

EXECUTIVE SUMMARY

The smart home market is growing, offering users a more convenient way of managing their surroundings. Gestura offers a new style of smart home system controlled by gestures, unlike the competition that relies on voice commands. This change offers a smart home to a wider range of users and does not require extra devices to set up or control the smart home. Gestura is an all-in-one tablet system that monitors gestures through cameras placed throughout a user's home. Figure 1 presents an overview of the project.



Figure 1: Gestura Diagram

To meet its goals, the project requires that Gestura detect gestures within 10 feet accurately, is easy to set up, is compatible with most smart home devices, has a long-lasting battery life, and prevents unintentional inputs to the device. The constraints include a fully working prototype within two semesters and a \$1000 budget.

For the hardware, the design team started the project using a Raspberry Pi as the focal point. The system runs through the Pi as a head unit communicating via Wi-Fi. Wi-Fi allows the device to send wireless commands to smart home products, such as lights and plug-ins. The team then chose an 8-megapixel camera for gesture tracking. The gesture recognition algorithm was coded in Python using the OpenCV library and Mediapipe for hand tracking. The 3D enclosure is designed with ABS (Acrylonitrile Butadiene Styrene) plastic to ensure durability in household environments. Gestura operates by looking for a start gesture, which is a gesture that will initialize its smart home control capability, much like how “Hey Siri” kickstarts voice recognition. Then, once Gestura takes input from the five available static gestures, it sends a user-defined command, such as turn on and turn off, to the smart home device.

The design team plans to make the camera wireless, have a more responsive/interactive interface, and implement user-programmable gestures. With all these changes, this product is perfect for both home users of smart home devices and businesses seeking additional accessibility options.