Bill Of Materials (BOM)

Project Name: Hydroponic IoT Monitoring System

A circuit board with wires and switches

AI-generated content may be incorrect.

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Simulation Platform: Wokwi

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# Electronic Components

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item No. | Component | Quantity | Type | Description/Purpose |
| 1 | ESP32-S2 Microcontroller | 1 | MCU | Core controller with Wi-Fi and GPIO |
| 2 | Flowmeter sensor | 2 | Sensor | Measures water inflow and return via pulses |
| 3 | Horizontal Float Switch | 2 | Digital Input | Detects low/warning and critical reservoir level |
| 4 | Vertical Float Switch | 1 | Digital Input | Detects overflow in outlet trough pipe |
| 5 | Push Button (Override) | 1 | Digital Input | Manual override to toggle pump on/off |
| 6 | Potentiometers | 2 | Analog Input | Simulates flow rate adjustment on flowmeters |
| 7 | LED – Red (Reservoir Cutoff | 1 | Output | Indicates reservoir critical level |
| 8 | LED – Yellow (Warning) | 1 | Output | Indicates reservoir low level |
| 9 | LED Blue (Overflow) | 1 | Output | Indicates pipe overflow |
| 10 | LED Green (Pump Status) | 1 | Output | Indicates if pump is active |
| 11 | LED Orange (Inflow pulse) | 1 | Output | Flashes flowmeter to indicate pulse rate |
| 12 | LED Orange (Return flow pulse) | 1 | Output | Flashes flowmeter to indicate pulse rate |
| 13 | Jumper wires | 20 | Connector | Simulated wire connectors for digital / analog signals |
| 14 | Breadboard | 2 | Interface | For arranging circuit |

# Cloud and Network Components

|  |  |  |
| --- | --- | --- |
| Item No | Component | Description |
| 15 | Wi-Fi (Wokwi emulated) | ESP32-S3 connects to simulated Wi-Fi |
| 16 | MQTT Broker (Adafruit IO) | Cloud-based data platform for MQTT publisher / subscriber |
| 17 | Adafruit IO Dashboard | IoT dashboard for real-time visualization |

# Software Tools

|  |  |  |
| --- | --- | --- |
| Item No. | Tool/Platform | Purpose |
| 18 | Wokwi Simulator | Circuit simulation and prototyping |
| 19 | Arduino IDE (Optional) | Flashing firmware to real ESP32 |
| 20 | GitHub | Source code and documentation repository |

# Notes

* All components are virtual/simulated in Wokwi – no physical purchase required
* For physical implementations, ensure components are 5V/3.3V tolerant
* Flowmeters simulated using pulse generation logic based on potentiometer input

# Appendix A – Bill Of Materials with costing for Hybrid solution

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component** | **Qty** | **Description** | **Total Cost** | **Source** |
| Pro S3 ESP32 S3 | 1 | Main controller board | 40.74 | Core Electronics |
| Flowmeter | 2 | Use of potentiometer | 0.00 |  |
| Pump Override Switch | 1 | Use of Push button | 0.00 |  |
| Horizontal Float Switch | 2 | Use of Push button | 0.00 |  |
| Vertical Float Switch | 1 | Use of Push button | 0.00 |  |
| LED | 100pk | For indicating state of sensors and pump override switch | 3.25 | Core Electronics |
| Resistors | 4 | For LEDs | 0.40 | Core Electronics |
| Push Button | 4 | Sensors and override switches | 4.00 | Core Electronics |
| Potentiometers | 2 | For controlling the flowrate of the flowmeters (Breadboard Trim Pot 10k) | 6.00 | Core Electronics |
| Breadboard ZY-102 | 2 | Circuit assembly | 10.00 | Core Electronics |
| Jumper Wire Kit assorted 140pcs | 1 | Circuit assembly | 10.00 | Core Electronics |
| Power supply | 1 | External 5V power supply | 12.05 | Core Electronics |
| **Total for Hybrid solution (Rounded)** | | | **87.00** | **Core Electronics** |
| **Delivery** | | | **8.15** | **AusPost Standard** |
| **Total (Rounded)** | | | **100.00** |  |

The amounts have been rounded up to accommodate potential price fluctuations. Cost savings will be achieved on delivery, as all items have been sourced from a single supplier. (Please note that the ESP32 board we can source is the ESP32-S3, which differs from the ESP32-S2 used in the simulation. The S3 is an upgraded version, offering enhanced performance, improved connectivity, and advanced AI capabilities.)

# Appendix B – Bill Of Materials for actual sensors

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component** | **Qty** | **Description** | **Cost** | **Source** |
| Flowmeter | 2 | Hall effect water flow meter YF-S201 | 19.00 | Altronics |
| Pump Override Switch | 1 | Smart Plug | 18.25 | Altronics |
| Horizontal Float Switch | 2 | Horizontal Tilt Float Switch | 31.90 | Altronics |
| Vertical Float Switch | 1 | Vertical Tilt Float Switch | 14.35 | Altronics |
| **Total component cost (Rounded)** | | | **90.00** | **Altronics** |
| **Delivery** | | | **9.60** | **Standard Del.** |
| **Total (Rounded)** | | | **100.00** |  |

The amounts have been rounded up to accommodate potential price fluctuations. Cost savings will be achieved on delivery, as all items have been sourced from a single supplier.