MID-DESIGN REVIEW

ECE Capstone Design I
Gestura

Meet The Team

Roy Whitenton

- Team Lead
- User Interface Lead

John Box

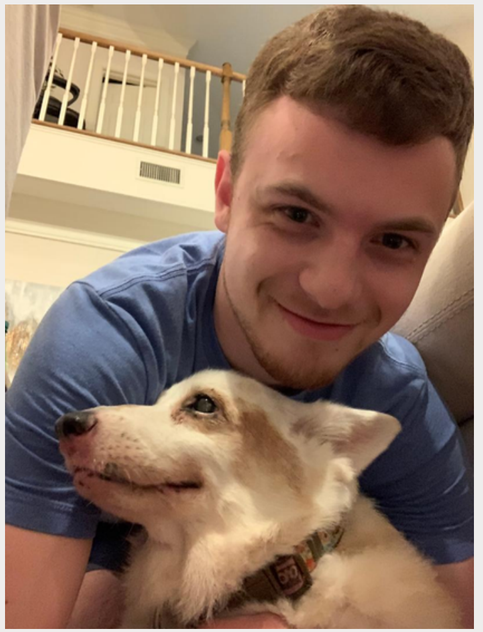
- Control Module Lead
- 3D Modeling Support

Shenna Booker

- User Feedback Lead
- Power Supply Lead

Brit Miranda

- 3D Modeling Lead
- User Interface Support



Eric Duncan

- Gesture Recognition Lead
- Control Module Support

Overview

Gestura is a product intended for home owners wanting/needing to use gestures instead of speech.

According to an experiment done by Kela et al., they concluded that 76% of respondents preferred gestures over using voice commands for smart home control [1].

The features of Gestura are as follows:

- Smart Home Control System
- High resolution cameras for tracking gestures
- Battery Powered tablet (Bluetooth and WI-FI Capable)
- Gesture Database preloaded with a gesture library.

Preliminary Design Plan

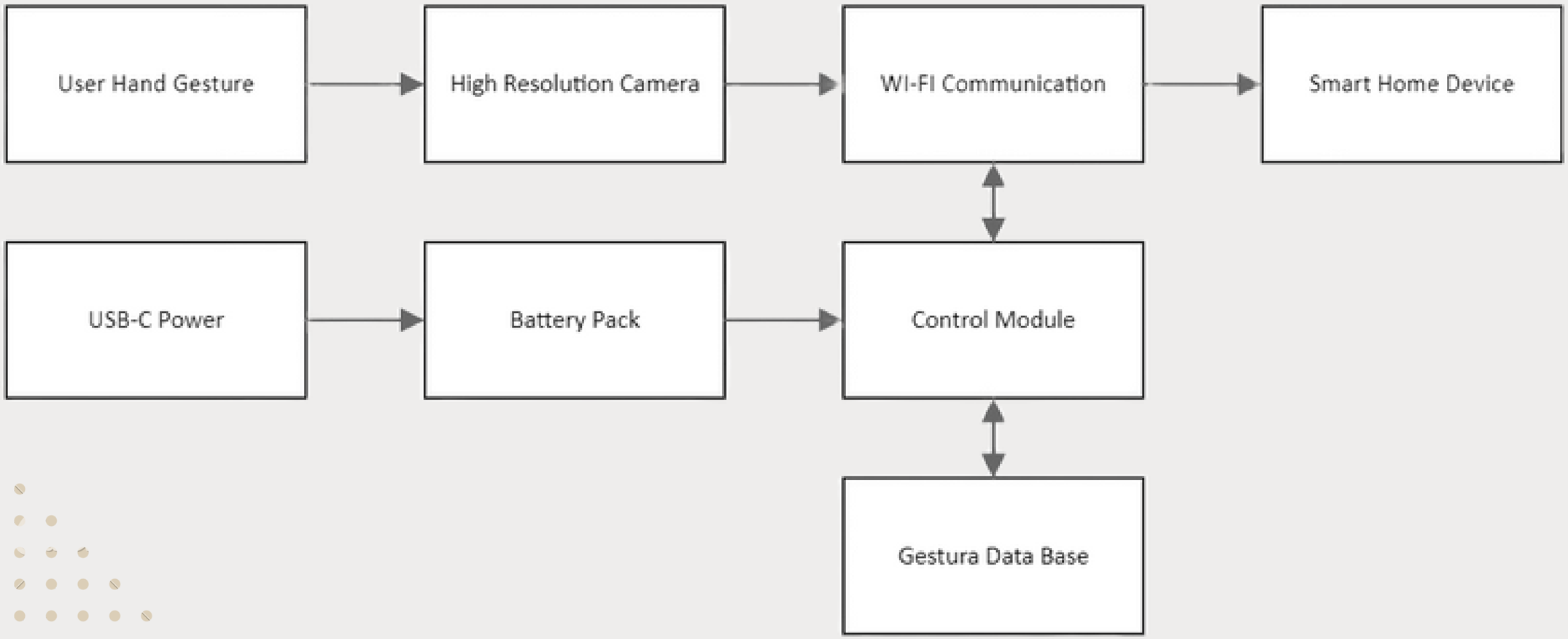


Fig. 1: Preliminary Design Chart

Control Module Subsystem

The control module the team chose is a Raspberry PI Model 4 B, as seen in figure 2.
Features:

- 2.4 GHz and 5.0 GHz IEEE 802.11ac wireless
- Bluetooth 5.0
- 8GB Ram
- 40 pin GPIO Header

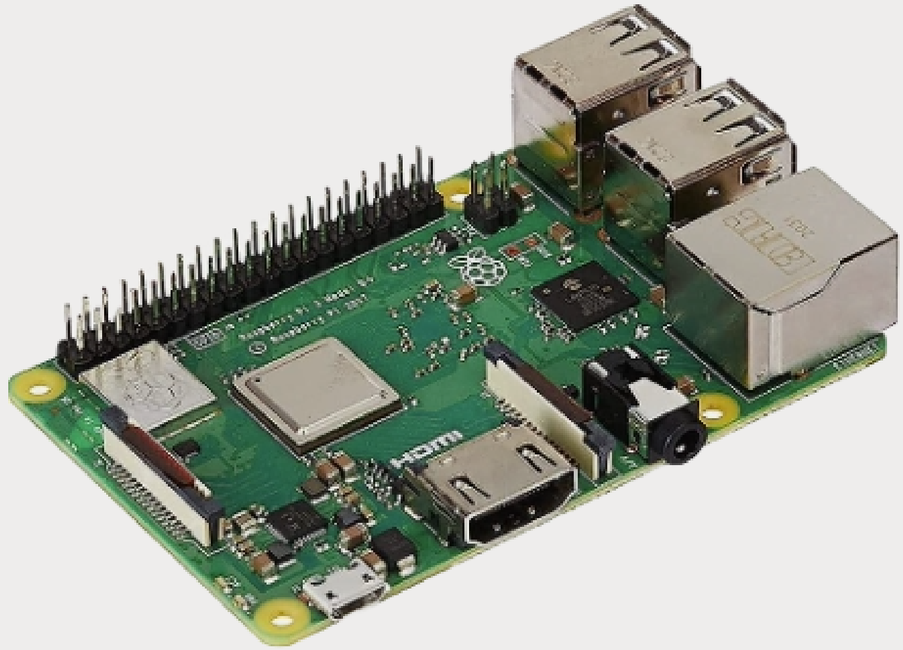


Fig. 2: Raspberry Pi Model 4[2]

Gesture Recognition Subsystem

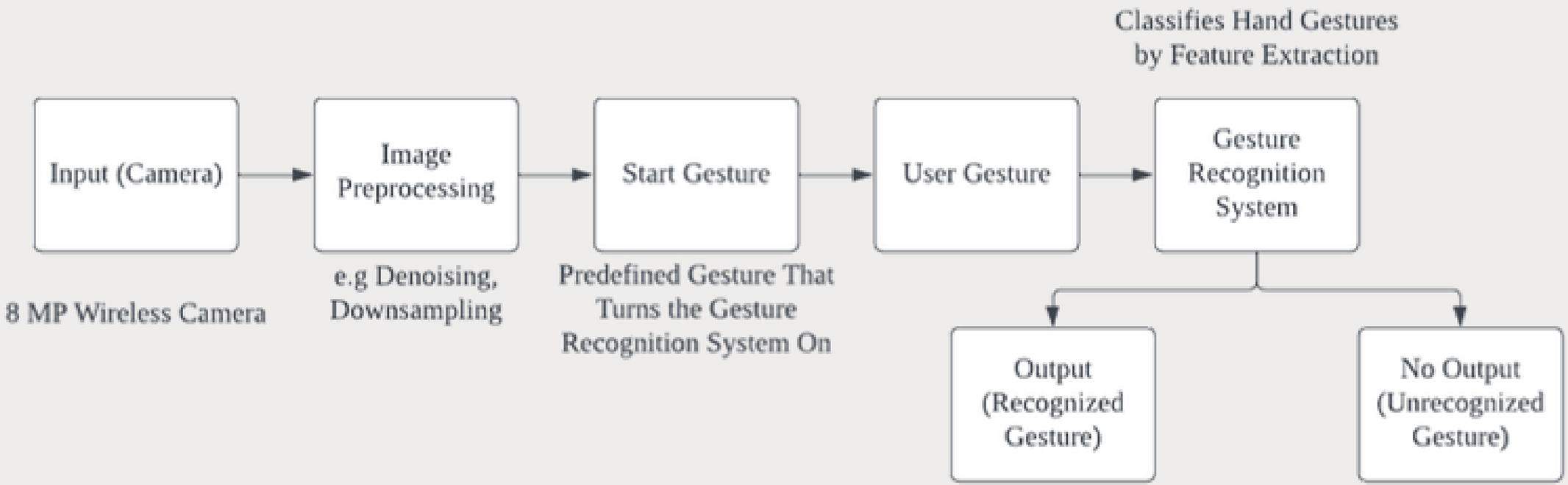


Fig. 3: Gesture Recognition Flowchart

User Interface Subsystem

- The control module is stored inside an all-in-one tablet.
- The tablet is a touch screen that enables the user to connect to their home network and smart home devices.
- The device gives user feedback when a gesture is detected.

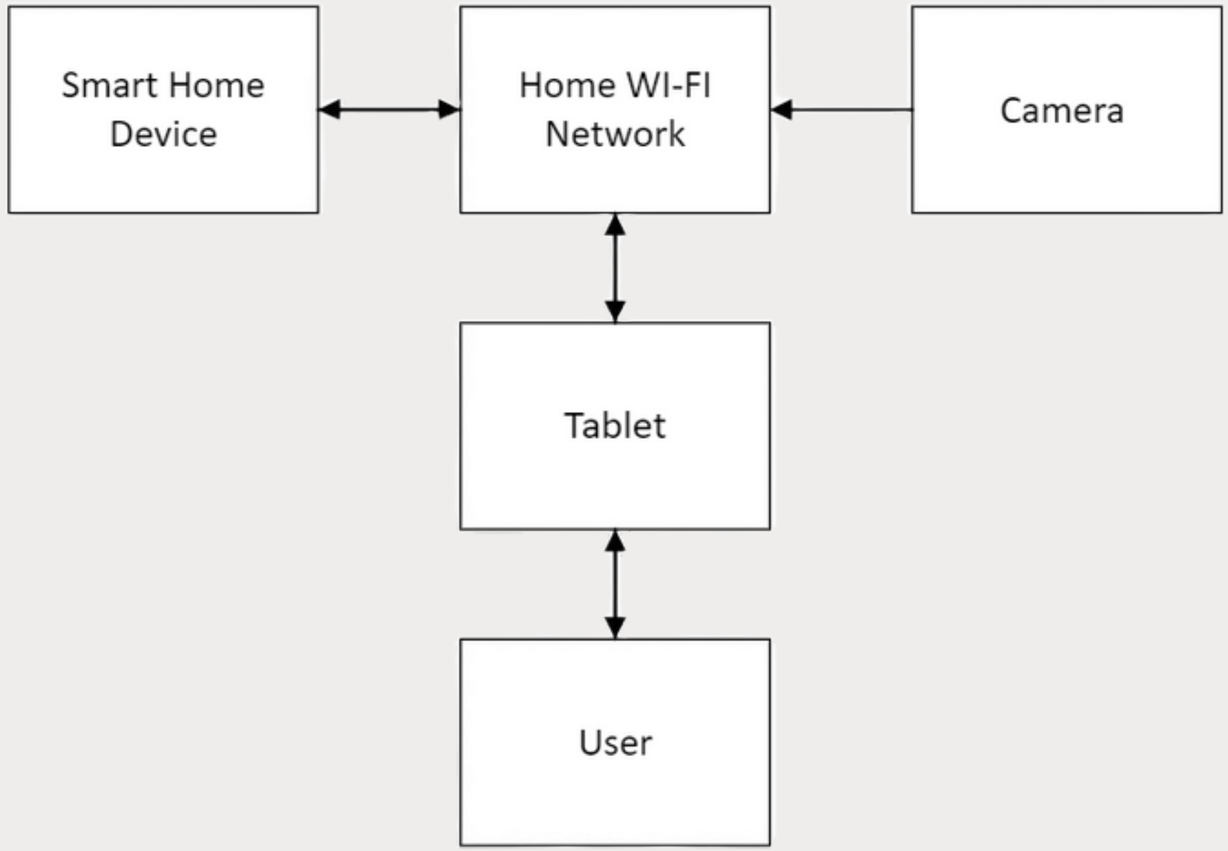


Fig. 4: User Interface Flowchart

3D Design Subsystem

The device will be encapsulated by a 3D-printed enclosure.

Enclosure will contain:

- Raspberry PI 4
- Touch screen
- Battery
- Internal wiring

Fig. 5: Tablet Enclosure Example[3]

Power Supply Subsystem

- The control module is powered by a 5V battery.
- The power supply uses 18650 batteries in parallel to achieve the needed longevity of the device.
- The battery charges with a USB Type C power connector.
- The battery powers both the Raspberry Pi and the screen.
- The cameras have separate power supplies.

Fig 6: Rechargeable Power Supply [4]

Fig 7: USB type C cable [5]

References

- [1] F. Alemuda and F. J. Lin, "Gesture-Based Control in a Smart Home Environment," 2017 IEEE International Conference on Internet of Things (iThings) and IEEE Green Computing and Communications (GreenCom) and IEEE Cyber, Physical and Social Computing (CPSCom) and IEEE Smart Data (SmartData), Exeter, UK, 2017, pp. 784-791, doi: 10.1109/iThings-GreenCom-CPSCom-SmartData.2017.120. (accessed Oct. 7, 2023).
- [2] “Element14 Raspberry Pi 3 B+ Motherboard,” Amazon https://www.amazon.com/ELEMENT-Element14-Raspberry-Pi-Motherboard/dp/B07BDR5PDW (accessed Oct. 8, 2023).
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- [4] https://selianenergy.com/products/3-7v3000mah-18650-good-price-rechargeable-batteries-in-stock-for-battery-pack-flashlight-small-fan-headlamp-led-light
- [5] https://www.amazon.com/Charger-Hootek-Charging-Compatible-Samsung/dp/B08XLT31K9 (accessed Oct. 8, 2023).

Questions?