

Problem

In a world where we have become addicted to our phones, it is easy for students to be distracted by social media and their personal cell phones while attempting to study. As of April 1, 2024, students spend an average of 4.8 hours a day on social media platforms, with the peak being seven hours a day.¹ If students had the tools to prevent them from picking up their phone while studying, they would not be as easily distracted by social media and procrastination levels will decrease.

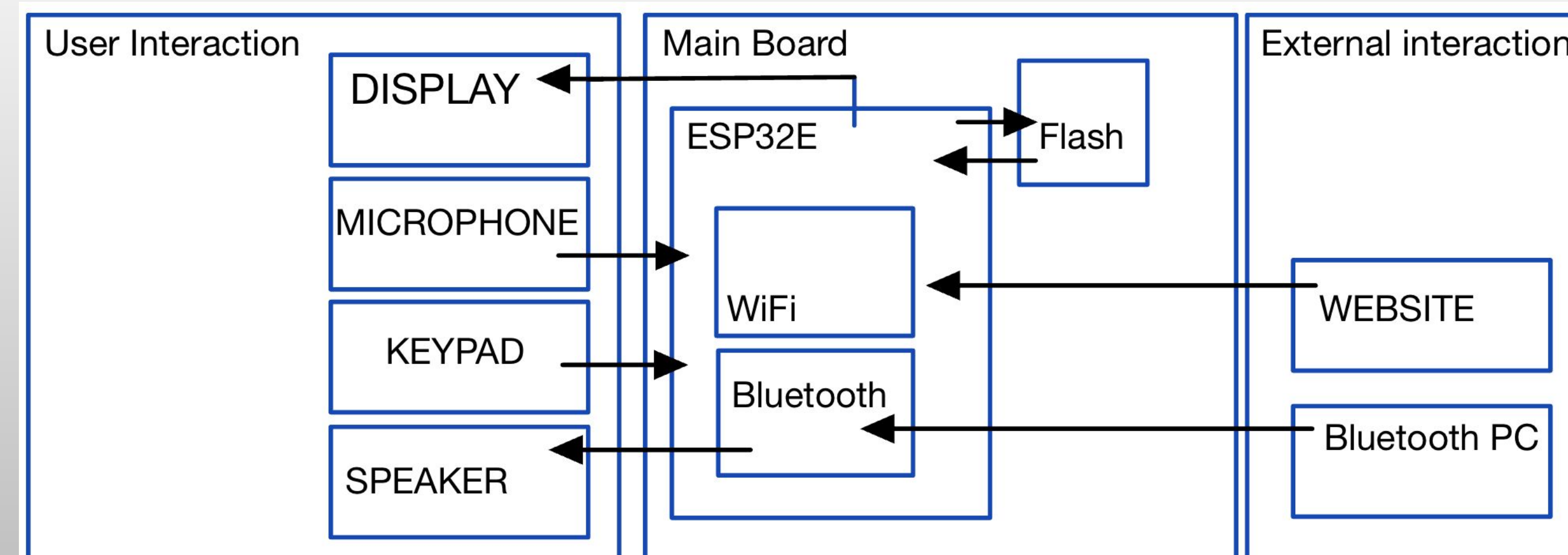
Solution & Design

To help students focus on studying, minimize social media distractions, and decrease time spent prospecting school work, we developed the "PIXIE." The Pixie is a custom, digital study tool with features to enhance focus. Features include:

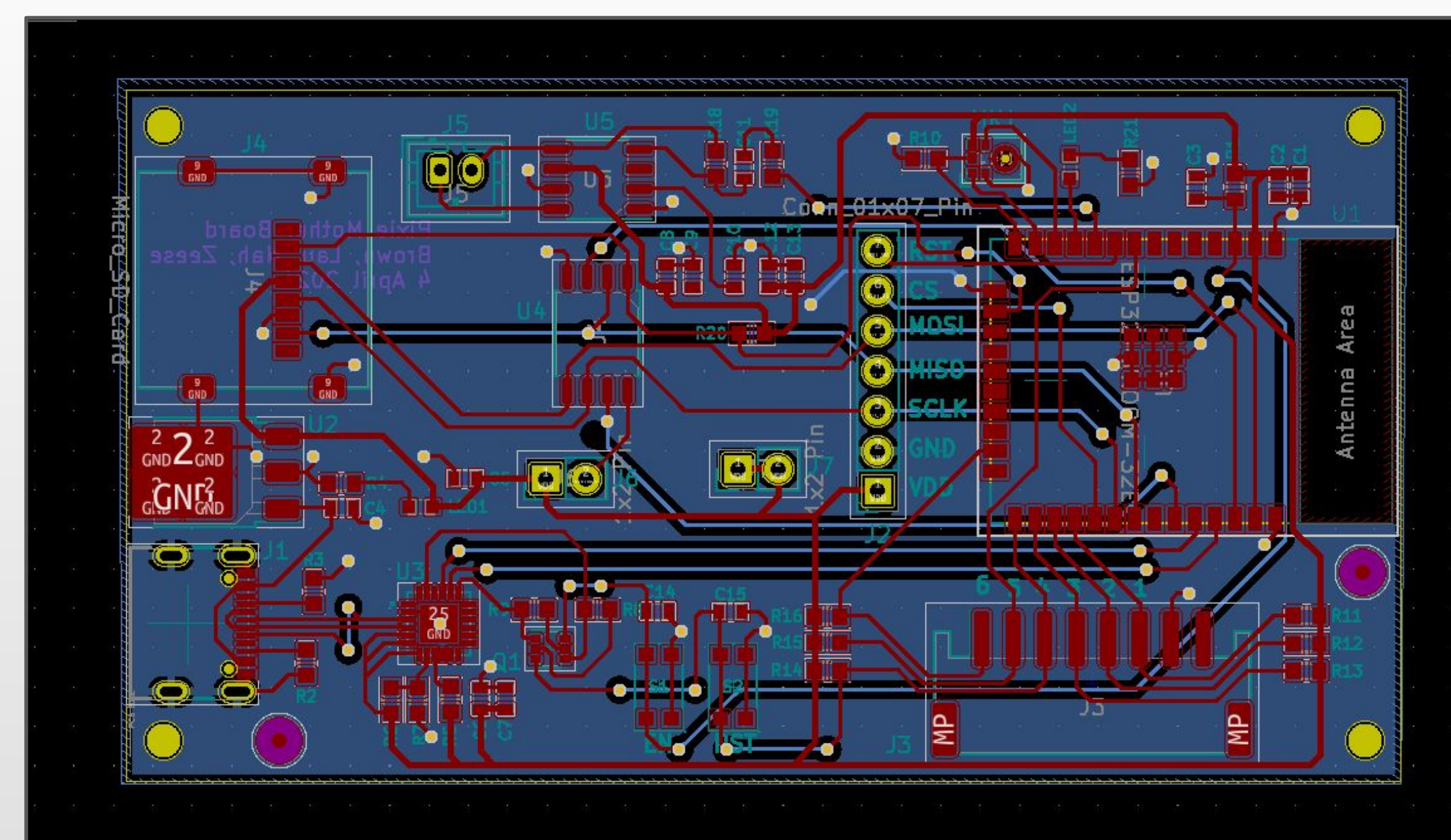
- Liquid Crystal Display to provide a visual perspective on date, time weather, study timers, appealing art for the user.
- Six push buttons for user-display interaction.
- Microphone to activate a night light feature
- Bluetooth Speaker: Music streaming & Alarms
- Upload notes via website interface.
- ESP32E Microcontroller:

The Pixie contains features that are included on students' phones, but with all of these features displayed directly on the Pixie, there should be no need for a the user to pick-up their phone, becoming distracted from their studies!

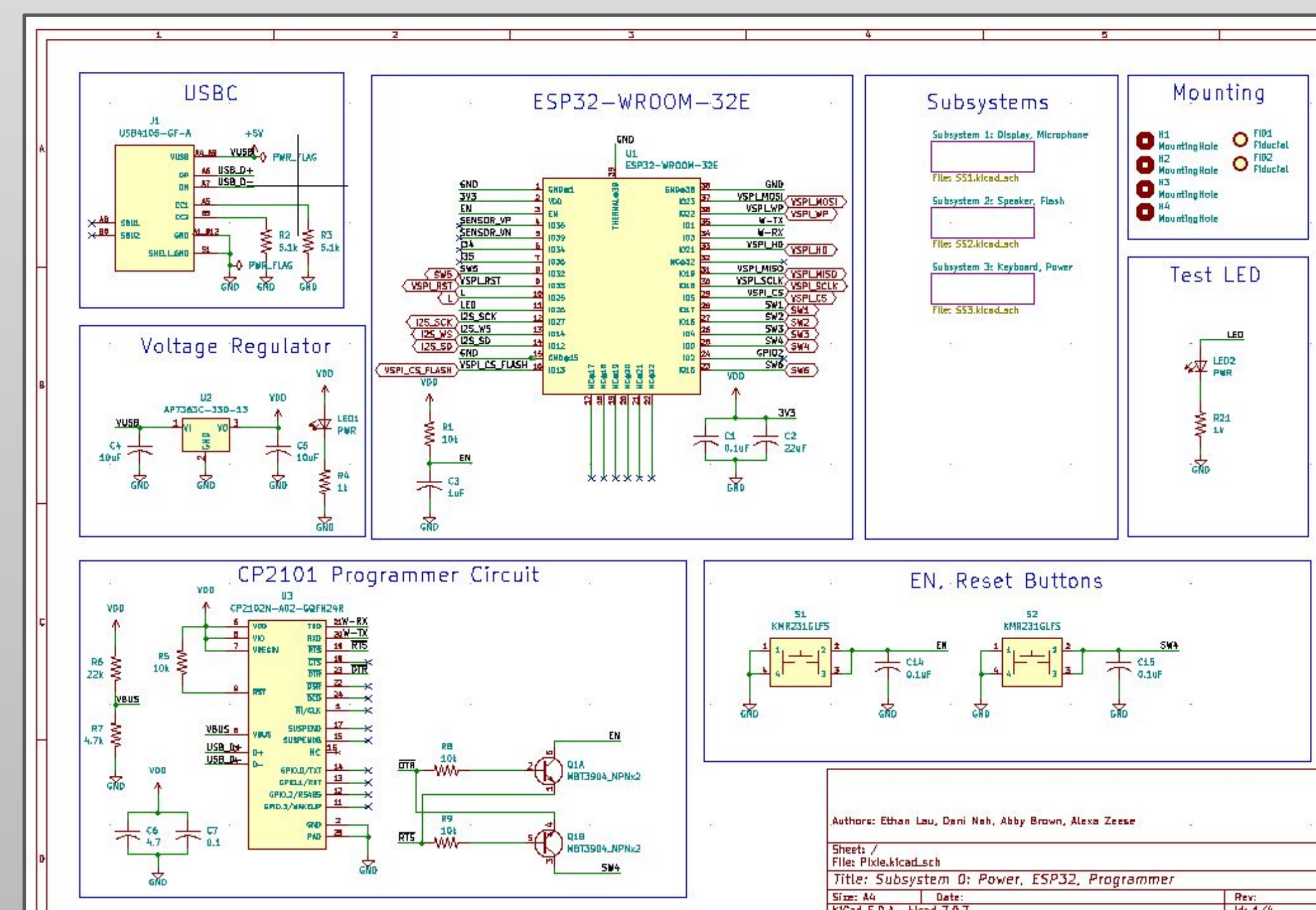
Subsystems:



Control Board:



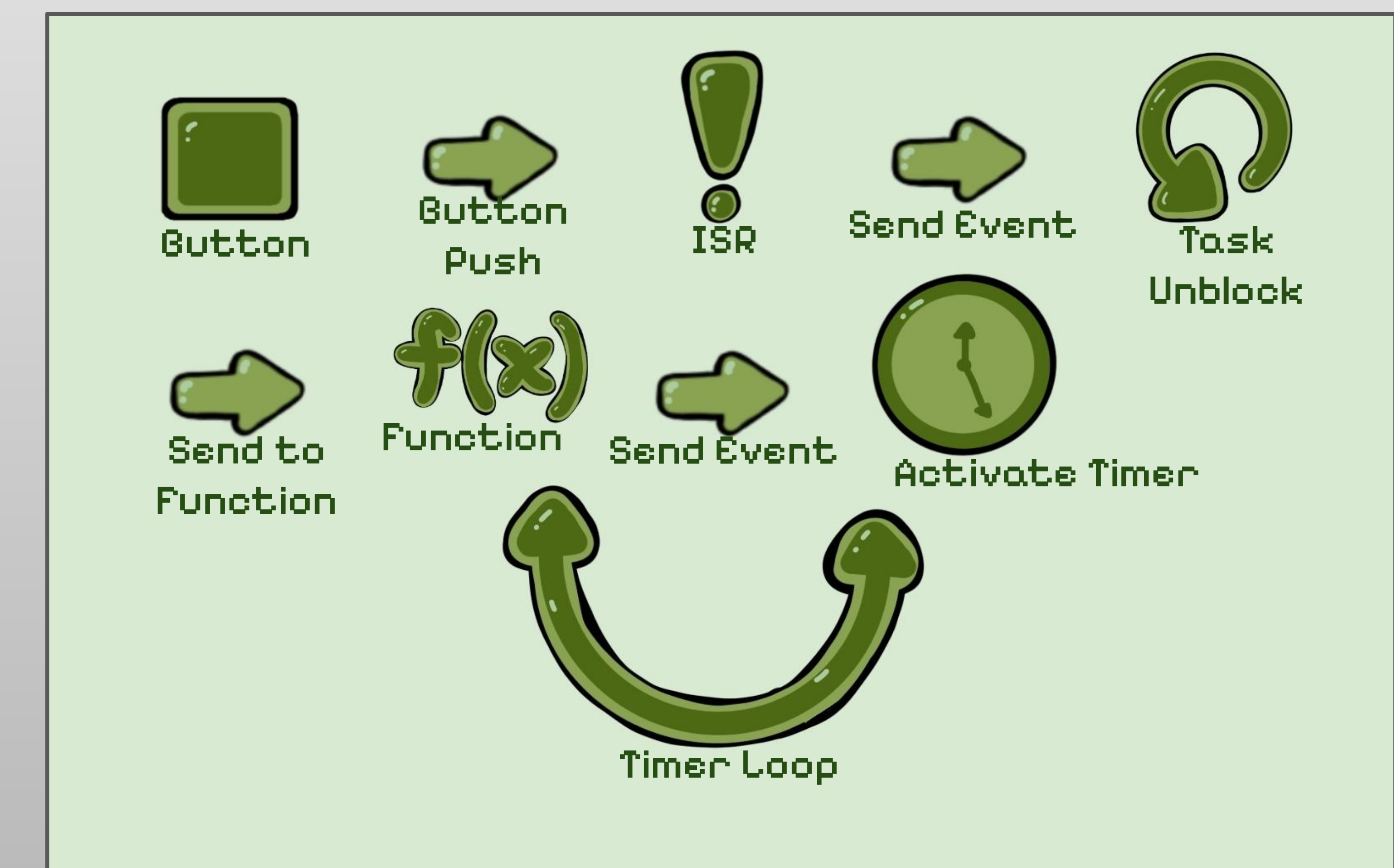
Motherboard PCB



Motherboard Schematic

Software:

- **Task Management:**
 - FreeRTOS: a real-time operating system allows the Pixie to control all tasks through event driven calls. The calls are made by flags and queues to hand off data and indicators.
- **Interrupt Service Routines (ISR):**
 - Timer Interrupts: Active Timer & Real Time Clock Updates
 - Change Notification Interrupts: attached to GPIO pins connected to keycap buttons



Future Enhancements:

Future iterations of our design include adding real time notifications from the user's school email address or school calendar. The addition will use the processor's internal wifi to gather notifications and display the message to the screen. Another enhancement would be to use the microphone to add voice activation features such as "start/stop timer." It is really easy to brainstorm a feature design, which is why our original Pixie Display is limited to five user interactive features.