EE149 Final Project: [BLOCK]

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Project Goal

[BLOCK] is a simple, unobtrusive at home notification hub so that users can easily tell what new notifications are currently on their mobile device instead of constantly referring to their phone for new arrivals.

Project Approach

This project can model the arrival of different notifications and various sensor inputs, from both the smartphone and on BLOCK itself, and its reaction to these inputs in a finite state machine. The goal will be to accurately display notifications from your personal linked devices in real-time, interact and control with BLOCK through gestures, and adjust the BLOCK's overall color scheme depending on the type of notification to create a visually satisfying notification hub for your home.

Resources

Our plan is to use the Blend Micro microcontroller (http://redbearlab.com/blendmicro/), which has Bluetooth Low Energy, as the main processor that drive BLOCK's integrated sensors. The first step in the project will be to identify the desired features we want to integrate into BLOCK, and the required sensors and hardware components to achieve these features. These components include a main screen to display (LED or LCD) features such as time, date, and notifications; NeoPixel LED strips for notification alerts and creating ambience/moods; IR sensors for gesture control and motion feedback; vibration motors for haptic feedback and tactile notifications; and a rechargeable power supply to ensure a fully wireless and stand-alone device. The first goal will be to integrate Bluetooth communication between the KL25Z microcontroller and a user device such as a laptop or smartphone. Next, we will have to enable the Bluetooth communication to grab notifications from our paired device. Once this communication is established, we can focus on the detailed features that utilize the different components mentioned above. We plan to design and integrate a state machine that will attempt to distinguish between types of events that BLOCK senses and receives such as "gesture control enabled", "battery low", "received new Facebook notification", and "vibrating to wake up user". If time permits, we will integrate additional features to our notification hub that enhance the user experience such as a microphone that enables a "LED light show" that syncs and changes color patterns according to the beat and rhythm of surrounding sounds and music; or having BLOCK utilize sensors in a smart device such as the camera, accelerometer, or gyroscope as control functions and features.

Schedule

- October 21: Project charter (this document)
- October 28: Choice of platform finalized after discussion with GSIs.
- November 4: Develop prototype "hello world" Bluetooth communication app between mobile device and mbed microcontroller. Complete parts order.
- November 11: Mobile app can pass notifications, mbed controller receive notifications and can change LED patterns accordingly. Test timing of received notifications.
- November 18: Prototype housing, functioning IR sensor for gesture control on display, and integrate vibration motor. Test timing of real-time gesture control.
- November 25: [Thanksgiving Weekend]
- December 2: 2nd iteration for housing, refining software development and features.
- December 9: System testing with classmates and friends, debugging, and final touches.
- December 16: Demonstration video made, powerpoint prepared. Prepare presentation skills.
- December 17: Final presentation and demo.
- December 19: Project report and video turned in.

Risk and Feasibility

This project scales with the number of sensors we deal with and according to what user-features we want to implement. While the focus will be on interfacing BLOCK with the mobile device to receive and display messages, efforts can also be taken to allow BLOCK to receive user input to feed back to the phone. Burning through components is always a risk, but our device should be relatively low-power.