Automated Connect Four Game
CMPE2965_A03
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Project Purpose

This project implements an automated version of Connect Four, allowing players to practice and play online against an AI Bot or another player.

Proposed Solution

This project will develop a compact integrated system to control DC motors, solenoid motors, infrared sensors, a wall power supply, and a web app interface. An online database will be utilized to save and track players' win streaks, usernames, and win percentages.

Specifications

Specifications for the Connect Four automated game include:

- Infrared sensor for disc placement detection
- Hopper system to dispense a disc
- DC motor for linear movement for disc dropper
- Solenoid Motor in hopper for disc release
- Record position of dropped disc
- User Interface to show the placement of disc
- LCD screen shows players turn
- Microcontroller send data to server
- Record win streak tracked on the database

Innovation Strategy

This project will utilize a Raspberry Pi Pico W, which has not been introduced into the program. Additionally, this project will further explore components that have not been implemented into the program, such as:

- Network Protocols
- 3D Design for loading player chips
- Real-Time Processing

This project will provide individuals to play Connect Four with people online, while also implementing physical hardware for more interactive experience.

KNOWLEDGE AND SKILL GAPS:

Familiar Areas includes:

- Solenoids
- Sensors
- Motors

Areas that will require more research are:

- Syncing software and hardware over wireless
- Design of the hopper system
- Power usage

- 3D Design hardware for dropper system
- Calibration of motors and sensors
- Power Options (Battery Option, wall outlet)

The potential concerns throughout this project are:

- Integration between hardware and software components
- Power usage and system calibration
- Reliability of Dropping system for chips

Resource Requirements

Components needed for automatic Connect Four games:

- 2x MicroController (Raspberry Pi Pico W)
- 10x Sensors and LEDs (Infrared Sensor)
- 2x DC/Stepper Motor
- 4x Solenoids
- 2x Game Board
- Power Supply
- 3D model for hopper
- 2x LCD screen
- Database
- Web Server with IP or Domain

Timeline

Week	Activity
1	During weekdays ● Course Introduction ● Project idea Exercise
2	During Weekdays ● Project Proposal Draft ● 2 min presentation on this 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 ● Learn about IP/MAC/DNS
3	During Weekdays ● Design motor driver circuits (Main DC Motor) ● Add Firmware Feature: Motors and Infrared Sensor ● Start building Logic on an “AI bot” to make for the automated Connect Four game ● Connect the circuit to check for sensor/motor feedback During Weekends

	• Master the logic of how it will be done through research and understanding • Double-check that all the feedbacks is valid
4	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 ~ Would not be an easy process so this may take time depending on how easy it would be for us to diversify into different system
5	During Weekdays • Add firmware feature: Managing network interface • Add firmware feature: Store system event and sensor data in the 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 app Depending on how motivated we are at this time)

6	During Weekdays ● Checking Communications and test code ● Working on the coding and ironing out any errors or holes in the code ● Work time
7	● Work Time ● Start to design the structure of the project ● Print the 3d model
8	● Work Time ● Debug Any features ● Work on SSL/TLS connection and firmware having a dynamic DNS service
9	● Progress Report Submission ● Debug and work on Fixing ● Add any other feature/QOL extensions (Work on it if there is time)
10	● Test system integration ● Work on prototype
11	● Debugs/Adding extension features ● Work on prototype
12	● Debugs/Adding extension features

	• Work on prototype
13	• Debugs/Adding extension features • Work on prototype
14	• Practice presentation/video of it working • Prototype Grading
15	• Final Technical Report submission • Final presentation rehearsals • Final presentation • Project demonstrations