E-INK IOT LABELS

A Low-Power Updateable Electronic Display with Internet Connectivity

SYSTEM REQUIREMENTS

- **Readability**
  4.2 inch screen, readable from 5 feet
- **Internet Connectivity**
  Utilizes OSU’s Access network to connect to online database
- **Low Power Consumption**
  Display and Microcontroller use <1mA while idling
- **Rechargeable Battery**
  USB-C charging port and solar cells
- **Quick Updates**
  Display can populate and refresh in under one second
- **Simple Setup**
  System walks user through internet setup and classroom selection
- **Customizable Database**
  User-friendly interface allows administrative users to easily update database
- **Rugged Enclosure**
  Tested to resist bumping and knocking from expected use

WEB INTERFACE

A defining feature of the electronic display is the ability to update automatically throughout the day. This was accomplished by implementing a web interface that modifies an online database of room information. A user can enter the web page and make changes to the room name, course name, course number and session times. The microcontroller then connects to this database and pulls information to show on the display.

MICROCONTROLLER

For the system’s microcontroller, we chose to use the ESP32, because it has built in memory, storage, and a wireless antenna. The ESP32 also has a low-power mode; by entering this mode, the device “sleeps” until it needs to update the display and consumes very little power while idling. Aside from this sleep function, the ESP32 is also well-equipped to handle both connecting to the online database, and transmitting data to the display via an SPI connection.

POWER & CHARGING

The system uses a microcontroller with a low-power “sleep mode”, as well as an e-paper display that only requires power when the display is modified. This allows the entire system to enter an idle state when not requesting data from the online database or updating the display.

Utilizing this idle state allows the system to run for long periods without the need for wired charging. Our team worked to maximize this battery life in our circuit and software design. We also included solar panels designed for use in indoor settings, which further extend the battery life of the system.

MEET THE TEAM

- **Benjamin Jones**: Hardware Engineer
  jonesben@oregonstate.edu
- **Emanuel Murillo**: Power Systems Engineer
  murilloe@oregonstate.edu
- **Alexander Mote**: Software Engineer
  motea@oregonstate.edu
- **Carlos Gonzalez**: Web Developer
  gonzalc5@oregonstate.edu