

In the of God

Core-Based Embedded System Design The Project Part B

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The increasing demand for automation in agriculture and home gardening has highlighted the need for an intelligent plant watering system that can monitor soil moisture levels and provide water only when necessary. Manual irrigation often leads to over-watering or under-watering, which can harm plants and waste resources.

1. Hardware Requirements

- Microcontroller: ESP32 (due to its Wi-Fi and Bluetooth capabilities)
- Sensors: Soil moisture sensors
- Actuators: Water pump (controlled via relay module)
- Communication Interfaces: Wi-Fi / Bluetooth
- Optional Sensors: Temperature and humidity sensors for advanced control

2. Software Requirements

- Firmware to read sensor values
- Logic to decide whether to activate the pump
- Connectivity protocols (Wi-Fi/Bluetooth) to send data to a mobile app or cloud service

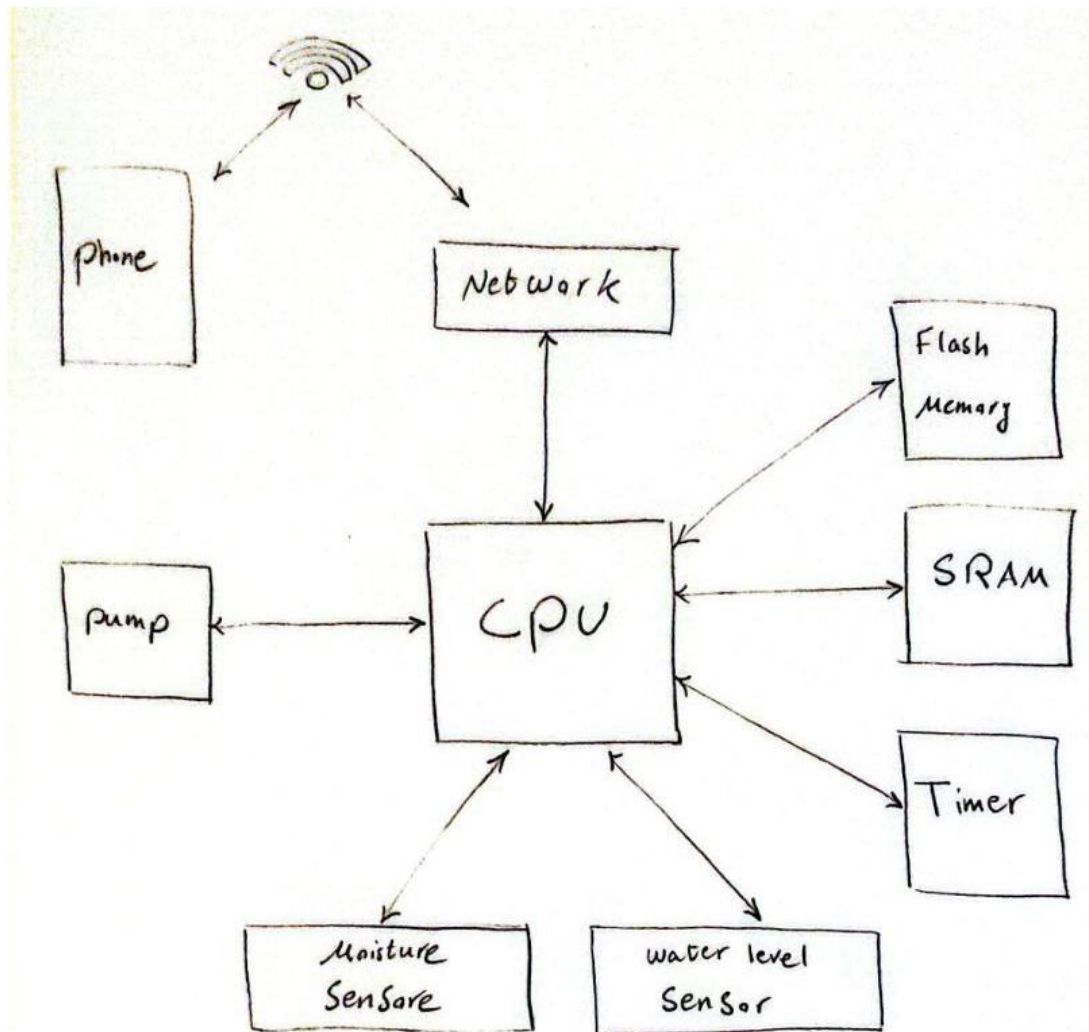


Figure 1 Block Diagram of Design

At first, the user sets some parameters through the mobile application, such as the type of plant and the required amount of water. These values are then transmitted wirelessly to the system. After initialization, the system enters a loop where the CPU waits for a timer interrupt. Upon the interrupt, it activates the moisture sensor and checks if the moisture level is above the predefined threshold. If not, the system sends a command to the pump to release water. Additionally, a water level sensor checks whether there is enough water in the tank before watering.

passed 1 hours
Sampling
Moisture : 7
reading from memory
Low moisture. Turn on the pump.
pumping water

passed 1 hours
Sampling
Moisture : 0
reading from memory
Low moisture. Turn on the pump.
out of water

passed 1 hours
Sampling
Moisture : 10
reading from memory
enough moisture. Do nothing.