Project Purpose

[handwritten: the popular tabletop game ↓]

This project aims to implement a unique automated version of Connect 4, allowing players to practice online against a computer or another player.

Proposed Solution

[handwritten: actuators such as ↓]

The project will be a small integrated system that will control DC motors, solenoid motors, Infrared sensors, wall power supply, and web app interface.

A database will be used in this project to store past games' player's win streaks and be used to play the game on the web browser. It will also log events and flags if something unexpected occurs during gameplay.

Specifications

- Infrared sensor for disc placement detection

- Have a (hooper) system to drop the disc on the computer players turn *[handwritten: hopper]*

- Update the Web browser *[handwritten: ↗ User interface]* to show the placement of the piece

- DC motor as a left-to-right movement for piece dropper *[handwritten: linear]*

- Solenoid motor in the hopper for disc release

- Micro-board *[handwritten: Microcontroller ↗]* send Post requests to server

- Record the position of a dropped piece

- LCD Screen to show players Turn

- Record win streak and save games in log files

Innovation Strategy *[handwritten: ^ning]*

[handwritten: probably]

We will explore a new microcontroller, the Raspberry Pi Pico W, which hasn't been introduced into the program. Additionally, we will further explore components that have not been implemented into the program, such as:

[handwritten margin note: Don't get too Specific about which parts]

- IP/DNS/MAC Addresses *[handwritten: Network Protocols]*

- 3D Design for loading player chips

- Real-Time Processing

This project will allow individuals play with people online while implementing something that gives feedback that is physical

KNOWLEDGE AND SKILL GAPS:

Familiar Areas:

- Solenoids, sensors, and motors are crucial parts of the project that we know more about.

Areas Needing More Research:

- Syncing software and hardware over ~~Wi-Fi~~ *wireless*
- Design of the hopper system
- Power management
- Dropping ~~system~~ *hardware* 3D Design
- Calibration of motors and sensors
- Power Options (~~Battery Option, wall outlet~~) ~~5v system or 12v~~ *(Source , output)*

Potential Concerns:

- Ensuring seamless integration between hardware and software components
- Effective power management and system calibration
- Ensuring each players turn with either a camera or use an honor system
- *Reliability of* Dropping system of chips (~~Jam in hopper~~) *for*

Resource Requirements

Components needed for build:

- 1x MicroController (Raspberry Pi Pico W)
- 7x Sensors and LEDs (Infrared Sensor)
- 1x DC/Stepper Motor
- 2x Solenoids
- 1x Game Board — *Budget for 2*
- Power Supply
- 3D model for hopper
- 1x LCD screen
- Database
- Web Server with IP or Domain

Timeline

Week	Activity
	During weekdays
	• Course Introduction
1	• Project idea Exercise
	During Weekdays
	• Project Proposal Draft
	• 2 min presentation on the Project
	• Project Proposal submission
	During Weekend
	• Order Parts
	• Start to explore the IDEs/Software that are being used
	• Learn about Communication between micro and server
2	• Learn about IP/MAC/DNS
	During Weekdays
	• Design motor driver circuits (Main DC Motor)
	• Add Firmware Feature: Motors and Infrared Sensor
	• Start building Logic on "AI bot" to make for the automated Connect 4 game
	• Connect the circuit to check for sensor/motors feedback
	During Weekends
	• Master the logic on how it will be done through research and understanding
3	• Double check for all the feedbacks are valid
	During Weekdays
	• Start to implement logic on the MCU (on "AI bot")
	• Implement the feedback on the MCU (Sensor and motors)
	During Weekends
	• Do the same work on the MCU
4	~ Wouldn't be a easy process so this may take time depending on how easy it would be for us to diversify into different system
	During Weekdays
	• Add firmware feature: Managing network interface
	• Add firmware feature: Store system event and sensor data in database
	• Testing Communication plus using the feature firmware for storing data
	During Weekends
	• Progress on what was worked on weekdays
	• Start the UI web-browser (Maybe Web-app
5	• Depending on how motivated we are at this time)
	During Weekdays
	• Checking Communications and test code
	• Working on the coding and iron out any errors or holes in code
6	• Work time 4
	• Work Time
	• Start to design the structure of the project
7	• Print the 3d model
	• Work Time
	• Debug Any features
	• Work on SSL/TLS connection and firmware having a dynamic DNS service
8	• Progress Report Submission

(handwritten note in right margin) Good, but you don't need to be this detailed yet.

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