Smart Bike Light Project

Group 8

Introduction

Problem
Many kids forget to turn on or charge their bike lights, especially on their way to and from school - leading to safety risks.
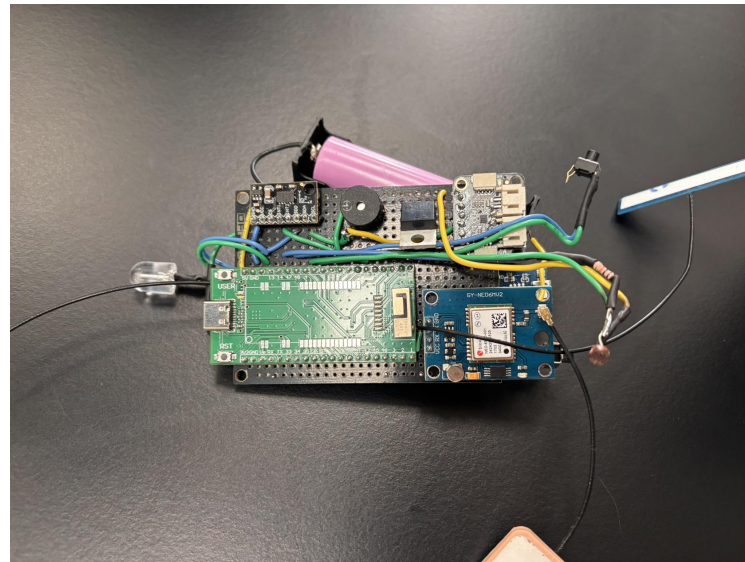
Our goal
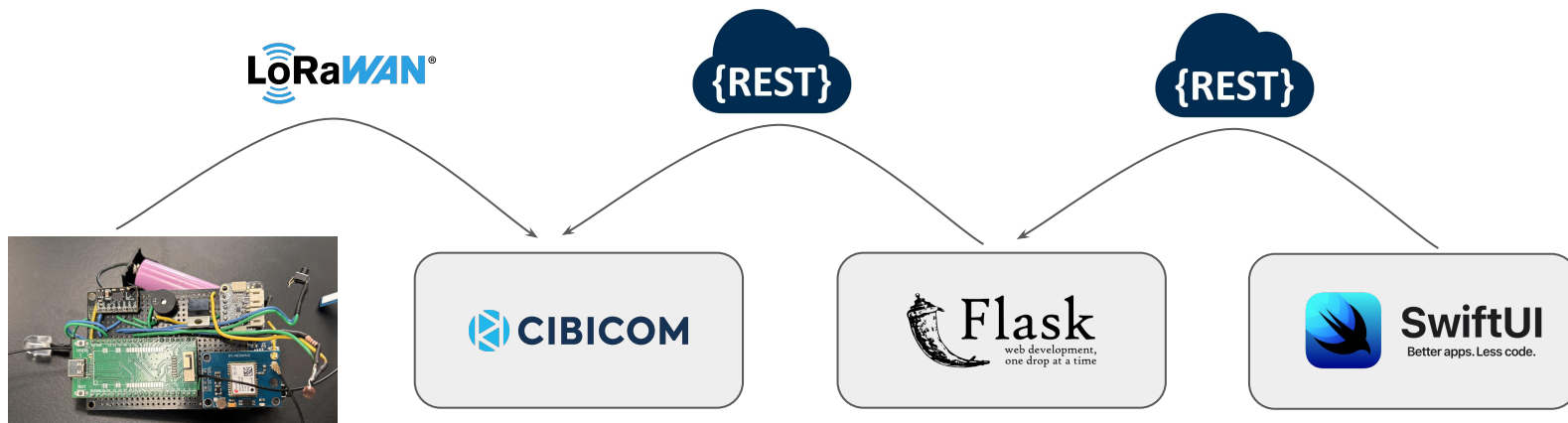To develop a Smart Bike Light to ensure safety, tracking and automation

Our Project

- Communication

- App and server

- Location Tracking

- Battery supply
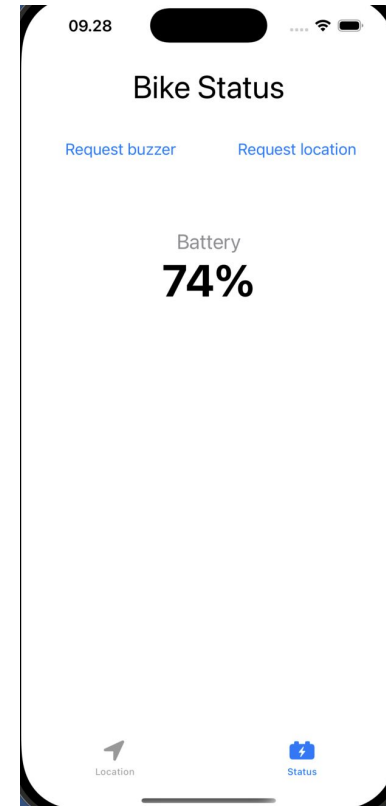
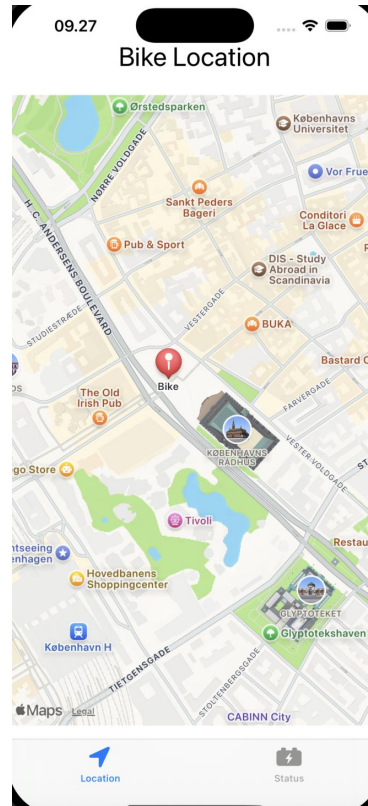- Light Activation

- 3D printed case

Heltec board: ESP32C3 + SX1262

Communication and mobile application

LoRaWAN®

{REST}

{REST}

CIBICOM

Flask
web development,
one drop at a time

SwiftUI
Better apps. Less code.

App and Server

- Location tracking
- Battery monitoring
- Playing a sound to locate the bike

Location Tracking

GPS Module (NEO-6M-0-001)

- ○ + more precise
- ○ - power intensive
- ○ - takes more time
- ○ - (doesn't work well indoors)
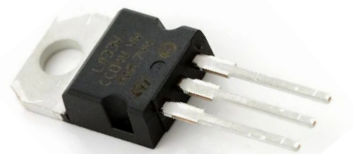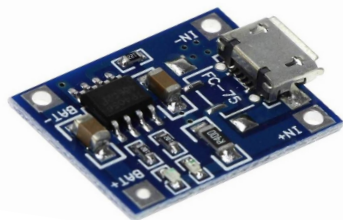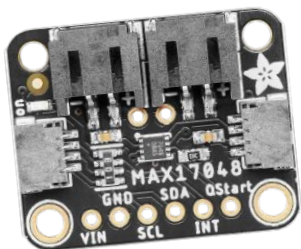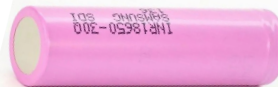- ○ when light turns on and when requested

WiFi Scanning

- ○ + power efficient
- ○ + faster
- ○ - requires external APIs
- ○ - needs WiFi networks nearby
- ○ frequently during trip

Battery supply & Monitoring

- Modules: Max17048 Fuel Gauge & TP4056
- Battery Life
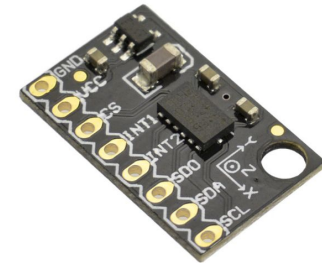   - 2500 mAh / 212.12 mA ≈ **11.8 hours**

Light activation

Automatic mode

- Activation when movement and low lighting detected
- Deactivation when still or bright light for 30 seconds
- Accelerometer and photoresistor

Manual mode

- Activation when button pressed
- Deactivation only when button pressed
- Automatic mode off

3D Printed Case

- dimensions: 48x70x150mm
- Weight: 150 grams
- Houses soldered breadboard
- Uses a recycled CATEYE lens
- Material: PLA
- Printers: Bambu Labs A1 and Ultimaker 2+
- Adjustable handlebar attachment implemented with neodymium magnets
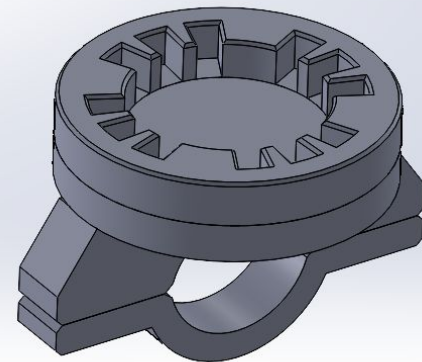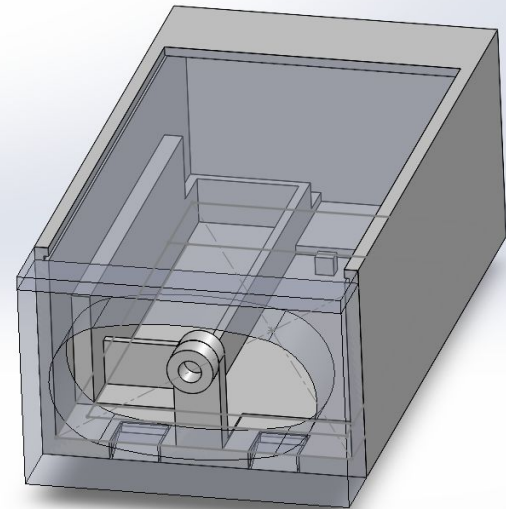
Conclusion

- automatic light switching
- location tracking
- battery monitoring
- communication based on LoRaWAN
- mobile application
- 3D printed case