Geffen Cooper
ECE 153B Project Proposal

Facial Temperature Scanner

Overview:

This project will use the MAX78000FTHR development board to create a facial temperature scanner that will report if a person has a safe temperature. The scanner will use the on-board camera module and CNN accelerator to detect a person's face in the image frame. The camera feed and instructions ('move left', 'move back', etc.) will be displayed to an LCD to help the person center their face. Once centered, an IR temperature sensor will measure the person's facial temperature. To avoid polling, a PIR motion sensor will be used to detect if a person has entered the field of view and will trigger the MAX78000 to begin inference. Once the temperature has been reported, the CNN accelerator will be deactivated to conserve power.

Peripherals and Serial Interfaces: (*the block diagram is on the next page*)

- OVM7692-RYAA Camera Module (on-board, uses parallel camera interface)
- HiLetgo ILI9341 2.8" SPI TFT LCD Display (**SPI**)
- HiLetgo GY-906 MLX90614ESF Infrared Temperature Sensor (**I2C**)
- Onyehn IR Pyroelectric Infrared PIR Motion Sensor (simple trigger signal)
- I may add a buzzer and LEDs to signify the scanner's state

Software Structure:

The software control flow for this system can be described using a state machine which is shown on the next page. There are four states the scanner be in: *Idle*, *Search*, *Positioning*, and *Measurement*. The initial and 'home state' is the *Idle State* in which the CNN accelerator is deactivated to save power and only the motion detector is active. When a person enters the field of view the motion detector will trigger an interrupt and the system will enter the *Search State*. In this state the system will first disable the motion sensor interrupt and then try to detect and localize a face in the image frame. Once a face is localized, the system will enter the *Positioning State* which will direct the person to move so that their face becomes centered for measurement.

The live camera feed and instructions will be displayed to the LCD over SPI. The *Measurement State* will request the temperature from the IR temperature sensor using I2C and display the result to the LCD. Finally, the system will hold for a transition period to let the person leave the frame before entering the *Idle State* again and enabling the motion sensor interrupts. Every state will have a timeout period that will trigger an interrupt upon completion and return the system to the *Idle State* in case there is a false trigger or a person leaves in the middle of the state. This will prevent the state machine from getting stuck as there is no form of physical user input to avoid touching. State information will be displayed at all times to the LCD to assist the user.

Goals:

1. Using the on-board camera and CNN accelerator, achieve real-time face detection and localization
2. Based on the user's positioning, report an accurate temperature measurement
3. Create a robust user interface based on a state machine that is stable through repeated usage

Project Website: link to google site

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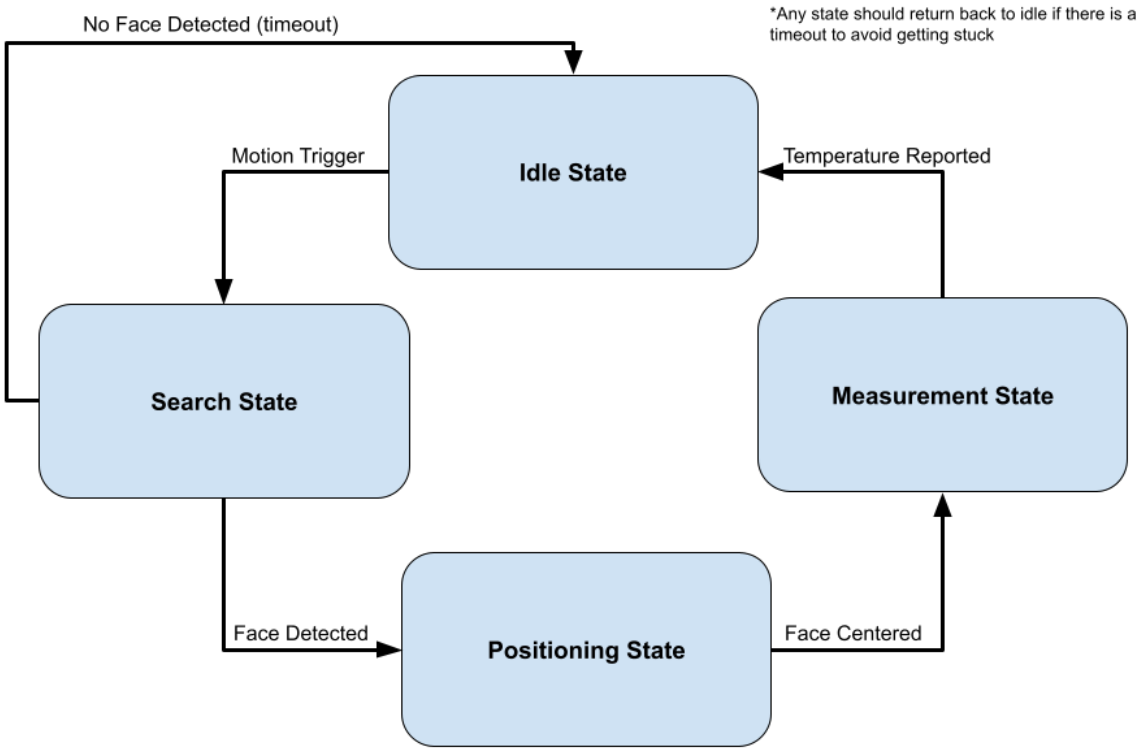
State Machine:



Block Diagram: