Bill of Materials (BOM) with Cost Breakdown

Component Quantity Unit Cost (USD) Total Cost (USD)
Arduino Uno 1 ~$10.00 **$10.00**
DS18B20 Temperature Sensor 1 ~$2.00 **$2.00**
MPU6050 Accelerometer/Gyroscope 1 ~$5.00 **$5.00**
BME280 Sensor (Pressure, Humidity) 1 ~$5.00 **$5.00**
OPENLOG(MAX7219) LED Matrix Module 1 ~$5.00 **$5.00**
MicroSD Card Module 1 ~$2.00 **$2.00**
330-ohm Resistors 6 ~$0.05 each **$3.00 (6×$0.50)**
LEDs (various colors: e.g., Orange/Blue) 6 ~$0.20 each **$1.20**
Miscellaneous (connectors, wires, PCB) 1 set ~$5.00 **$5.00**
Total cost around $45-50 dollars.

Power Consumption Analysis

The system's power consumption is calculated based on typical operational current draw per component:

Component	Voltage (V)	Current (mA)	Power (mW)
Arduino Uno	5.0	50 mA	250 mW
DS18B20 Temp Sensor	3.3	~1 mA	3.3 mW
MPU6050 Accelerometer	3.3	5 mA	16.5 mW
BME280 (Pressure/Humidity)	3.3	~3 mA	9.9 mW
OPENLOG (MAX7219) LED Matrix	5.0	100 mA	500 mW
MicroSD Card Module	3.3	15 mA	49.5 mW

Six LEDs and 330-ohm Resistors:

- **Current per LED:** ~10 mA typical each (realistic safe current)
- **Voltage:** 5.0 V
- **Total for 6 LEDs:** ~60 mA total current draw
- **Individual LED+Resistor pair:**
  - Power per LED-resistor pair ≈ Voltage × Current ≈ 5 V × 10 mA ≈ 50 mW

- Total for 6 pairs ≈ 6 × 50 mW = **300 mW**

Total Power Consumption:

- Arduino + sensors/modules: approximately **830.0 mW**
- LEDs and resistors: approximately **300 mW**

Total Active Power Draw ≈ ~1130 mW (1.13 W)

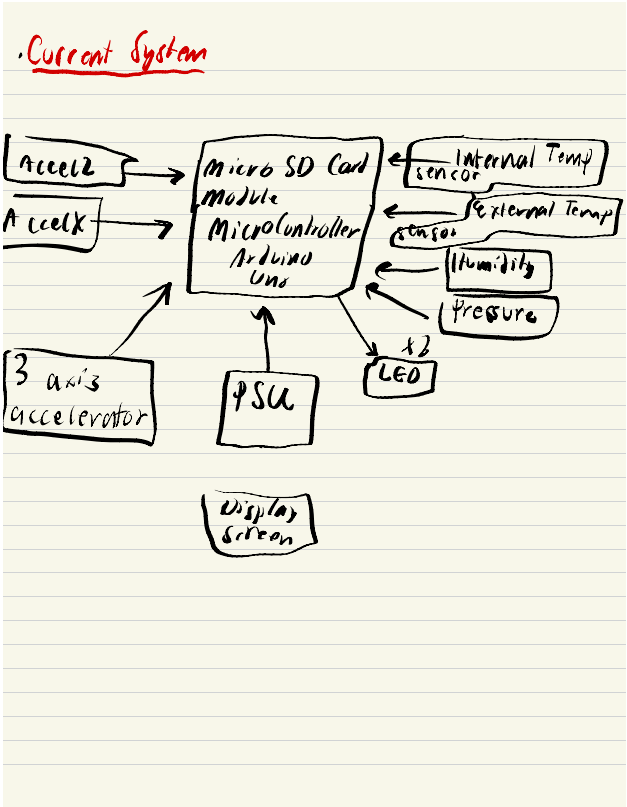
Weight ANALYSIS

Component/Section	Approx. Weight (g)
Arduino Uno	~25 g
DS18B20 Sensor	~3 g
MPU6050 Sensor	~5 g
BME280 Sensor	~3 g
MAX7219 LED Matrix Display	~20 g
MicroSD Card Module	~10 g
6× 330-ohm Resistors + 6 LEDs	~5 g
PCB & Miscellaneous Components	~20 g
Wires, connectors	~10 g
Battery pack & power circuit (if used)	~40 g

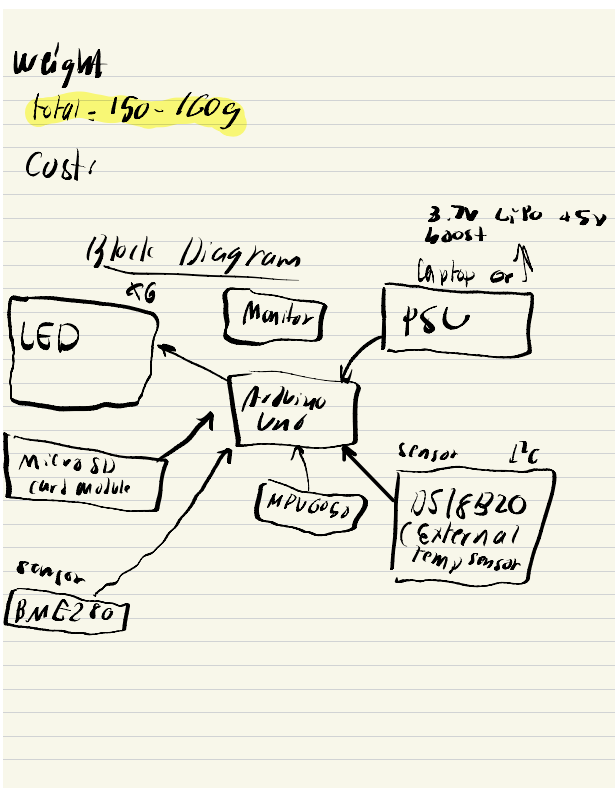
Total Estimated Weight:

- Approximately **~135 g**

BLOCK DIAGRAM CURRENT SYSTEM



BLOCK DIAGRAM PROPOSED SYSTEM



APPENDIX

SPI: MAX 7219, MicroSD Card Module

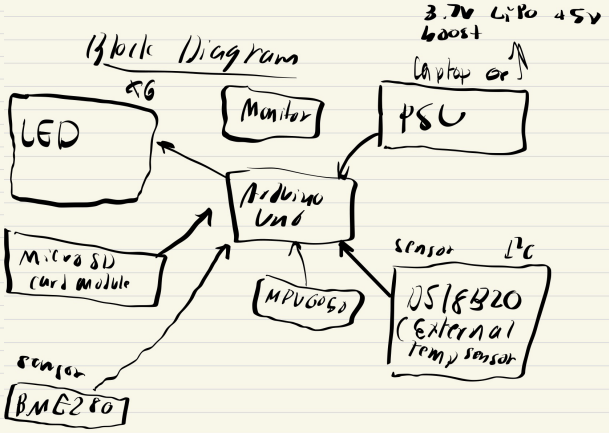
5V power

Weight

total = 150 - 160g

Cost:

Block Diagram



Proposed design

Arduino - stays the same ~ 50 mA

Sensors:

- DS3231 RTC: accurate timekeeping and internal temp measurements ~200 µA (active)
- DS18B20: External temp ~1 mA
- MPU6050: 3 axis acceleration ~5A
- BME280: pressure, humidity and temp sensor ~3mA

- Display:

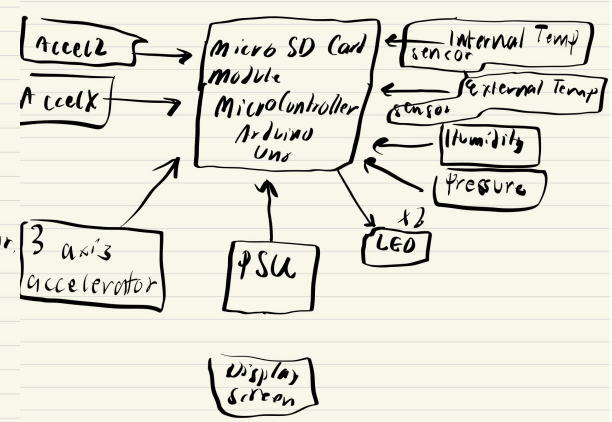
MAX 7219 LED Display Driver connected to 8x8 LED matrix ~10 mA

- Storage:

- MicroSD Card Module ~20 mA

Total ≤ 90-110 mA (active).

Current System



microSD Card module: 20mA

Total: 95 mA

Weight:

Ard - 25g

Sensors - 30g

PSU - 50g

Structural Components - 50g

Total weight - 155g

Design:

- Replace accelemoter with an MPU 6050
  it offers " functions.
- Pressure and Humidity: The BME280 sensor
- LED - MAX7219 LED Display Driver 8x8 matrix
- Data Storage same

- missing components
- evaluate current system
- Design alternative payload solution

↓ Ensure ↓

Availability — cost constraints

1. Block Diagram Current System

Current System:

- Micro Controller : Arduino
- Sensors
  - mp internal
  - humidity
  - temp ext
  - 3 axis accelerometer
  - Pressure
- Indicators : LED
- Power Supply : Battery
- Data Storage : microSD module.

→ some of these missing!

- Power Consumption:

Arduino ~ 50 mA

- Temp Sensor ~ 1mA (x2)
- Accel ~ 5 mA
- LED ~ 10mA
- Pressure ~ 5 mA
- Humidity ~ 3mA