Assumption College Samutprakarn

PROJECT REPORT IN COMPUTER

"TECHOASIS"

Multipurpose robot system

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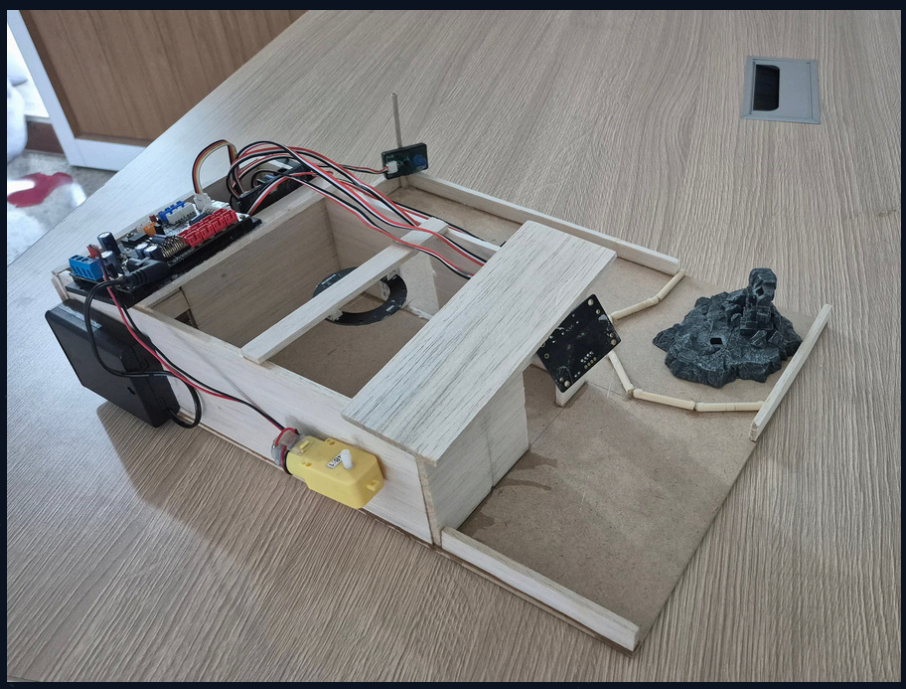
TECHOASIS CAFE

INTRODUCTION



Welcome to Techoais Cafe a cozy, tech-enhanced space where innovation meets comfort! Here, doors open as you approach, lights adjust with the daylight, and customizable mood lighting sets the perfect ambiance for any moment. The outdoor zone setting in a peaceful nature scene will make you have great impressiveness. It’s more than just a cafe; it’s a seamless blend of convenience and relaxation, designed to make every visit memorable.

OBJECTIVES

- To make managers/workers manage their applications easily
- Enhance Energy Efficiency
- Improve Customer Comfort and Convenience
- Create a Dynamic Ambiance from Neopixel

KEY COMPONENTS

SENSORS

- Temperature sensor- detect temperature when the temperature in room too hot, system will close the curtain.
- Ultrasonic sensor - when have people or object near the window the system will not working due to safety.
- Servo motor - for control the motion of the window and curtain.
- Light sensor - detect the day light when to open and close curtain.
- Water sensor -detect the rain when to close the window.
- Switch - For manually control in case of the system error.

ACTUATORS

- Buzzer- Produce an alarm when the system will start working for warn people to not move too close t othe project
- LED- Show the status of the rain when the water sensor start detect liquid LED will show the light for showing the window is gonna work.
- NEOPIXEL RING- show the value of the temperature and sunlight it will start turn on form yellow into red depend on the temperature and sunlight

CONTROL UNIT

- Esp32 micro controller: Act as the brain of the system, processing data from sensors, controlling the display, and managing alerts. It's programmed to activate the alarm based on sensors readings.

COMMUNICATION MODULE

- Wi-Fi Module (if ESP32 isn't already used) : send alerts to a mobile device or cloud service for remote monitoring.

DISPLAY UNIT

- OLED display : show realtime temperature, sunlight and rain level and system status to keep users informed about current conditions.

SYSTEM ARCHITECHTURE

DESCRIPTION OF PROJECT

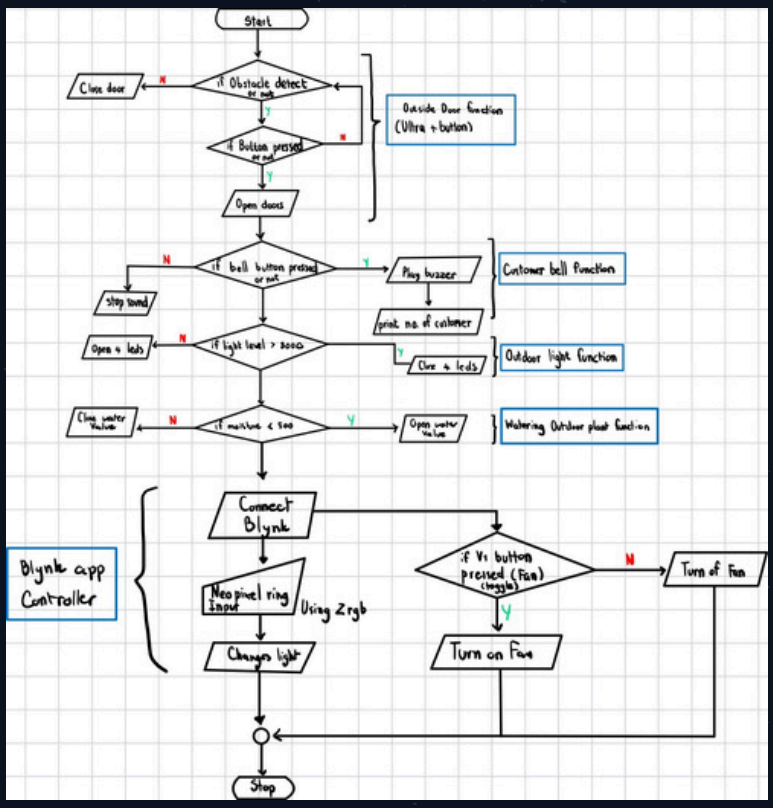
Systems | Blynk and Board || Boards Indoor |
-if ObstacleDetect && ButtonPressed
---> Open doors(Motor) ---> Customer walks to Customer bell ---> Pressed bell button ---> Buzzer plays

| Boards Outdoor |
-if light level < 3000 ---> turns on the light
---> if moisture in soil < 500 turn on water pump(servo)

| Blynk app/website |
-if user input Neopixels color ---> color changes ---> if Virtual button pressed(V1)
--->Turn Fan on (motor)

INPUT BUTTONS,ULTRASONIC,SOIL MOISTURE
PROCESS Ultrasonic ----> Buzzer ----> Light Sensor ---->Soil Moisture
OUTPUT RGB LIGHT,LED,BUZZER,MOTOR

SYSTEM ARCHITECHTURE DIAGRAM



TECHOASIS CAFE

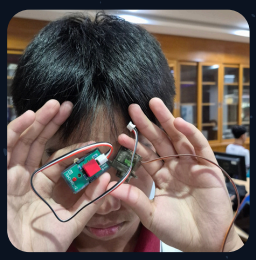
METHODOLOGY

WEEK 5

Collecting the Components

Ultrasonic Sensors : One of our sensors to detect people came in and out cafe.

RGB LED Ring and Light Sensor : Adjusts café mood lighting and brightness automatically based on surroundings.

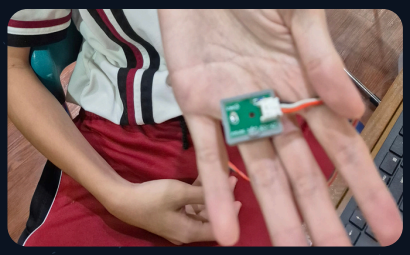


The switch and servo : Controls water pumps of the cafe and some other components.

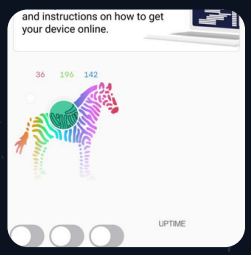
Motor : To open the front door automatically and efficiently.

The main power supply is x4 2AA Batteries which are our main power for entire automactic cafe system.

The ESP32 microcontroller and iKbz-1 are the brains of our system.And it's connects all components including Blynk cloud to our code.And including buzzer and display unit which is Oled display.



Earth is holdong the light sensor which is used to detect light at outdoor zone to managing leds to turn on/off for saving energy automatically.



To have a greatly acess to the lightings in cafe,we use Blynk Cloud app which make RGB room with Neopixels.

Next is holding the soil moisture which is used in the watering automation to set when will water pump will turn on/off.

The temperature sensors is waht Nex is holding right now. It'll be use with another motor to swing Fans at outdoor cafe.

TECHOASIS CAFE

METHODOLOGY

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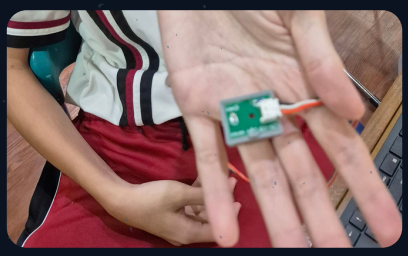

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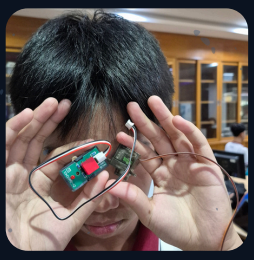

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TECHOASIS CAFE

METHODOLOGY

WEEK 5

PLANNING THE LAYOUT

Our smart café is designed to blend modern IoT technology with a seamless user experience. The entrance features servo motors that automatically open the doors when customers approach, creating a welcoming and touch-free entry. Inside, light sensors adjust the brightness based on ambient light levels, ensuring the café remains energy-efficient and comfortable throughout the day. An RGB LED ring adds a customizable ambiance, allowing the lighting to change based on the mood or special events. To enhance airflow, motors control ceiling fans, providing a cool and pleasant environment. Additionally, we've integrated a buzzer to serve as a custom bell, notifying staff or signaling events. These technologies come together to create a modern, efficient, and customer-friendly café environment, showcasing the possibilities of IoT in everyday spaces.

TECHOASIS CAFE

METHODOLOGY

WEEK 6-7

PLACING ALL THE COMPONENTS

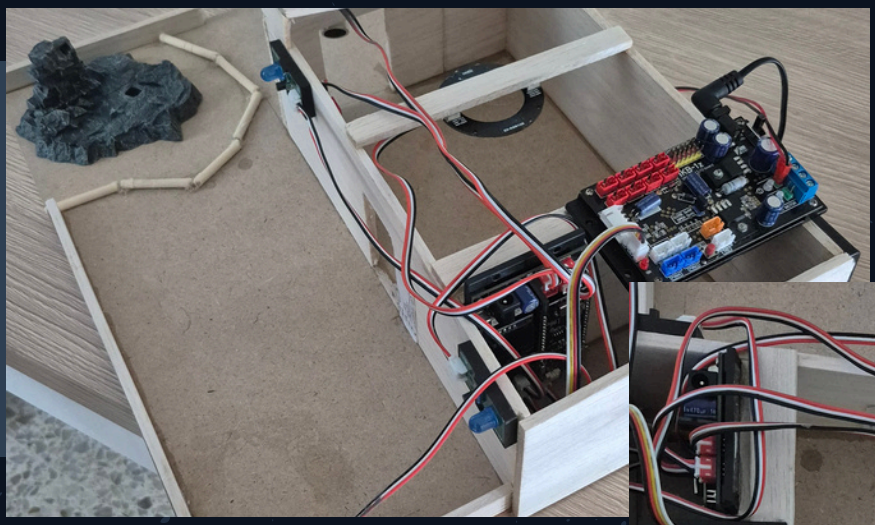
I envision a smart café that utilizes IoT technology to enhance customer experience and operational efficiency. While my team and I were placing the components, we carefully integrated servo motors at the entrance to automate door opening, providing a hands-free and modern entry experience. We installed motors to control ceiling fans, ensuring a comfortable environment by adjusting airflow automatically. Light sensors were strategically positioned to optimize energy usage by controlling lights based on the café's natural lighting conditions. To add a dynamic touch, we set up an RGB LED ring to create customizable lighting effects, perfect for setting the mood during different times or events. Additionally, we incorporated a custom bell system using a buzzer, allowing staff to receive notifications or signal order completions. This collaborative effort not only brought our vision to life but also demonstrated the potential of IoT in transforming everyday spaces into smart, interactive environments.

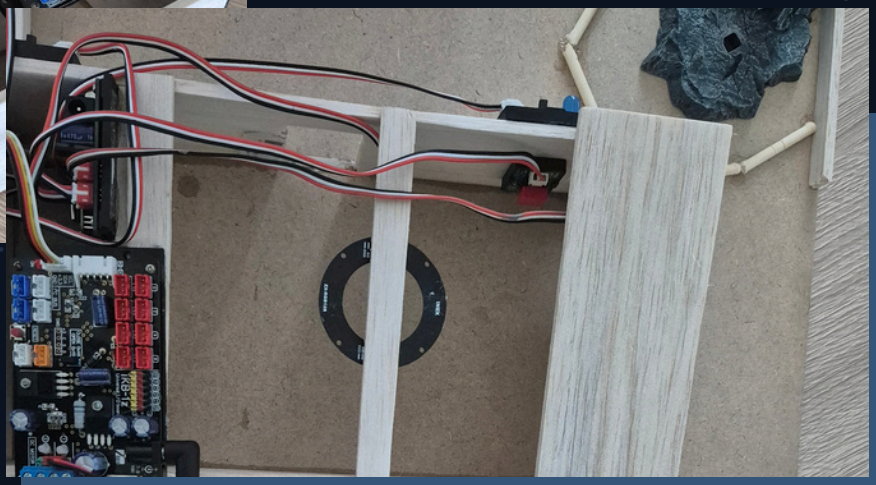
TECHOASIS CAFE

METHODOLOGY

WEEK 6-7

FINALIZING THE PROTOTYE



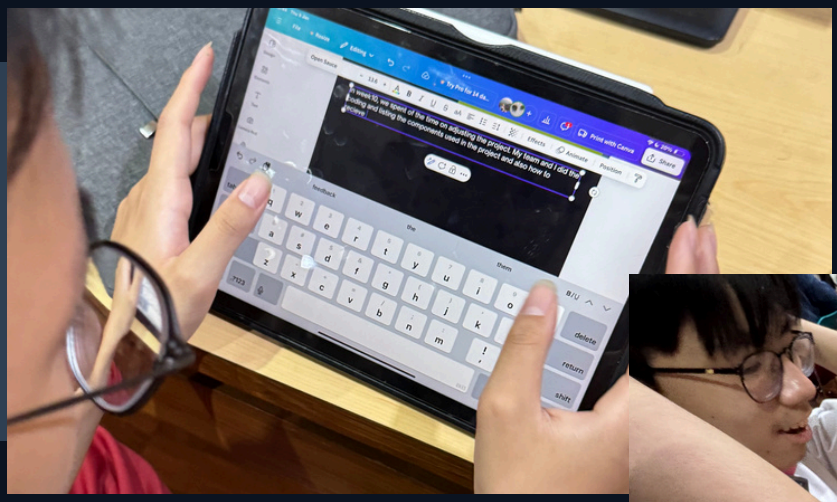


As we approached the final stages of our smart café project, my team and I focused on fine-tuning every component to ensure seamless functionality and a smooth user experience. We conducted rigorous testing of the servo motors to guarantee the automated doors operated flawlessly, providing an efficient and touch-free entry for customers. The motors controlling the ceiling fans were calibrated to maintain optimal airflow, while the light sensors were adjusted to respond accurately to ambient lighting changes, ensuring energy efficiency. The RGB LED ring was programmed with multiple modes to set the perfect mood for various occasions, adding a customizable ambiance to the café. Lastly, we finalized the custom buzzer system, ensuring it effectively notified staff and enhanced communication within the space. Completing this project demonstrated the successful integration of IoT technology, teamwork, and innovation, turning our vision of a smart café into reality.

TECHOASIS CAFE

Programming,Initial Testing and System Integration

WEEK 10-11



This week, my team and I focused on adjusting and improving our project based on the teacher's suggestions. We divided our time between coding, writing the methodology, preparing our presentation, and documenting the components used in the project. We also included instructions on how to create or acquire these components.

Progress Breakdown:

1. Coding: We successfully completed half of the website.
2. Neopixel and LED: The Neopixel and LED components are ready for real testing.
3. Motor System: The motor system is still a work in progress and hasn't been completed yet.

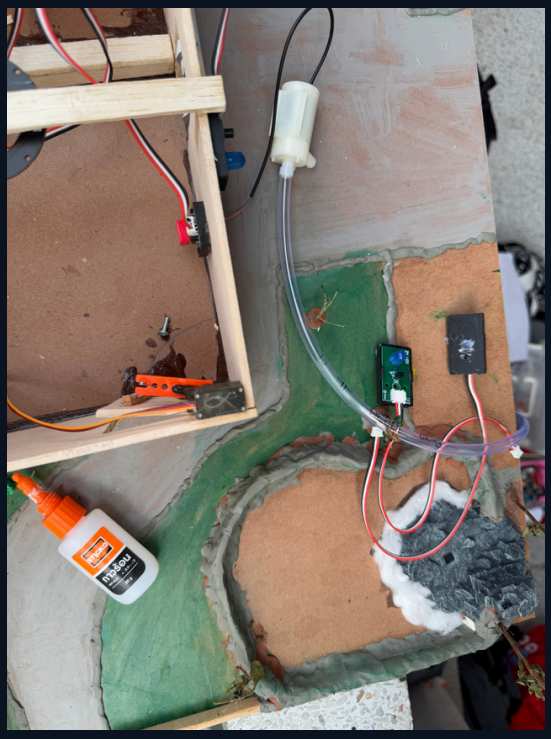
Overall, we made significant progress on various aspects of the project, and we're continuing to refine the remaining parts.

In week10, due to the suggestion from our teacher, we spent of the time on adjusting the project. My team and I did the coding, contined writing the methodology and presentation and listing the components used in the project and also how to create or recieve them. On the coding, half of the website was completed, and Neopixel and LED parts were ready for real testing. The motor system is still during in progress.

TECHOASIS CAFE

Programming,Initial Testing and System Integration

WEEK 12-13

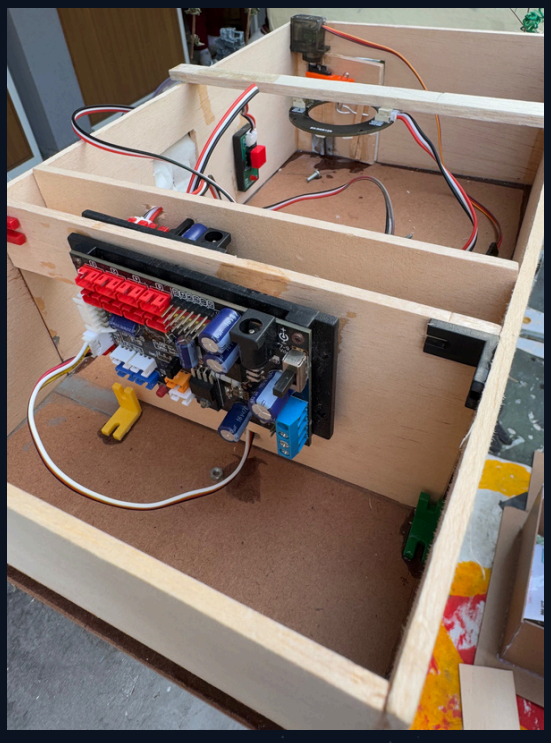


Prototype refinement and optimiztion

DURING THE REFINEMENT PROCESS FOR OUR GENIUS CAFE PROTOTYPE, WE ENCOUNTERED AN ISSUE WHERE THE SERVO MOTOR AND WATER PUMP WERE NOT FUNCTIONING PROPERLY FOR A PERIOD OF TIME. AFTER TROUBLESHOOTING, WE IDENTIFIED THAT THE PROBLEM WAS RELATED TO TIMING AND THE ARDUINO BOARD SETUP. TO RESOLVE THIS, WE ADJUSTED THE TIMING PARAMETERS IN THE CODE TO ENSURE PROPER SYNCHRONIZATION OF THE SERVO MOTOR AND WATER PUMP. WE ALSO FIXED THE ARDUINO BOARD CONFIGURATION TO ENSURE STABLE COMMUNICATION AND POWER SUPPLY TO THE COMPONENTS. AFTER CONDUCTING MULTIPLE TEST RUNS, WE CONFIRMED THAT THE SYSTEM NOW OPERATES SMOOTHLY WITHOUT INTERRUPTIONS. WITH THIS ISSUE RESOLVED, WE CAN NOW FOCUS ON FURTHER OPTIMIZING EFFICIENCY, RELIABILITY, AND INTEGRATING ADDITIONAL SMART AUTOMATION INTO THE PROTOTYPE.

Advanced testing and troubleshooting

AS PART OF THE REFINEMENT PROCESS FOR GENIUS CAFE, WE CONDUCTED ADVANCED TESTING AND TROUBLESHOOTING TO ENSURE THAT ALL SYSTEMS FUNCTION CORRECTLY AND OPERATE AT PEAK EFFICIENCY. OUR APPROACH INVOLVED COMPREHENSIVE TESTING OF ALL FUNCTIONS, FOLLOWED BY A PERFORMANCE EVALUATION TO IDENTIFY POTENTIAL AREAS FOR IMPROVEMENT. WE SYSTEMATICALLY CHECKED EACH COMPONENT TO VERIFY ITS RELIABILITY, ACCURACY, AND RESPONSIVENESS. WE ASSESSED THE SERVO MOTOR, WATER PUMP, ARDUINO BOARD, AND OTHER INTEGRATED SYSTEMS TO ENSURE SEAMLESS OPERATION. AFTER GATHERING PERFORMANCE DATA, WE ANALYZED THE RESULTS TO DETERMINE ANY INEFFICIENCIES OR INCONSISTENCIES. BASED ON OUR FINDINGS, WE IMPLEMENTED ADJUSTMENTS TO ENHANCE PERFORMANCE, IMPROVE RESPONSE TIMES, AND OPTIMIZE THE OVERALL FUNCTIONALITY OF THE SYSTEM. THROUGH CONTINUOUS TESTING AND REFINEMENT, WE AIM TO FURTHER IMPROVE EFFICIENCY, RELIABILITY, AND AUTOMATION TO CREATE A MORE SEAMLESS AND INTELLIGENT EXPERIENCE FOR GENIUS CAFE.



METHODOLOGY

Conclusion

The development of our project followed a structured approach, beginning with the preparation of essential components, including sensors and motors, while also planning a timeline to ensure an organized workflow. Once the preparation phase was complete, we proceeded with reading and coding to program the system effectively. This stage was crucial in ensuring that all components functioned as intended.

After completing the coding, we carefully assembled all the components and conducted thorough testing to verify the overall functionality of our innovation. This process involved checking both the hardware and software aspects, ensuring that the system operated seamlessly without errors. Additionally, we created a presentation slide to effectively communicate our project's objectives, design, and outcomes.

As a result of our efforts, our project has been a success, performing exactly as we envisioned. It operates smoothly with a well-structured and robust design, both internally and externally. With continued development and further refinements, this project has the potential to evolve into a more advanced and efficient system in the future.