

Abstract

Our project introduces a novel device that simplifies the control of smart home appliances through natural hand gestures. This device employs a server on Google Cloud to accurately interpret these gestures and translate them into commands. These commands are then communicated to the smart home devices via a Raspberry Pi 4, ensuring a responsive interaction. The device itself is encased in a protective enclosure that houses a screen, providing users with a straightforward and interactive interface. Designed for convenience, the device is powered by a battery that supports a full day's usage on a single charge, making it a reliable addition to any smart home setup.

Problem

In today's fast-paced world, managing a smart home can be cumbersome, especially when it involves navigating through multiple apps or voice commands that may not always be recognized accurately. Our project addresses the challenge of creating a more intuitive and efficient way to control smart home devices.

Objective

The objective is to facilitate the use of smart home control and remove one more step to controlling your devices.

Design Requirements

1. Gestura allows the user to control their smart home devices via hand gestures.
2. Gestura is easy to install.
3. Gestura reads gestures accurately within 10 feet.
4. Gestura is compatible with most smart home devices.
5. Gestura is suitable in any home environment.
6. Gestura provides user feedback, indicating whether a gesture has been recognized or not.
7. Gestura minimizes the chance of unintentional inputs

Design Approach

Power Supply Subsystem: The power supply must be 5 volts and rechargeable. To do this, we put 4 18650 batteries in parallel.

Gesture Recognition Subsystem: Gestures need to be recognized 10 feet away and be at least 50 percent accurate. A server was used to get higher quality input to meet this goal.

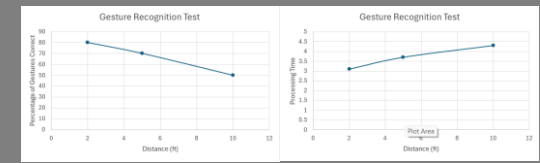
Data Communications Subsystem: When a gesture is recognized, it should send a command to the designated smart home device. This is sent by the Raspberry Pi over an internet connection.

User Interface Subsystem: To facilitate the use of the device, a user interface is necessary. The user interface provides access to pairing smart home devices and assigning gestures that will send commands to them.

Microprocessor Subsystem: For the microprocessor, the Raspberry Pi 4 was used for its internet connectivity.

Testing Results

This table below is the results of testing the integration and accuracy of Gestura:



This shows that the gesture is recognized at 10 feet 50 percent of the time. This also shows that the processing time is under 5 seconds at the 10 feet range as well, which falls within our requirements.

Project Status

As of now, our project has successfully developed a prototype that can recognize basic hand gestures and translate them into commands for smart home devices. The gesture recognition server on Google Cloud is operational, and the Raspberry Pi 4 is effectively communicating these commands to the smart home devices. The user interface on the device's screen is functional, allowing users to see the gestures being recognized in real-time.

