

A Project Proposal – Summer 2025

Project Title: IoT-Based Home Automation System And Auto Water Pump Control Using ESP-32 NodeMCU

This proposal is submitted to fulfilment of the requirements for the course
CSE 0613-3299 (Project Development).



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Title: IoT-Based Home Automation System and Auto Water Pump Control Using ESP-32 NodeMCU

1. Objectives:

The objectives of this project are to:

To design and implement a low-cost IoT-based home automation system using ESP-32 NodeMCU that can remotely control home appliances, including a water pump, through a smartphone or web interface, enhancing convenience, safety, and water usage efficiency.

2. Proposed Work/ Project Architecture:

System Overview:

This project aims to automate and remotely control basic household appliances like lights, fans, and especially a **water pump**, using Wi-Fi-based communication via the **ESP-32 microcontroller**.

Components:

- **ESP32 NodeMCU** (main controller)
- **Sonar/Ultrasonic Sensor (HC-SR04)** → water tank level measurement
- **Rain Sensor Module** → detect rain conditions
- **DHT11 Sensor** → temperature & humidity monitoring
- **4-Channel Relay Module** → control 2 bulbs, 1 fan, and 1 water pump
- **4 Manual Switches** → physical override for each device
- **Mobail Appication** → voice command override for each device
- **Bulbs (x2), Fan (x1), Water Pump (x1)**
- **Breadboard & Jumper Wires** → prototyping connections
- **Resistors** → protection for LEDs/sensors
- **Power Supply** → 5V regulated supply
- **Cork Sheet** → prototype home

Total Estimated Cost: BDT 2000 - BDT 2500.

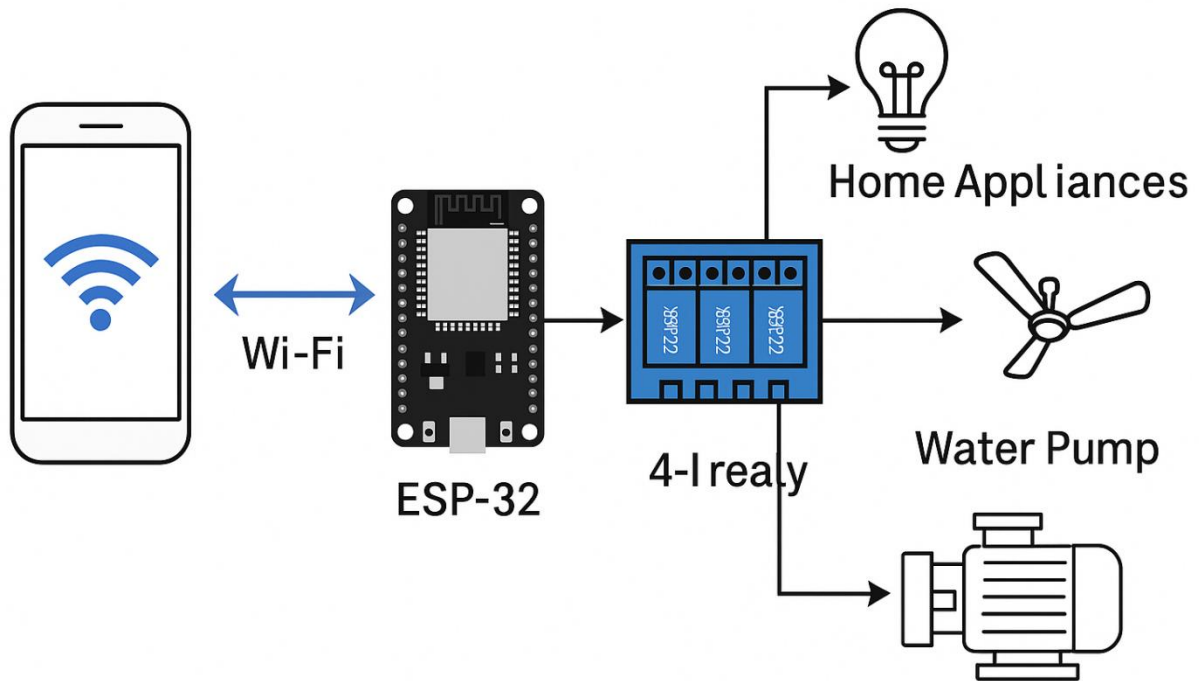


Fig 1.0: System Architecture of the proposed system.

3. Applications/Social Impact:

Smart Home Appliance Control: Control lights, fan, and water pump from a smartphone or web interface, and enable scheduled or real-time control of appliances.

Water Pump Automation: Automatically turns on the pump when water level is low and turns it off when the tank is full.

Elderly and Physically Challenged Support: Makes it easier for people with limited mobility to control appliances. Adds convenience and safety.

Water and Energy Conservation: Prevents water overflow and unnecessary power usage by turning devices off automatically.

Affordable Smart Solutions: Low-cost alternative to expensive foreign smart home systems. Suitable for low-income and rural households.

Empowering Elderly and Disabled: Allows independent living by enabling remote control of home appliances.

Opportunities for Innovation and Employment: Promotes learning in IoT, electronics, and embedded systems. Can lead to local manufacturing, startups, and job creation.

Approval/Supervisor's Feedback:

This project proposal is approved for development, subject to periodic review and guidance by the supervisor during implementation.