EXECUTIVE SUMMARY

The smart home market is growing, offering users a more convenient way of managing their surroundings. Gestura intends to add to this by using a 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.

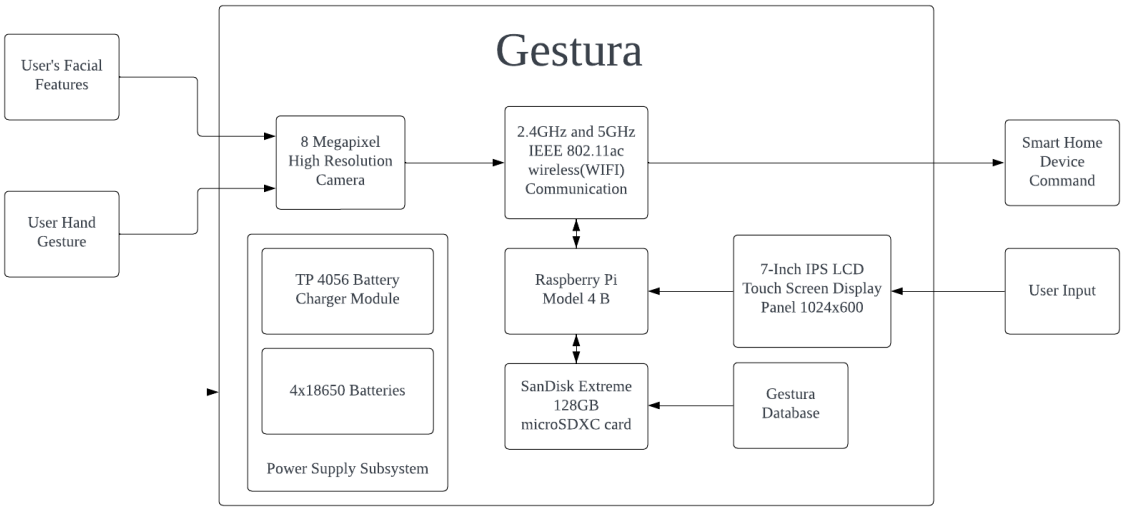

Figure 1: Gestura Level 2 Diagram

The design team set goals for their project including requirements, constraints, and standards. The team requires that Gestura detects gestures within 10 feet accurately, is easy to set up, compatible with most smart home devices, has a long-lasting battery life, and prevents unintentional inputs to the device. The constraints for the project are the time that was given, the 1000-dollar budget for the project, and the power consumption to maintain the portability of Gestura.

Gestura started by addressing the problem of the hardware needed to accomplish its tasks. The team started the project using a Raspberry Pi as the focal point. The system runs through the Pi as a head unit making communications via Wi-Fi. Wi-Fi allows the device to send wireless commands to smart home products, such as lights, plug-ins, etc. The team then chose their camera, using an 8-megapixel camera to get the quality and distance needed for gesture tracking. The gesture recognition algorithm was coded in Python using the OpenCV library and Mediapipe for hand tracking. The 3D enclosure was designed by recording the measurements of all the parts placed inside it. The measurements are used as a guideline for the design of the enclosure and to decide the restrictions and constraints for the enclosure.

This semester has been a learning experience for all the team members involved. The team has done a lot of work, but some areas can be improved upon next semester. The team plans to develop the project into a well-rounded product that could be taken to market if so chosen. There are plans to make the camera wireless, a more responsive/interactive interface, and the possibility of 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.