

## **Project Title: Smart Hostel Hot Water Dispensing System Using RFID for User Authentication and Access Control**

### **Aim:**

To design a smart water dispensing system for hostels that allows only registered users to access hot water using RFID-based authentication and ensures controlled and fair usage.

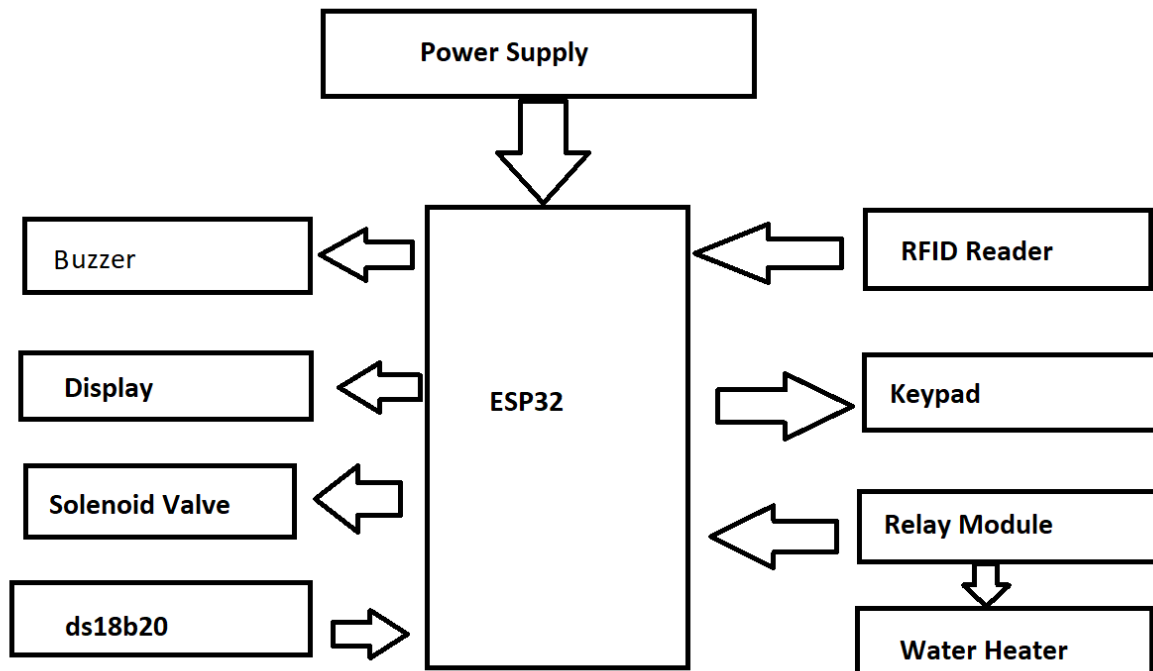
### **Objectives:**

- To provide hot water to authorized hostel users only.
- To use RFID cards for secure user authentication.
- To automate water dispensing and stop after a set time or quantity.
- To prevent water and electricity wastage.
- To monitor and log daily usage for management.

### **Working Principle:**

Each user is assigned an RFID card. When a user scans the card on the system, the microcontroller checks the user's ID against a preloaded list. If valid, the system activates a water heater and opens a valve to dispense hot water for a specific time or volume. After the limit is reached, it shuts off automatically. The system can also log usage and restrict repeated access within a time period.

## Block Diagram



## Hardware Components:

- Arduino
- RFID Module (RC522)
- Solenoid Valve
- Relay Module
- Water Heater (Geyser)
- LCD Display
- Buzzer / LEDs
- Real-Time Clock (RTC) (*optional*)
- Power Supply

## Software Used:

- Arduino IDE
- Embedded C/C++

### **Advantages:**

- Prevents unauthorized use of hot water
- Saves electricity and water by limiting usage
- Secure and easy RFID-based access
- Reduces manual supervision in hostels
- Can be integrated with digital logging for hostel management

### **Disadvantages:**

- Initial setup cost for RFID and valve system
- RFID cards may get lost or damaged
- Limited scalability without network integration
- Requires regular maintenance of hardware components

### **Applications:**

- Hostel bathrooms and water supply areas
- PGs and dormitories
- Employee housing
- Controlled water systems in public areas

### **Future Scope:**

- Add mobile app or online portal for usage tracking
- Integrate payment-based usage (prepaid credits)
- Enable Wi-Fi-based monitoring and remote control

- Use face or fingerprint authentication instead of RFID
- Auto-refill tank with water level monitoring

**Conclusion:**

This smart hot water dispensing system provides a secure and efficient way to manage water usage in hostels. With RFID-based access and automatic control, it ensures fair usage, prevents waste, and reduces operational costs. It's a practical step toward smarter hostel facilities.

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