

Hybrid HMI System

The "Hybrid HMI (Human Machine Interface) System" is a project designed to let users operate a device completely touch-free using hand gestures, while also providing physical push-buttons as a backup. It displays a graphical interface on an OLED screen and interacts with various hardware components like a buzzer, LEDs, a temperature sensor, and a real-time clock.

How it Works: The system centers around an APDS9960 gesture and proximity sensor that detects hand movements. The main code continuously runs in a loop, waiting for either a recognized gesture or a button press to navigate a four-item menu: "Blink LED", "Show Time", "Buzzer", and "Temperature".

Here is the control scheme:

- **Move Up:** Swipe UP or press the Up button.
- **Move Down:** Swipe DOWN or press the Down button.
- **Select Option:** Swipe LEFT or press the Okay button to execute the highlighted menu item.
- **Go Back:** Swipe RIGHT or press the Back button to exit an option and return to the main menu.

To ensure smooth operation, the code includes a "debounce" feature that ignores any new gestures made within 400 milliseconds of the last one, preventing accidental double-inputs. Once a user selects an option, the system triggers the corresponding function (like making the buzzer beep or reading the ambient temperature) until the user gestures to go back.