Title: Wireless Remote-Controlled Bomb Detection and Defusing Robot with NRF Module, Wi-Fi Camera, and Real-Time Monitoring

Aim:

The aim of this project is to develop a wireless robot that can detect and defuse bombs from a safe distance. It uses a Wi-Fi camera for live monitoring and an NRF module for wireless remote control.

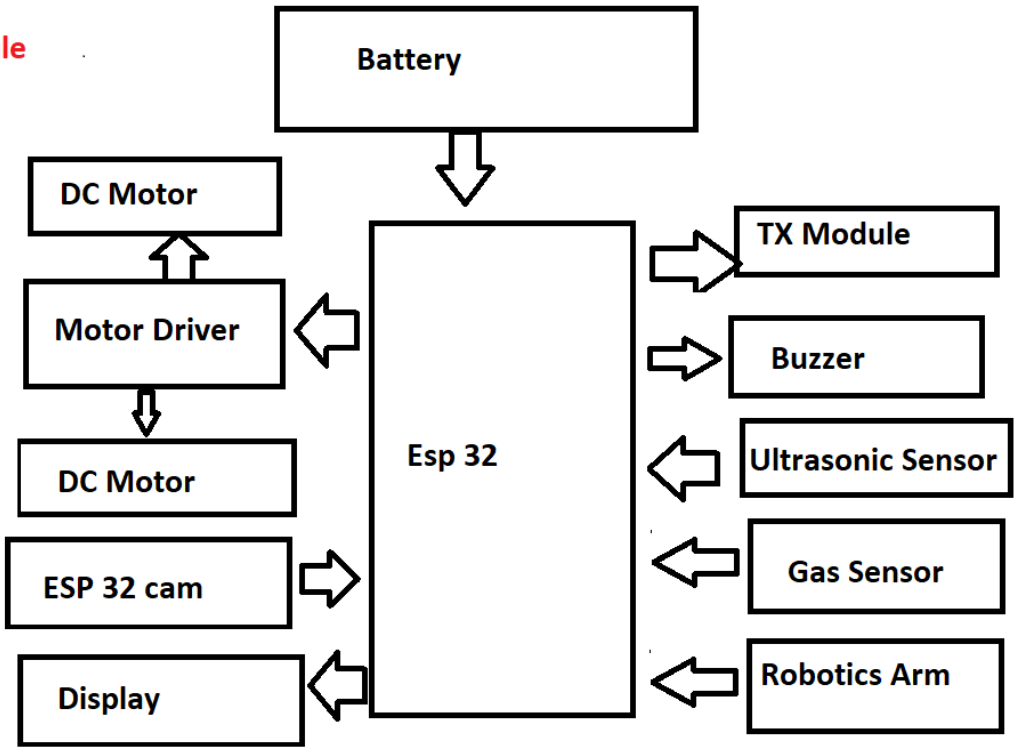
Objective:

- To create a robot that can be controlled remotely.
- To detect and approach suspected bombs safely.
- To monitor the situation in real-time through a camera.
- To reduce the risk to human life during bomb disposal.
- To defuse or manipulate bombs using a robotic arm.

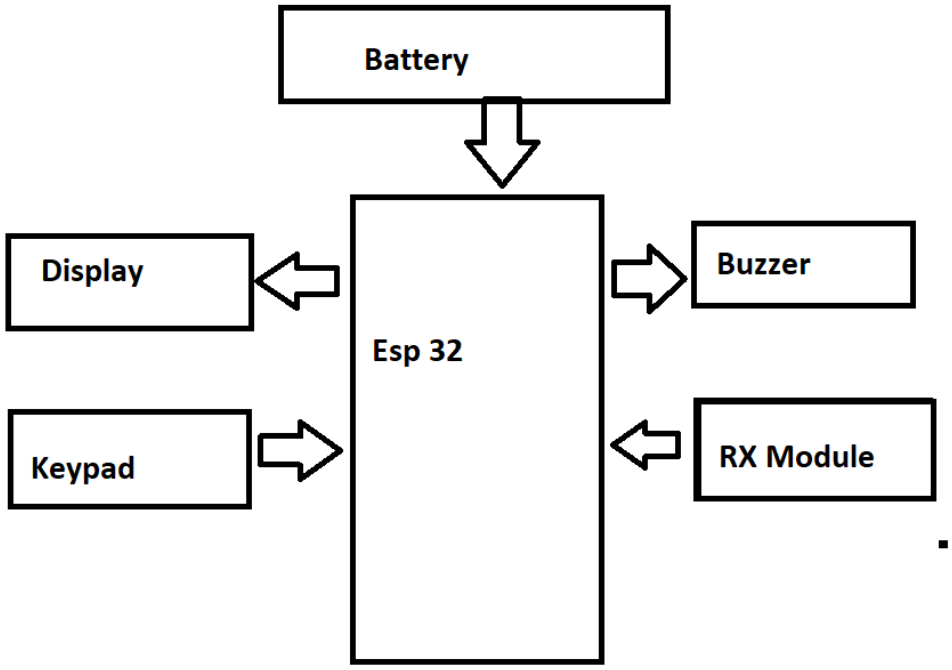
Working:

The robot is controlled through a remote using the NRF24L01 wireless module. A controller sends movement commands to the robot. A Wi-Fi camera mounted on the robot streams live video to a phone or laptop, helping the operator navigate and inspect objects. The robot also has a small robotic arm or tool to handle and defuse suspected bombs safely. All operations are done remotely, keeping the human operator out of danger.

TX Module



RX Module



Components Used:

🖴 Hardware Components:

- **Arduino Uno/Nano** – Main controller
- **NRF24L01 Wireless Module (2 units)** – For remote control communication
- **ESP32-CAM** – For live video streaming
- **L298N Motor Driver** – To control robot motors
- **Geared DC Motors with Wheels s** – For movement
- **Robotic Arm** – To defuse or lift the bomb
- **Ultrasonic Sensor** – For obstacle detection
- **Smoke/Gas Sensor** – To detect explosive gases
- **Battery Pack (12V or 7.4V Li-ion)** – To power the robot
- **Chassis and Body Frame** – Holds all components

Software Used:

- **Arduino IDE** – For coding the robot
- **Web browser or mobile app** – To view camera footage

Advantages:

- Keeps humans at a safe distance from bombs
- Real-time video helps in better monitoring
- Easy to operate using wireless controls
- Portable and lightweight for quick deployment
- Can be modified for other security purposes

Disadvantages:

- Limited wireless range of NRF module
- May not work well in areas with weak Wi-Fi signals
- Not suitable for complex bomb disposal without human help

- Camera may have delay or lag

Applications:

- Police and military bomb squads
- Airports, railway stations, and public events
- Rescue operations in dangerous environments

Future Scope:

- Add AI-based bomb detection and facial recognition
- Use GPS for outdoor tracking and mapping
- Replace NRF with long-range wireless like LoRa
- Add tools like wire cutters or water jet systems
- Include hazardous gas/radiation detection sensors