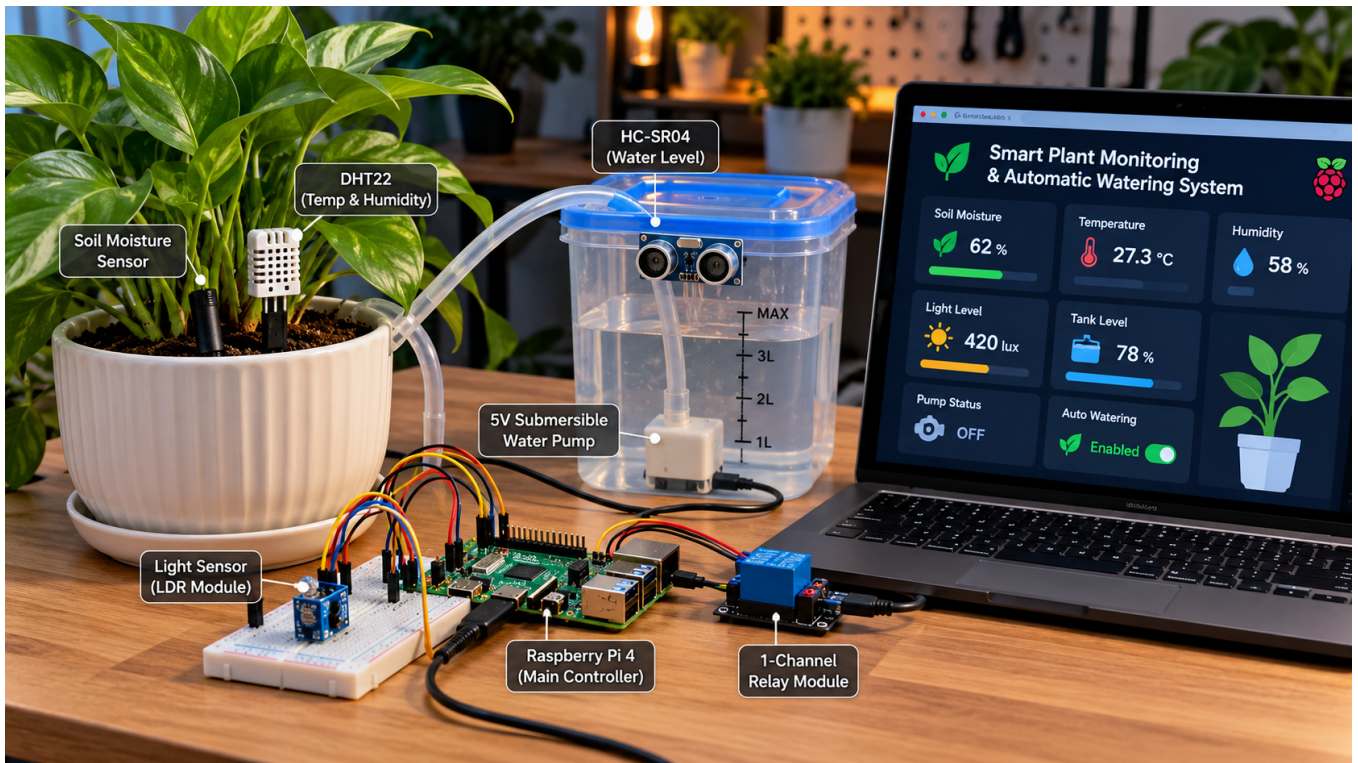


Smart Plant Monitoring & Automatic Watering System

Raspberry Pi IoT project concept | TechTrivandrum



Illustrative concept image — not a photograph of an assembled, tested system.

Overview

This proposed project uses a Raspberry Pi to monitor soil moisture, air temperature, humidity, ambient light and water-reservoir level. When conditions permit, a separately powered low-voltage pump can water a plant through a short, bounded control cycle.

Main capabilities

Soil and environmental monitoring; proposed automatic irrigation with tank-level safety interlocks; optional dashboard, history and alerts; customizable thresholds and expandable multi-plant design.

How it works

A capacitive soil probe feeds an MCP3008 ADC. A DHT22 and BH1750 provide environmental measurements; an overhead ultrasonic sensor estimates reservoir level. The Raspberry Pi compares measurements with configurable limits and activates a relay-controlled pump only while safety conditions are satisfied. Measurements can be displayed in a proposed monitoring interface.

Suggested hardware

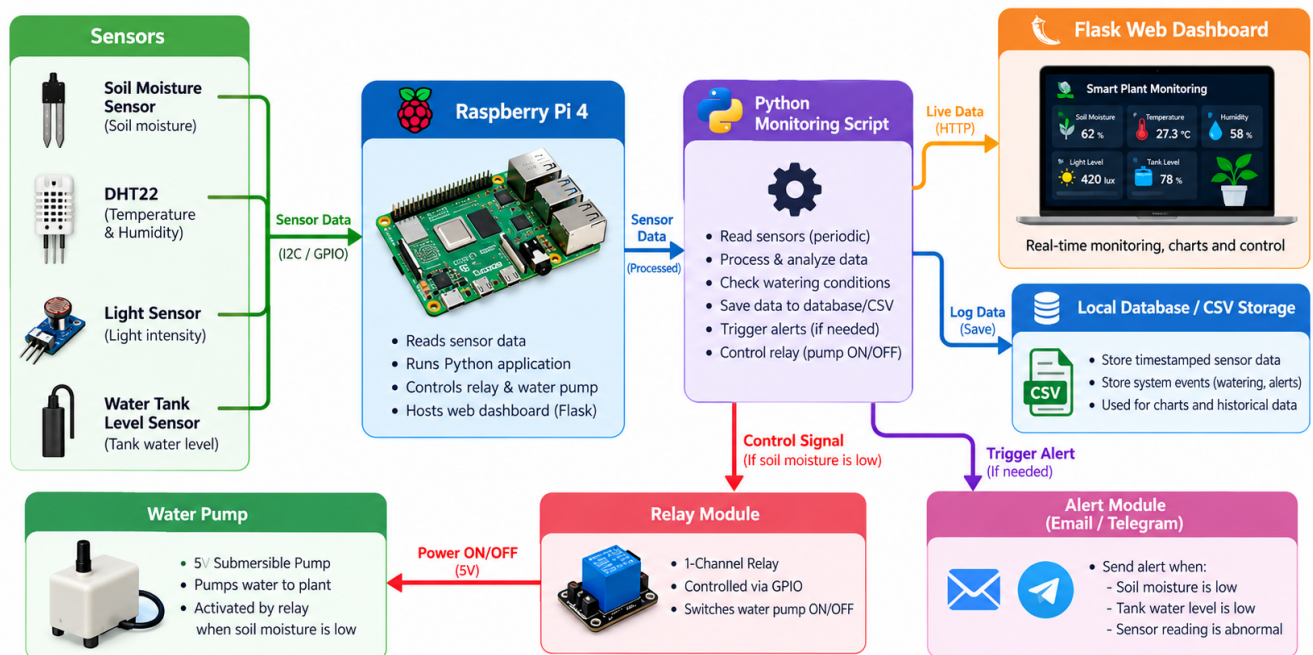
Component	Function
Raspberry Pi 4 + power supply	Controller
Capacitive moisture probe + MCP3008	Analog soil moisture reading
DHT22 / BH1750	Temperature, humidity and light

Component	Function
HC-SR04 + echo level shifting	Reservoir level estimate
3.3 V compatible relay + external 5 V pump supply	Low-voltage pump switching
Pump, tubing, tank, enclosure	Water delivery and housing

System architecture concept



System Architecture – Smart Plant Monitoring & Automatic Watering System



Conceptual overview including optional dashboard, storage and alert components.

Proposed monitoring interface



Example dashboard visual — values and controls shown are illustrative.

Electrical considerations

Raspberry Pi GPIO uses 3.3 V logic. The HC-SR04 ECHO pin requires level shifting before it reaches GPIO; the pump must use a separate rated power supply and suitable switching driver. Protect the electronics from moisture. Final wiring must be checked against actual module datasheets before construction.

Potential applications

Educational IoT demonstrations, connected home gardening, prototype greenhouse monitoring, and tailored irrigation concepts. Extensions can include mobile notifications, multiple growing zones, weather-aware scheduling and cloud reporting.

Project enquiries

Interested in developing a similar project? Contact **TechTrivandrum** through the website to discuss hardware selection, programming, integration and customized implementation.

Publication note: This guide presents an illustrative concept and potential implementation approach, not a completed installation or validated hardware prototype.