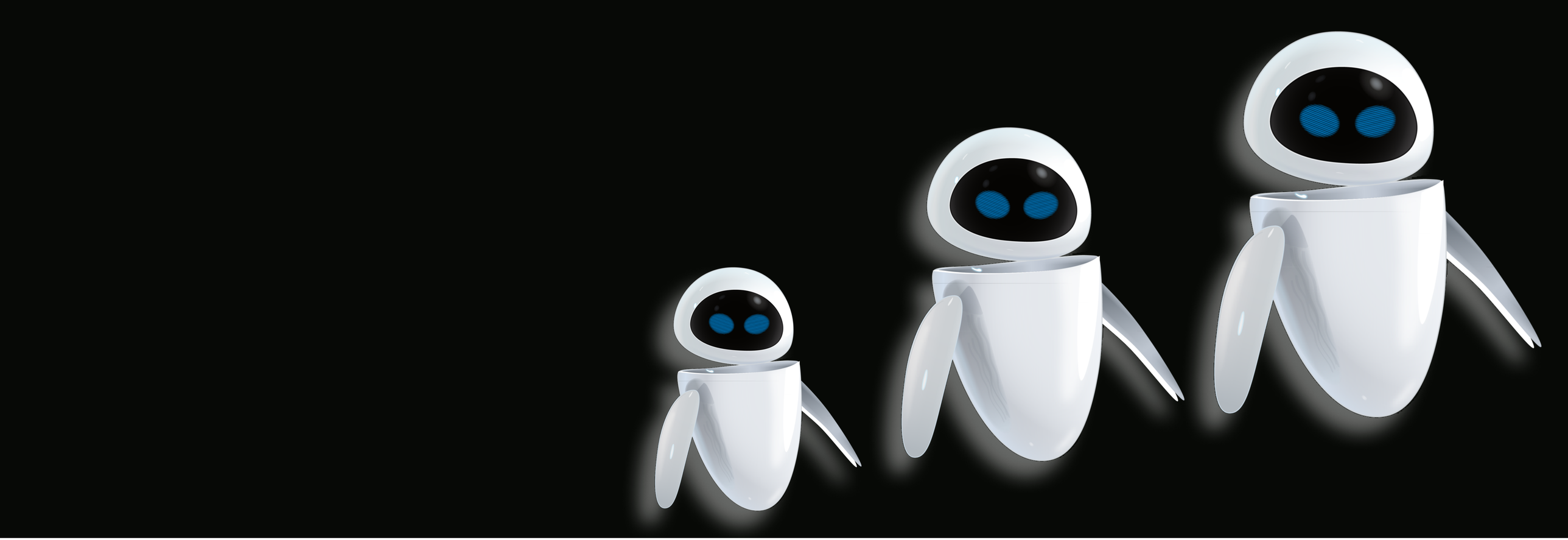

ESE 5190 Smart Device

Design and Development of an ATmega328P and ESP32 Based Interactive Companion Robot

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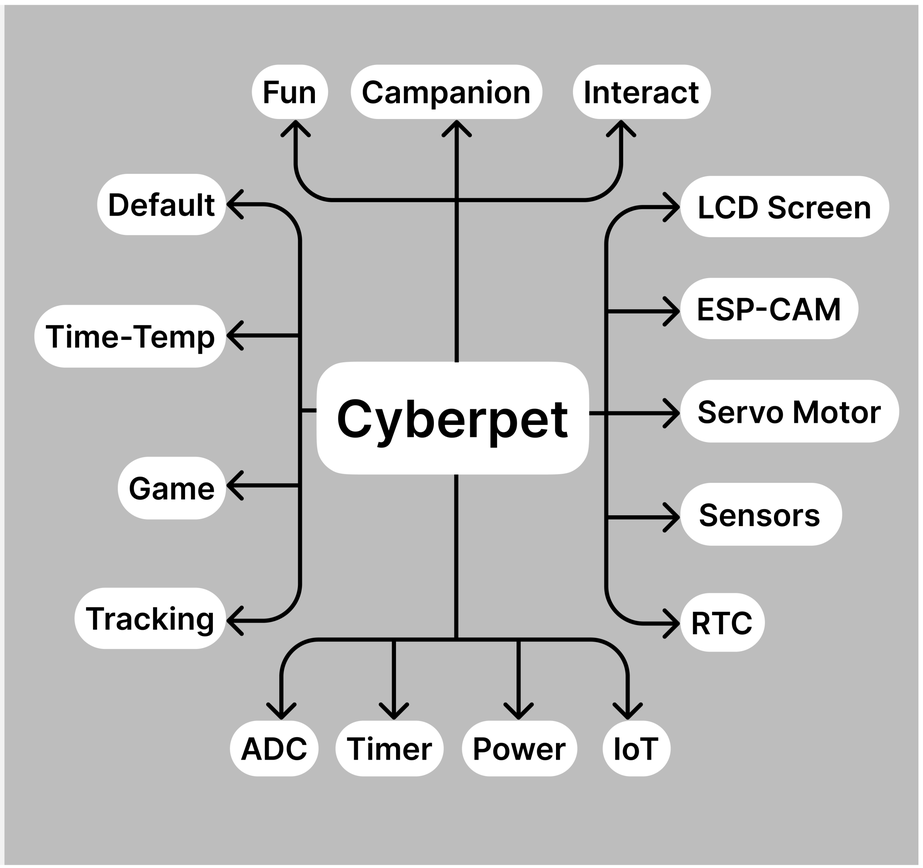
MVP Analysis – What Worked & What Did Not

Definition of MVP for the Robotic Companion Project

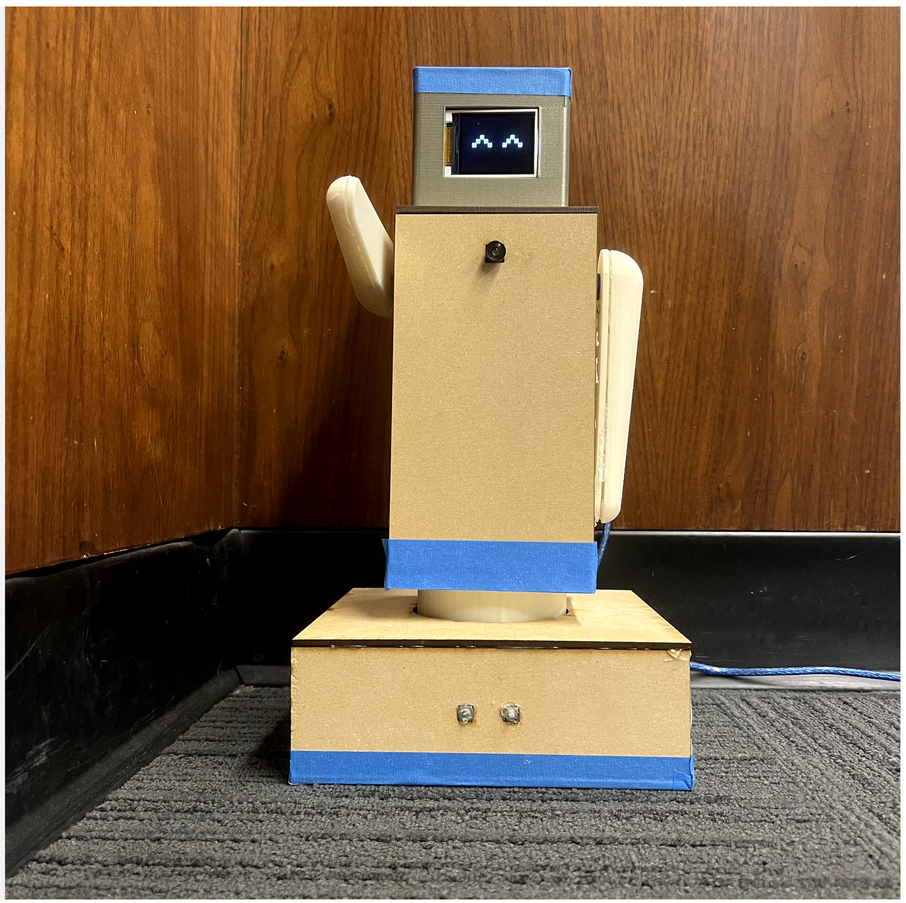
1. **Default Mode (Your Companion):** In this mode, the robot displays various expression–movement combinations randomly, showcasing its ability to perform as an interactive companion.
2. **Temp–Time Mode (Timely Updates):** This mode offers real–time updates on time and temperature, positioning the robot as a helpful assistant in everyday life.
3. **User Tracking Mode (Smart Interactions):** The robot is designed to track the user's position and adjust its orientation to face the user directly, enhancing the interactive experience.



MPV Analysis

Default Mode

1. Integrated System: Combined **AVR ATmega328P microcontrollers** with an **LCD display** and **servo motors** to create varied expression–movement combos.
2. Dynamic Interactions: Implemented a randomization algorithm for spontaneous and engaging **expressions and movements.**
3. User–Friendly Design: Ensured safety and relatability with **universally recognizable** expressions and gentle movements.



MPV Analysis

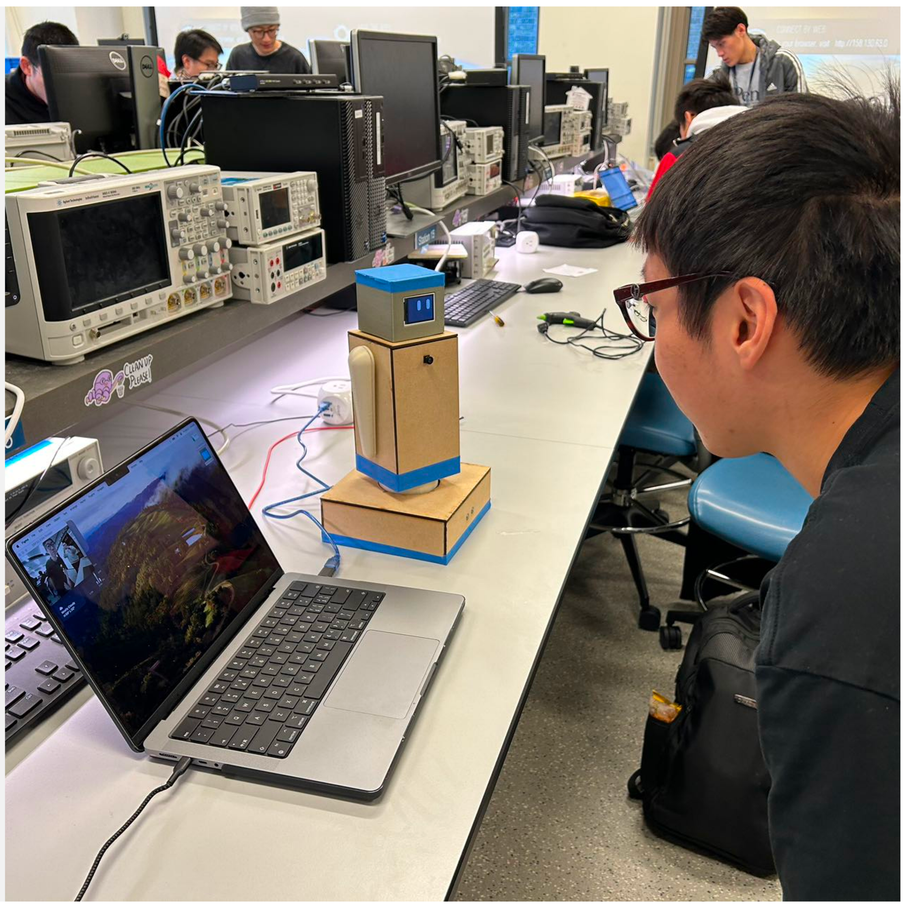
Time–Temp Mode

1. **Hardware:** Integrated a real–time clock module, temperature sensor, and an LCD display with the AVR ATmega328P microcontroller.
2. **Software:** Programmed to fetch and display current time and temperature data on the LCD.
3. **Outcome:** Delivered an informative Temp–Time mode, offering users instant access to time and environmental updates.

MPV Analysis

Time–Temp Mode

1. **Hardware Integration:** Utilized ESP32–CAM for video capture and streaming, interfaced with the AVR ATmega328P microcontroller.
2. **Software Processing & Communication:** Leveraged OpenCV on a computer to analyze the video stream for user tracking, sending positional data back to the microcontroller.
3. **Interactive Outcome:** Achieved a responsive User Tracking mode where the robot dynamically adjusts its orientation.



Conclusion

Successfully implemented all the functionalities.

Put class content into practice.

Explored wireless communication and CV

Familiar ourselves with laser cut and 3D printing

Thank you!

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