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

# Electronic Components

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| 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

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| 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

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| 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