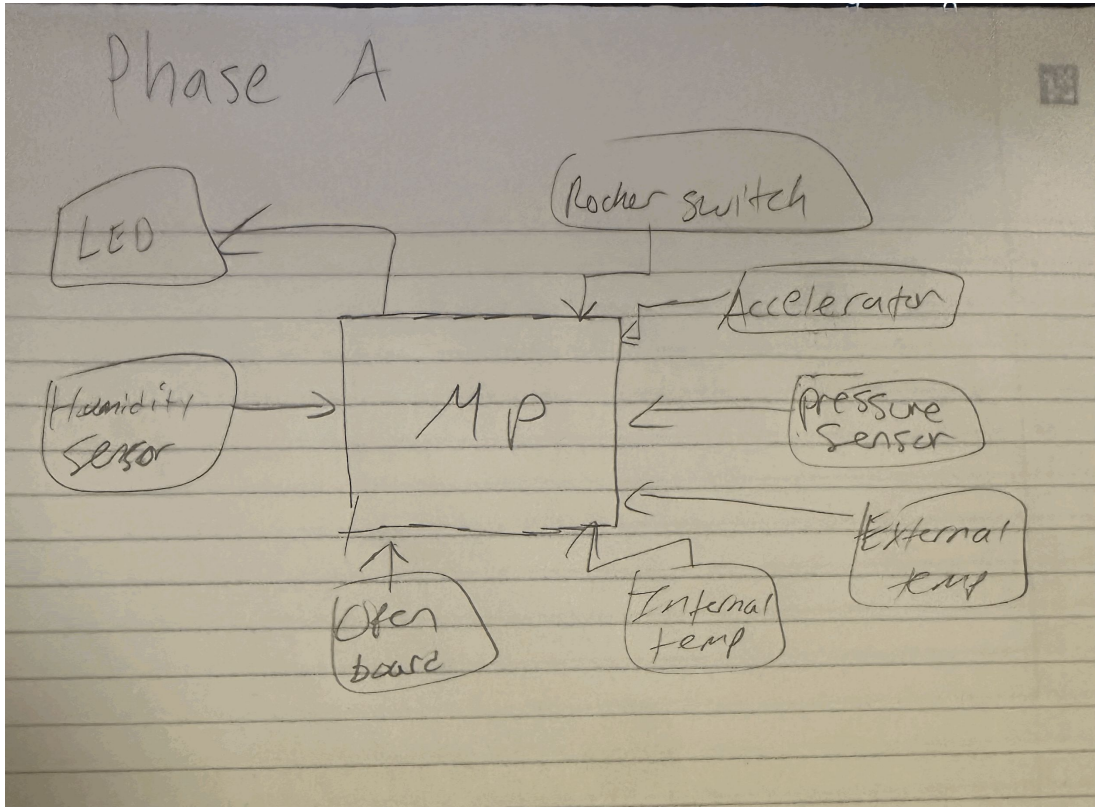
# The Weather Balloon

By Daniel Quiroa


# Phase A

# Design and Block Diagram



# Original Power Consumption

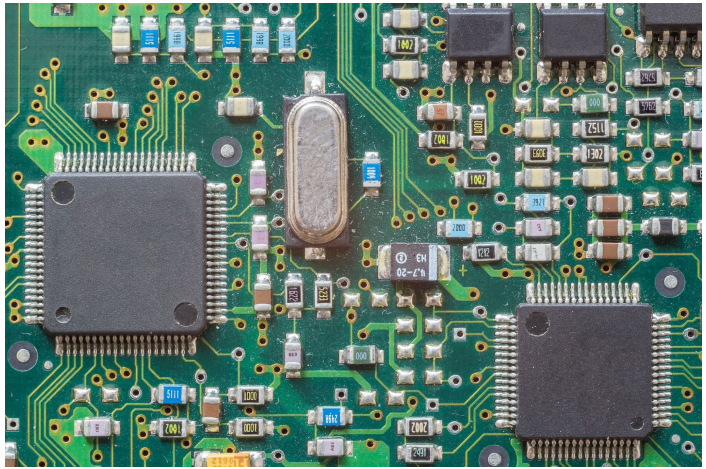
| Power Analysis | Old Design | |
|---|---|---|
| Part Description | QTY | Power Consumption |
| 330 Ohm Resistors | 6 | 0.25 W |
| PCB (Arduino Uno Shield v | 1 | |
| LED - Yellow | 1 | 0.03 W |
| LED - Orange | 1 | 0.03 W |
| LED - Blue | 2 | 0.05 W |
| LED - Green | 1 | 0.06 W |
| LED - Red | 1 | 0.03 W |
| Arduino UNO | 1 | 1.04 W |
| Jumper Wires | 1 | 0 W |
| POT (10K) | 1 | 0.5 W |
| 8-pin Stackable Plug Heac | 2 | N/A |
| 6-pin Stackable Plug Heac | 2 | N/A |
| DIP Socket Halves | 2 | N/A |
| Header (6 Pin Socket - Sh | 2 | N/A |
| Header (3 Pin Socket) | 1 | N/A |
| Header (2 Pin Plug Breaka | 2 | N/A |
| Header (3-Pin Locking) | 1 | N/A |
| Humidity Sensor | 1 | 200 mA |
| OpenLog Board | 1 | 2 mA / 6 mA at max reading state |
| Temperature Sensor | 1 | 50 µA |
| Pressure Sensor | 1 | 2.7 mA |
| Accelerometer (IC: ADXL3 | 1 | 350 µA |
| Rocker Switch | 1 | 0 W |
| 9V Barrel Connecter | 1 | 0 W |
| Stranded Wire (8" - 22 AW | 1 | 0 W |
| Stranded Wire (8" - 22 AW | 1 | 0 W |

# Original Weight Analysis

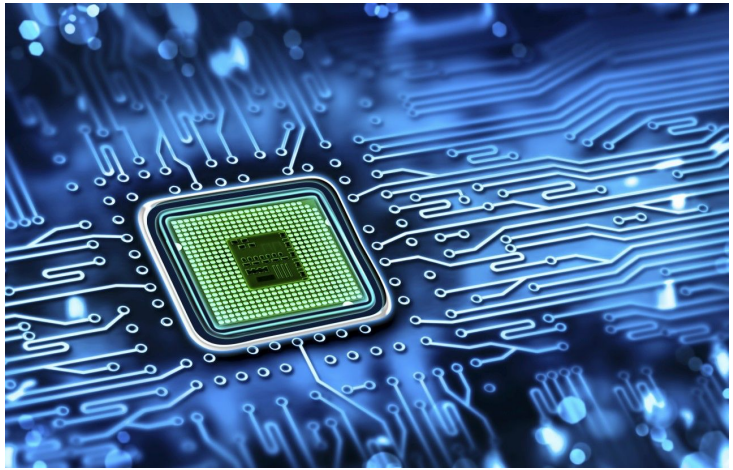
| Weight Analysis | Old Design | | |
|---|---|---|---|
| Part Description | QTY | Weight per Unit | otal Weight |
| 330 Ohm Resistors | 6 | 5 | 30 |
| PCB (Arduino Uno Shield wout/ components) | 1 | 15 | 15 |
| LED - Yellow | 1 | 0.27 | 0.27 |
| LED - Orange | 1 | 0.26 | 0.26 |
| LED - Blue | 2 | 0.26 | 0.52 |
| LED - Green | 1 | 0.26 | 0.26 |
| LED - Red | 1 | 0.26 | 0.26 |
| Arduino UNO | 1 | 25 | 25 |
| Jumper Wires | 10 | 0.7 | 7 |
| POT (10K) | 1 | 4.5 | 4.5 |
| 8-pin Stackable Plug Headers | 2 | 0.8 | 1.6 |
| 6-pin Stackable Plug Headers | 2 | 0.65 | 1.3 |
| DIP Socket Halves | 2 | | 0 |
| Header (6 Pin Socket - Short Pins) | 2 | 0.6 | 1.2 |
| Header (3 Pin Socket) | 1 | 0.4 | 0.4 |
| Header (2 Pin Plug Breakaway) | 2 | 0.3 | 0.6 |
| Header (3-Pin Locking) | 1 | 1.5 | 1.5 |
| Humidity Sensor | 1 | 0.8618 | 0.8618 |
| OpenLog Board | 1 | 2.5 | 2.5 |
| Temperature Sensor | 1 | 0.208 | 0.208 |
| Pressure Sensor | 1 | 1 | 1 |
| Accelerometer (IC: ADXL335) | 1 | 1.45 | 1.45 |
| Rocker Switch | 1 | 8.3 | 8.3 |
| 9V Barrel Connecter | 1 | 4 | 4 |
| Stranded Wire (8" - 22 AWG) - Red | 1 | 0.93 | 0.93 |
| Stranded Wire (8" - 22 AWG) - Black | 1 | 0.93 | 0.93 |
| | | Total Weight = | 109.8498 |

# Feasibility

- Good weight
- Good Price
- Sufficient Power Consumption
- Humidity Sensor is no longer being sold
- If found - fairly expensive



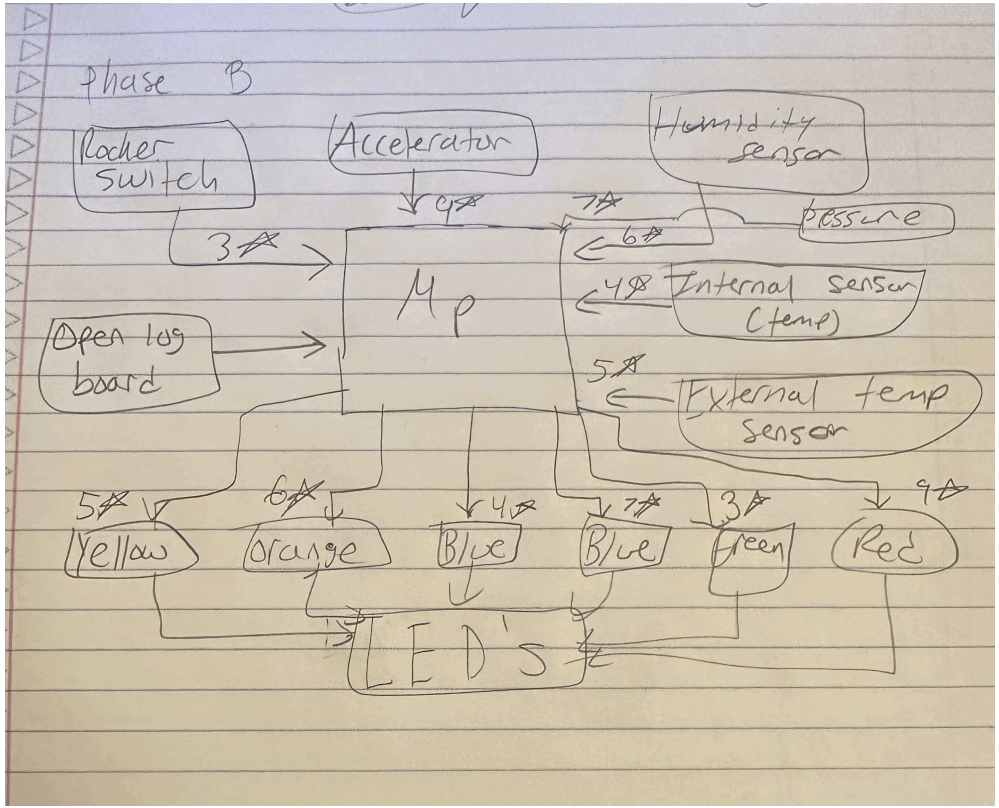
# Phase B



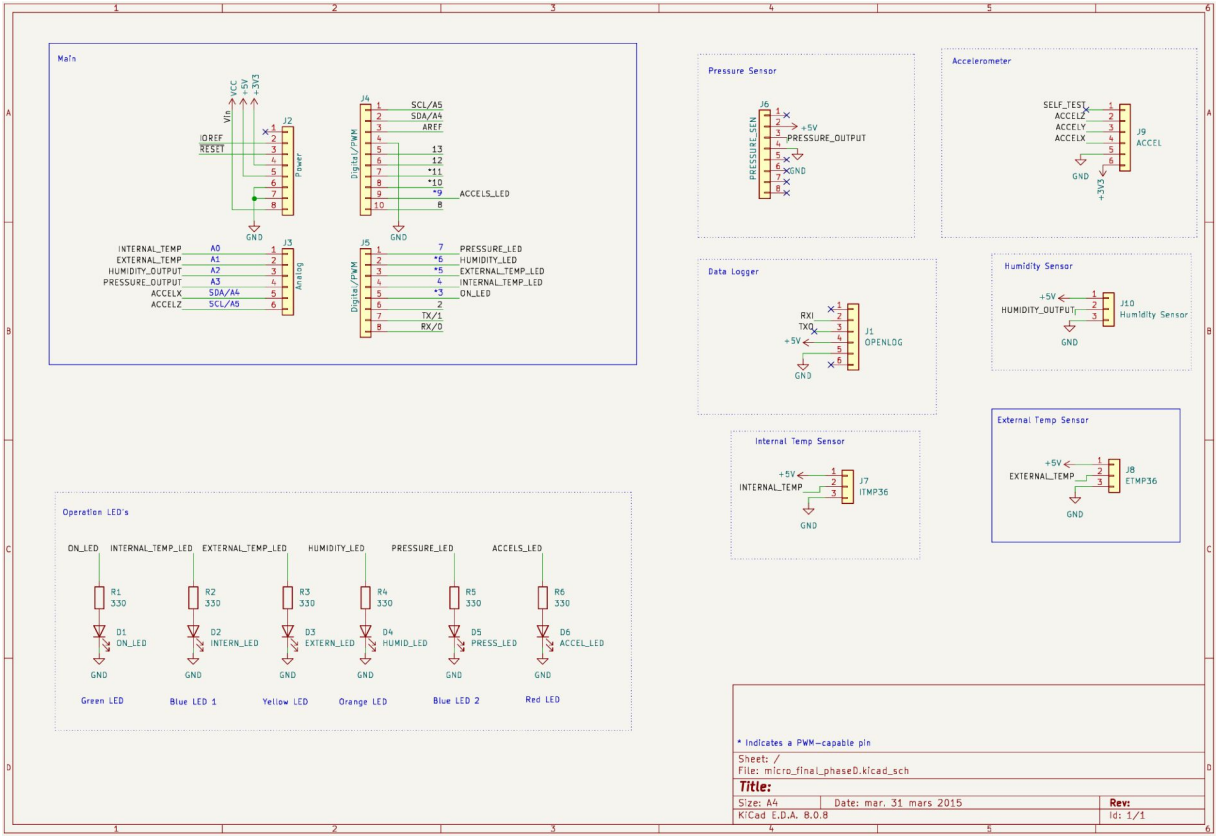
# New Design Requirements:

- Total cost should not exceed $147
- Maximum payload weight: 200 grams
- Maintain the same functionality: internal and external temperature sensing, 3 -axis, acceleration,pressure, humidity, LED indicators, battery-powered operation, and data storage
- Lower Power Consumption

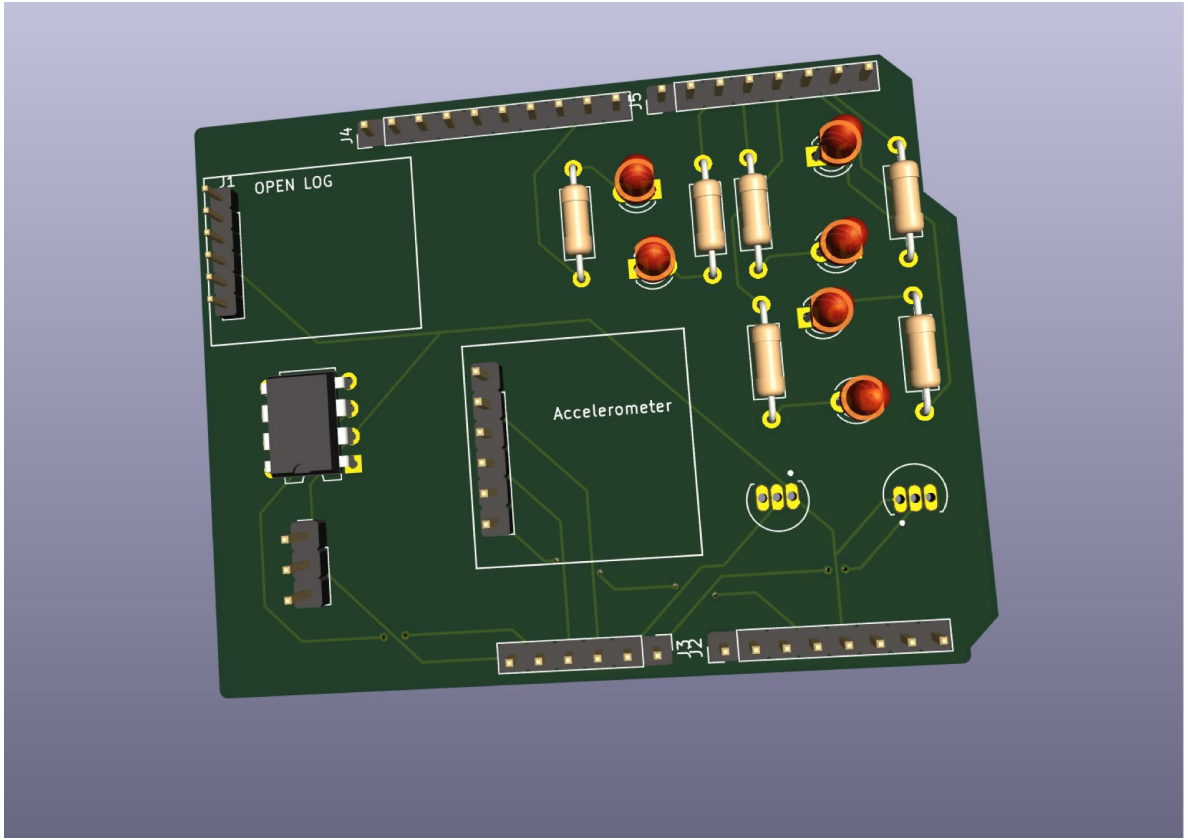
# New Design Block Diagram



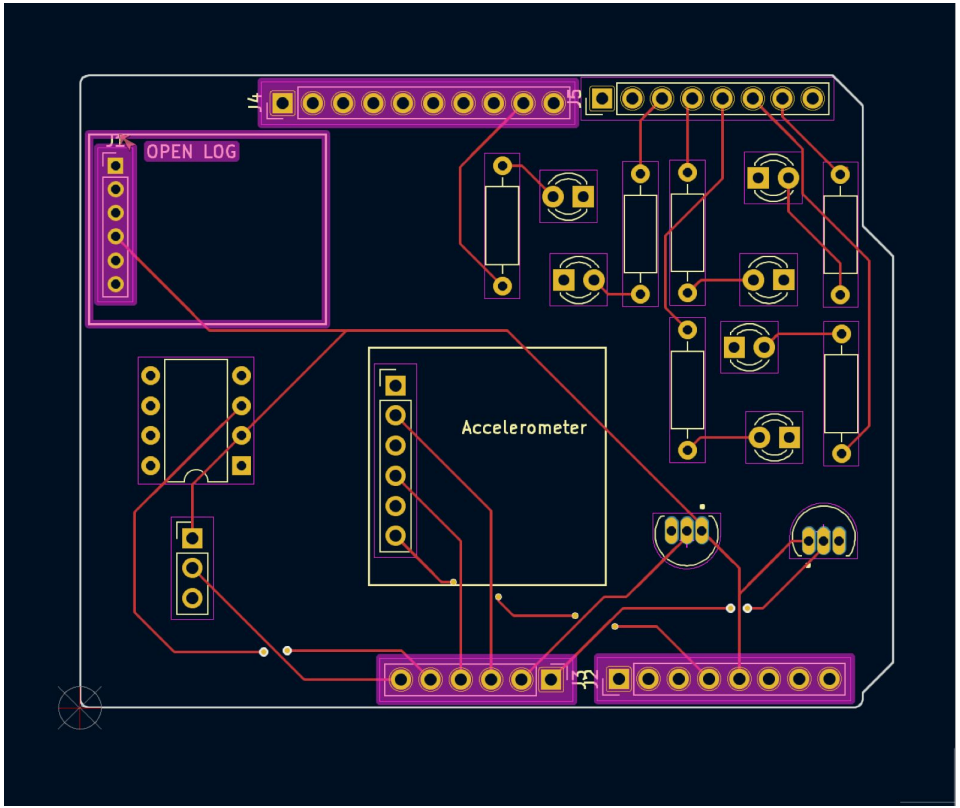
# New Design Schematic



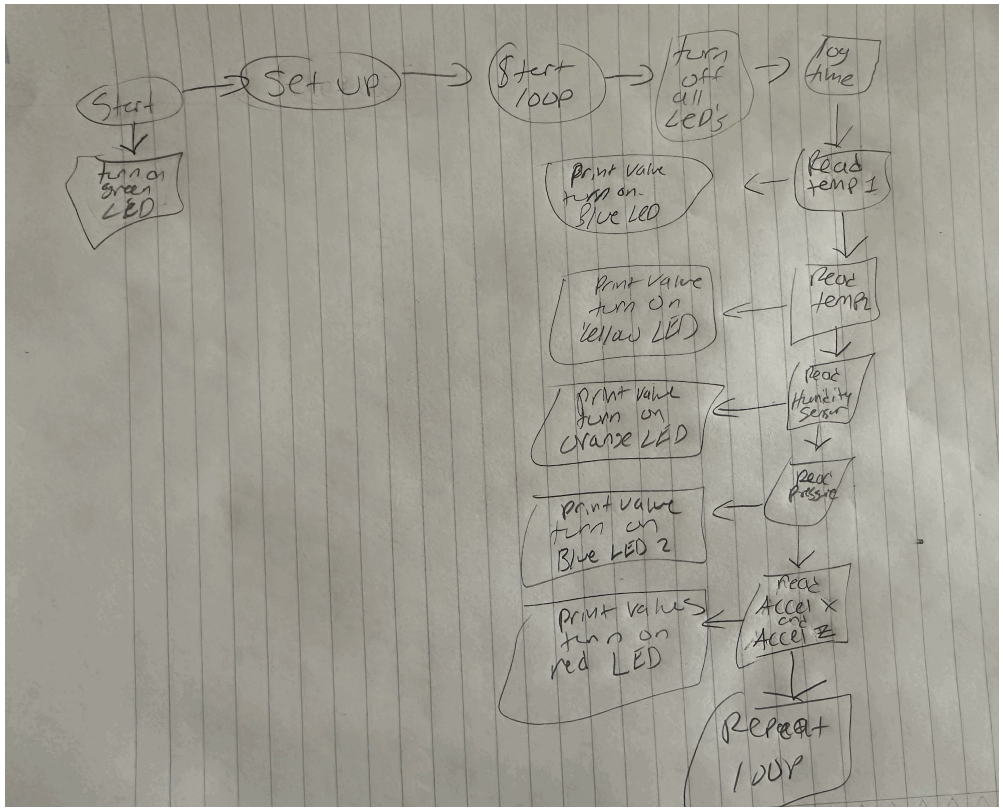
# New Design PCB



# Wires and Connnections



# Code Flowchart



# New Design Cost Analysis

| Cost Analysis | | | |
|---|---|---|---|
| Part Description | QTY | Cost per Unit | Total Cost |
| 330 Ohm Resistors | 6 | $0.10 | $0.60 |
| PCB (Arduino Uno Shield wout/ components | 1 | $1.00 | $1.00 |
| LED - Yellow | 1 | $0.28 | $0.28 |
| LED - Orange | 1 | $0.35 | $0.35 |
| LED - Blue | 2 | $0.24 | $0.48 |
| LED - Green | 1 | $0.24 | $0.24 |
| LED - Red | 1 | $0.15 | $0.15 |
| Arduino UNO | 1 | | |
| Jumper Wires | 1 | $1.95 | $1.95 |
| POT (10K) | 1 | $1.05 | $1.05 |
| 8-pin Stackable Plug Headers | 2 | $0.75 | $1.50 |
| 6-pin Stackable Plug Headers | 2 | $0.75 | $1.50 |
| DIP Socket Halves | 2 | | $0.00 |
| Header (6 Pin Socket - Short Pins) | 2 | $0.26 | $0.52 |
| Header (3 Pin Socket) | 1 | $0.21 | $0.21 |
| Header (2 Pin Plug Breakaway) | 2 | $0.47 | $0.94 |
| Header (3-Pin Locking) | 1 | $0.67 | $0.67 |
| Humidity Sensor | 1 | $4.79 | $4.79 |
| OpenLog Board | 1 | $17.50 | $17.50 |
| Temperature Sensor | 1 | $1.65 | $1.65 |
| Pressure Sensor | 1 | $48.67 | $48.67 |
| Accelerometer (IC: ADXL335) | 1 | $16.95 | $16.95 |
| Rocker Switch | 1 | $0.45 | $0.45 |
| 9V Barrel Connecter | 1 | $1.09 | $1.09 |
| Stranded Wire (8" - 22 AWG) - Red | 1 | $0.57 | $0.57 |
| Stranded Wire (8" - 22 AWG) - Black | 1 | $0.57 | $0.57 |
| | | Total cost = | $103.68 |

# New Design Weight Analysis

| Weight Analysis | New design | | |
|---|---|---|---|
| Part Description | QTY | Weight per Unit | Total Weight |
| 330 Ohm Resistors | 6 | 5 | 30 |
| PCB (Arduino Uno Shield wout/ components | 1 | 15 | 15 |
| LED - Yellow | 1 | 0.27 | 0.27 |
| LED - Orange | 1 | 0.26 | 0.26 |
| LED - Blue | 2 | 0.26 | 0.52 |
| LED - Green | 1 | 0.26 | 0.26 |
| LED - Red | 1 | 0.26 | 0.26 |
| Arduino UNO | 1 | 25 | 25 |
| Jumper Wires | 10 | 0.7 | 7 |
| POT (10K) | 1 | 4.5 | 4.5 |
| 8-pin Stackable Plug Headers | 2 | 0.8 | 1.6 |
| 6-pin Stackable Plug Headers | 2 | 0.65 | 1.3 |
| DIP Socket Halves | 2 | | 0 |
| Header (6 Pin Socket - Short Pins) | 2 | 0.6 | 1.2 |
| Header (3 Pin Socket) | 1 | 0.4 | 0.4 |
| Header (2 Pin Plug Breakaway) | 2 | 0.3 | 0.6 |
| Header (3-Pin Locking) | 1 | 1.5 | 1.5 |
| Humidity Sensor | 1 | 2.5 | 2.5 |
| OpenLog Board | 1 | 2.5 | 2.5 |
| Temperature Sensor | 1 | 0.208 | 0.208 |
| Pressure Sensor | 1 | 1 | 1 |
| Accelerometer (IC: ADXL335) | 1 | 1.45 | 1.45 |
| Rocker Switch | 1 | 8.3 | 8.3 |
| 9V Barrel Connecter | 1 | 4 | 4 |
| Stranded Wire (8" - 22 AWG) - Red | 1 | 0.93 | 0.93 |
| Stranded Wire (8" - 22 AWG) - Black | 1 | 0.93 | 0.93 |
| | | Total Weight = | 111.488 |

# New Design Power Consumption

| Power Analysis | New Design | |
|---|---|---|
| Part Description | QTY | Power Consumption |
| 330 Ohm Resistors | 6 | 0.25 W |
| PCB (Arduino Uno Shield wout/ components | 1 | |
| LED - Yellow | 1 | 0.03 W |
| LED - Orange | 1 | 0.03 W |
| LED - Blue | 2 | 0.05 W |
| LED - Green | 1 | 0.06 W |
| LED - Red | 1 | 0.03 W |
| Arduino UNO | 1 | |
| Jumper Wires | 1 | 0 W |
| POT (10K) | 1 | 0.5 W |
| 8-pin Stackable Plug Headers | 2 | N/A |
| 6-pin Stackable Plug Headers | 2 | N/A |
| DIP Socket Halves | 2 | N/A |
| Header (6 Pin Socket - Short Pins) | 2 | N/A |
| Header (3 Pin Socket) | 1 | N/A |
| Header (2 Pin Plug Breakaway) | 2 | N/A |
| Header (3-Pin Locking) | 1 | N/A |
| Humidity Sensor | 1 | 0.3mA when measuring and 60uA in standby mode |
| OpenLog Board | 1 | 2 mA / 6 mA at max reading state |
| Temperature Sensor | 1 | 50 µA |
| Pressure Sensor | 1 | 2.7 mA |
| Accelerometer (IC: ADXL335) | 1 | 350 µA |
| Rocker Switch | 1 | 0 W |
| 9V Barrel Connecter | 1 | 0 W |
| Stranded Wire (8" - 22 AWG) - Red | 1 | 0 W |
| Stranded Wire (8" - 22 AWG) - Black | 1 | 0 W |