Week 08

Keel Bone Chicken Project

10/17/2025

PURDUE UNIVERSITY | College of Engineering

This Week

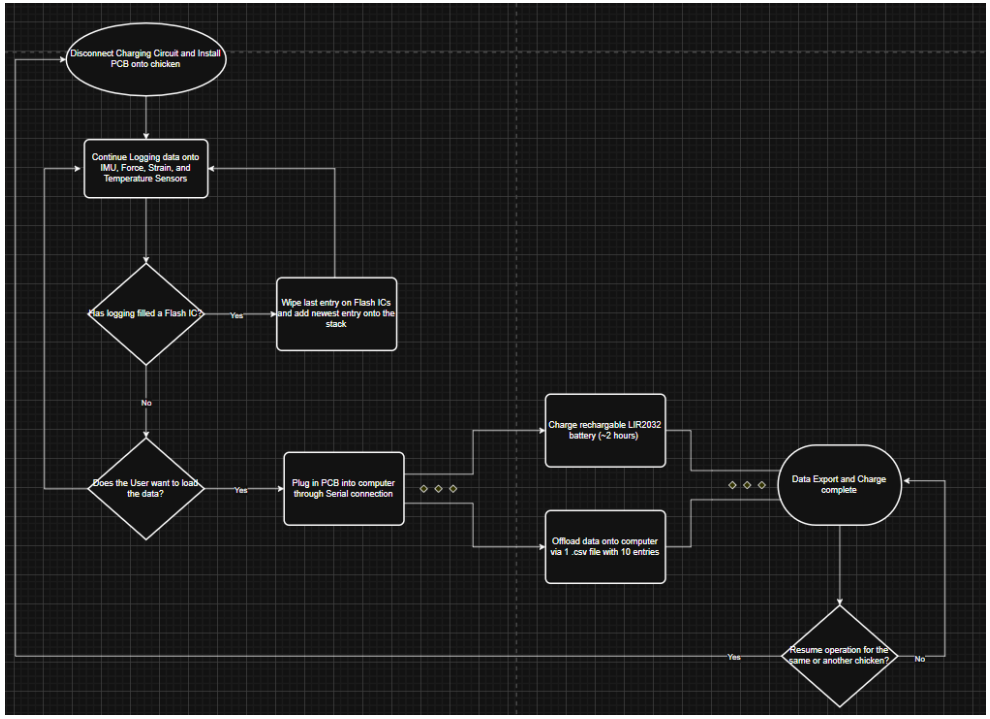
Progress & Issues faced this week

- Design Changes
- Data Logging
- Schematic Edits

Design Changes

Exchanges with Agriculture Department will move to being Client Side

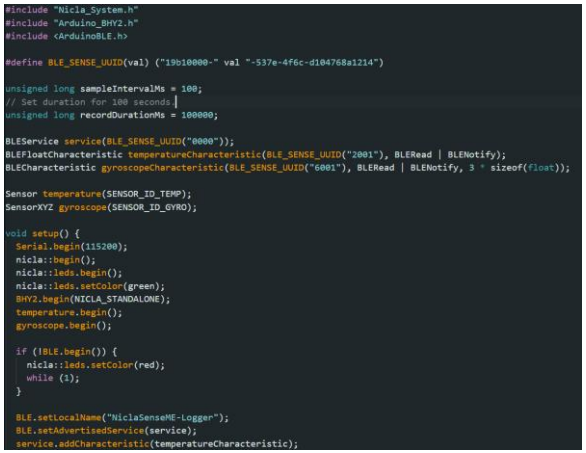
- More emphasis on time (~10 – 25-hour operating range)
  - Allow Agriculture research to see the entire egg laying process
  - All sensors may be used; some sensors may be omitted.
- Client-Service relationship with Agriculture, specifications given by them
- Current Flowchart Design of Rev. 1 PCB:



Data Logging

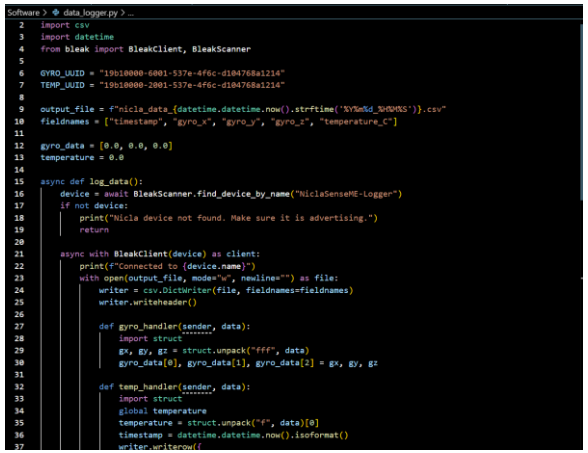
Values successfully logging over AsyncIO and Python

- Run on Arduino IDE first
- Able to log values over Python to generate a .csv over a time frame
- Will update website to be able to download/generate .csv



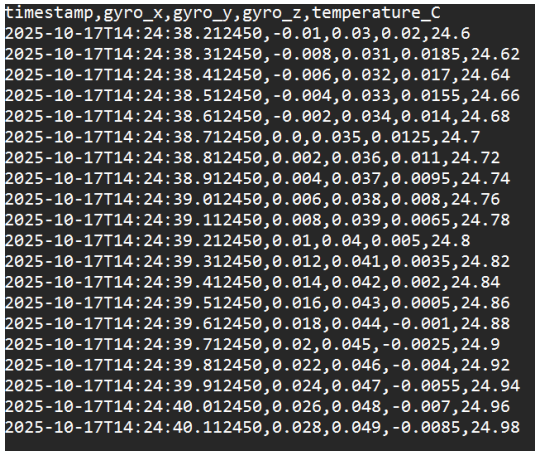
```
#include "Nicla_System.h"
#include "Arduino_BHY2.h"
#include <ArduinoBLE.h>

#define BLE_SENSE_UUID(val) ("19b10000-" val "-537e-4f6c-d104768a1214")

unsigned long sampleIntervalMs = 100;
// Set duration for 100 seconds
unsigned long recordDurationMs = 100000;

BLEService service(BLE_SENSE_UUID("0000"));
BLEFloatCharacteristic temperatureCharacteristic(BLE_SENSE_UUID("2001"), BLERead | BLENotify);
BLECharacteristic gyroscopeCharacteristic(BLE_SENSE_UUID("6001"), BLERead | BLENotify, 3 * sizeof(float));

Sensor temperature(SENSOR_ID_TEMP);
SensorXYZ gyroscope(SENSOR_ID_GYRO);

void setup() {
  Serial.begin(115200);
  nicla::begin();
  nicla::leds.begin();
  nicla::leds.setColor(green);
  BHY2.begin(NICLA_STANDALONE);
  temperature.begin();
  gyroscope.begin();

  if (!BLE.begin()) {
    nicla::leds.setColor(red);
    while (1);
  }

  BLE.setLocalName("NiclaSenseME-Logger");
  BLE.setAdvertisedService(service);
  service.addCharacteristic(temperatureCharacteristic);
```

Arduino Entrance Point



```
Software > data_logger.py > ...
import csv
import datetime
from bleak import BleakClient, BleakScanner

GYRO_UUID = "19b10000-6001-537e-4f6c-d104768a1214"
TEMP_UUID = "19b10000-2001-537e-4f6c-d104768a1214"

output_file = f"nicla_data_{datetime.datetime.now().strftime('%Y%m%d_%H%M%S')}.csv"
fieldnames = ["timestamp", "gyro_x", "gyro_y", "gyro_z", "temperature_C"]

gyro_data = [0.0, 0.0, 0.0]
temperature = 0.0

async def log_data():
    device = await BleakScanner.find_device_by_name("NiclaSenseME-Logger")
    if not device:
        print("Nicla device not found. Make sure it is advertising.")
        return

    async with BleakClient(device) as client:
        print(f"Connected to {device.name}")
        with open(output_file, mode="w", newline="") as file:
            writer = csv.DictWriter(file, fieldnames=fieldnames)
            writer.writeheader()

            def gyro_handler(sender, data):
                import struct
                gx, gy, gz = struct.unpack("fff", data)
                gyro_data[0], gyro_data[1], gyro_data[2] = gx, gy, gz

            def temp_handler(sender, data):
                import struct
                global temperature
                temperature = struct.unpack("f", data)[0]
                timestamp = datetime.datetime.now().isoformat()
                writer.writerow({
```

Python Backend



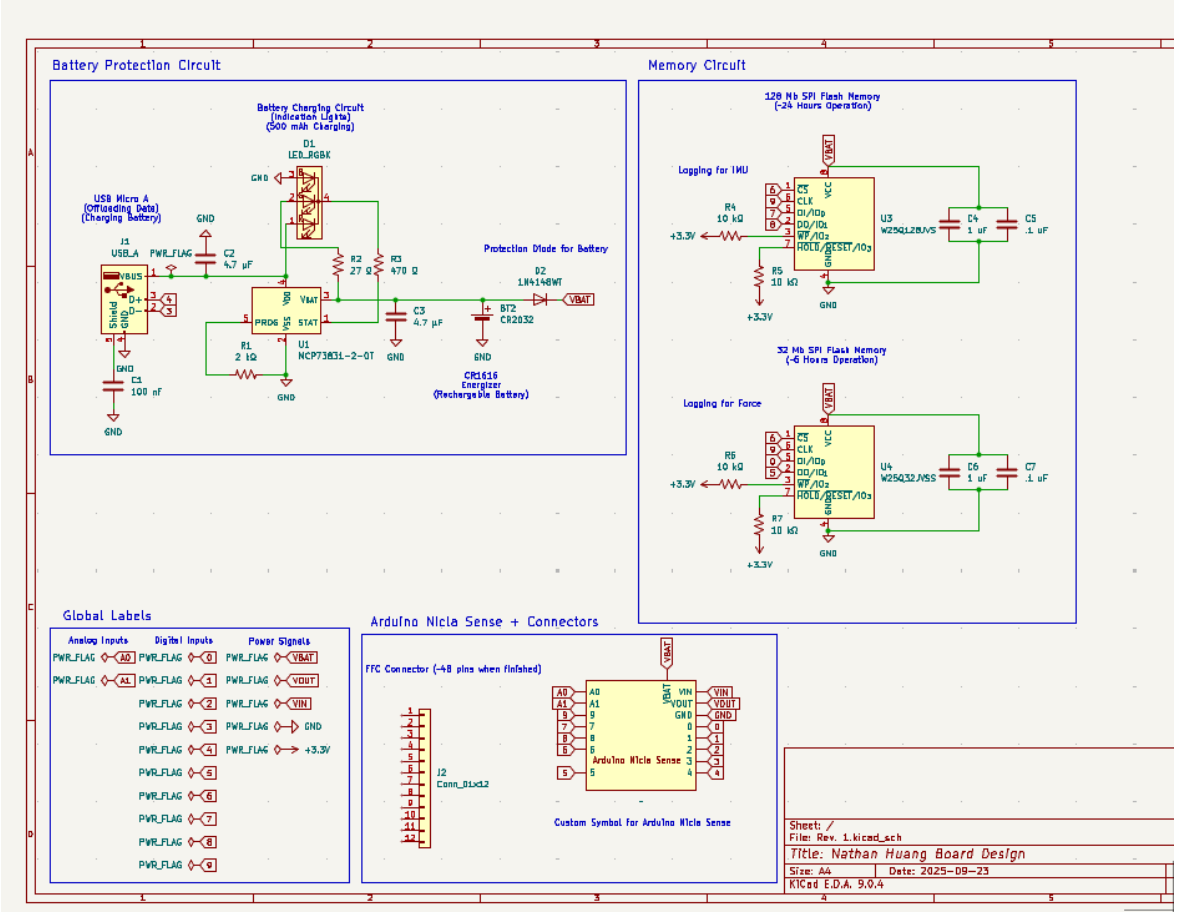
```
timestamp,gyro_x,gyro_y,gyro_z,temperature_C
2025-10-17T14:24:38.212450,-0.01,0.03,0.02,24.6
2025-10-17T14:24:38.312450,-0.008,0.031,0.0185,24.62
2025-10-17T14:24:38.412450,-0.006,0.032,0.017,24.64
2025-10-17T14:24:38.512450,-0.004,0.033,0.0155,24.66
2025-10-17T14:24:38.612450,-0.002,0.034,0.014,24.68
2025-10-17T14:24:38.712450,0.0,0.035,0.0125,24.7
2025-10-17T14:24:38.812450,0.002,0.036,0.011,24.72
2025-10-17T14:24:38.912450,0.004,0.037,0.0095,24.74
2025-10-17T14:24:39.012450,0.006,0.038,0.008,24.76
2025-10-17T14:24:39.112450,0.008,0.039,0.0065,24.78
2025-10-17T14:24:39.212450,0.01,0.04,0.005,24.8
2025-10-17T14:24:39.312450,0.012,0.041,0.0035,24.82
2025-10-17T14:24:39.412450,0.014,0.042,0.002,24.84
2025-10-17T14:24:39.512450,0.016,0.043,0.0005,24.86
2025-10-17T14:24:39.612450,0.018,0.044,-0.001,24.88
2025-10-17T14:24:39.712450,0.02,0.045,-0.0025,24.9
2025-10-17T14:24:39.812450,0.022,0.046,-0.004,24.92
2025-10-17T14:24:39.912450,0.024,0.047,-0.0055,24.94
2025-10-17T14:24:40.012450,0.026,0.048,-0.007,24.96
2025-10-17T14:24:40.112450,0.028,0.049,-0.0085,24.98
```

.CSV file generation

Schematic Edits

Mostly Finished Revision 1 of the Schematic for the Board

- Summary:
  - Two Memory Circuits
  - 1 Battery Charging Circuit
  - 24-48 Pin FFC Connector
- Rev. 2 starts next week
  - Hit constraints
  - Potentially add new circuitry



Next Week

Blockers & Summary of next week's work

- Verify with Agriculture department that PCB meets their specifications
- Select parts for PCB Assembly and start setting up the order
- Get .csv loading/downloading working on the BLE web interface

Thank You

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