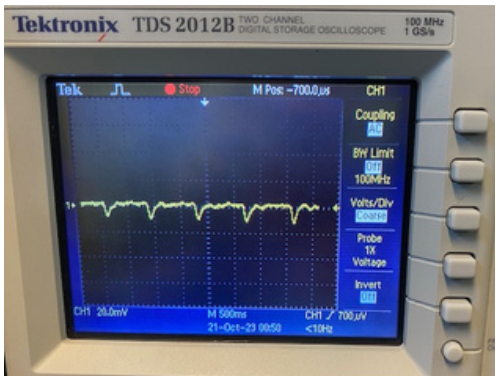
How?

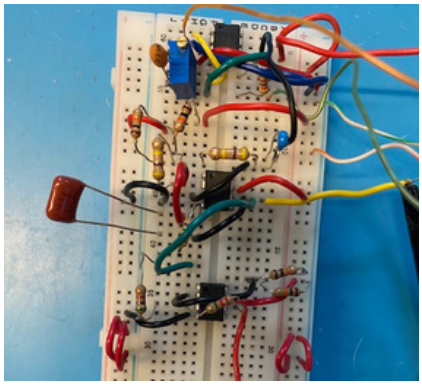
- Applied **feature engineering** techniques, including grayscale conversion, cropping, contouring, and edge detection, to optimize input image quality.
- Trained a **Logistic Regression** model for classification, enhancing accuracy with targeted image processing features.

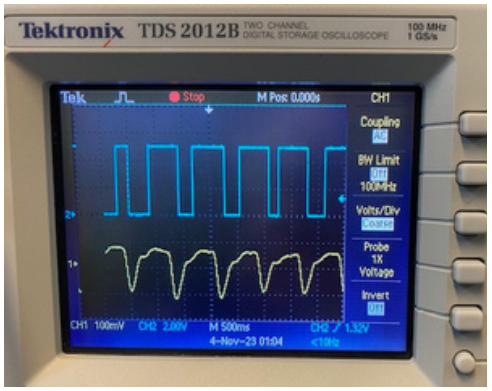
Results

- Achieved an accuracy of over 80% in classifying LEGO pieces despite challenges with non-ideal images.
- Identified rotation and lighting inconsistencies as key error sources, highlighting areas for future improvement to avoid over fitting.

HEART RATE SENSOR - ENGR 451







What?

- Designed and implemented a heart-rate sensor circuit capable of real-time monitoring.
- Combined optical components (IR emitter and photodiode) with analog circuitry to detect and process heart-rate signals.
- Applied practical circuit design methodologies commonly used in electrical engineering.

How?

- Built and tested the circuit using tools like the **Oscilloscope** and **DC Power Supply** for accurate signal capture.
- Used **capacitors**, **resistors**, an **amplifier**, and a **comparator** to filter, amplify, and shape the heart-rate signal.
- Optimized and debugged the design through iterative testing and adjustments.

Results

- Successfully captured clear heart-rate signals with a functional sensor and stable square wave output.
- Developed proficiency in circuit design, assembly, and troubleshooting through hands-on lab work.
- Identified potential improvements, such as enhanced signal stability and noise reduction, for future iterations.