Fire Fighting Smart Car

An IoT-Enabled Robotic Platform for Flame Detection & Safety Automation

ARDUINO BASED

FIRE FIGHTING ROBO CAR

Created By

Dedicated Engineering Team

Passionate about leveraging technology to create safer environments through innovation in robotics and IoT.

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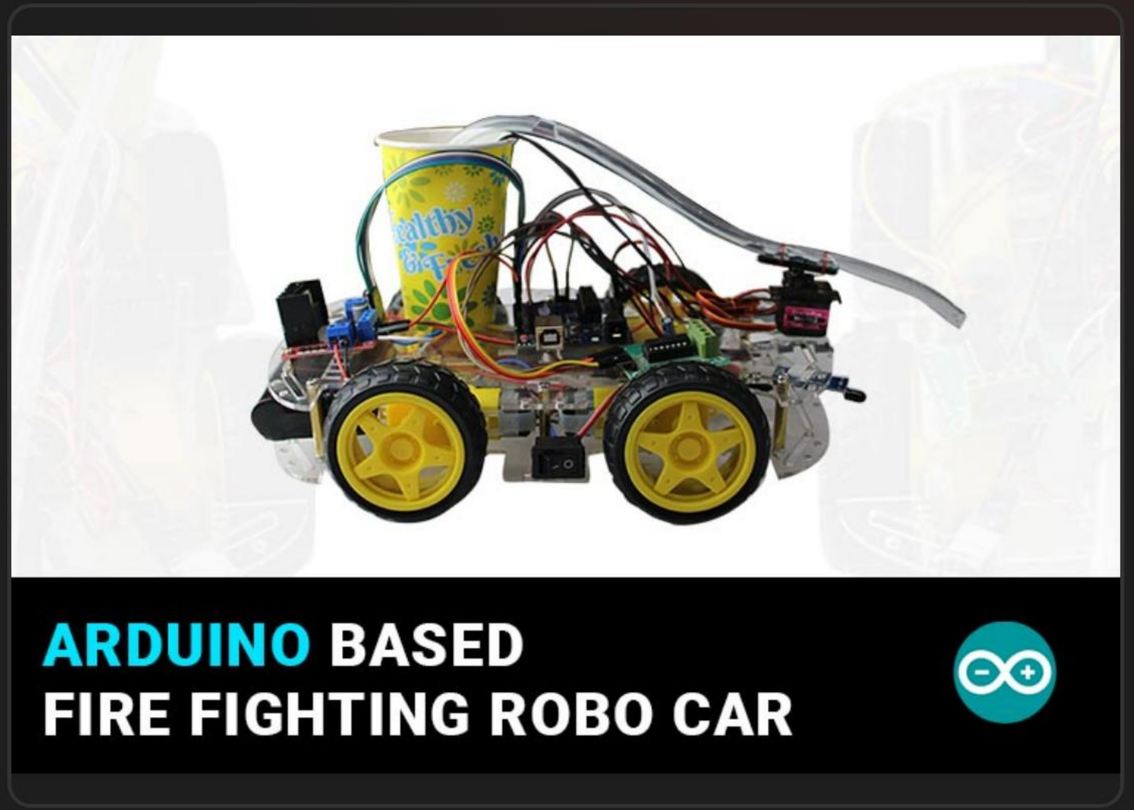
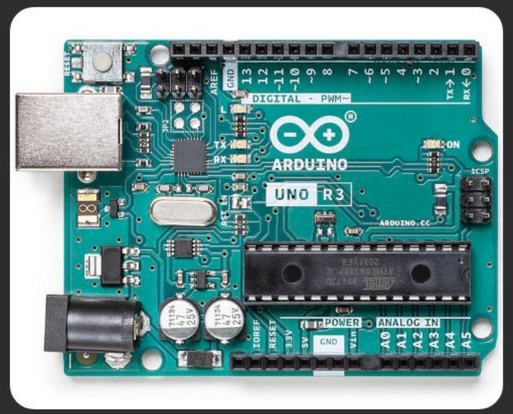
Project Overview

- **IoT-Enabled:** Integrates Arduino & ESP8266 for robust connectivity and seamless data transfer.
- **Detects Flames:** Uses advanced sensors to accurately pinpoint fire sources and hazards.
- **Remote Monitoring:** Controlled via a user-friendly, responsive web interface accessible from anywhere.
- **Safety Automation:** Autonomously reacts to detected fires to mitigate risks immediately.

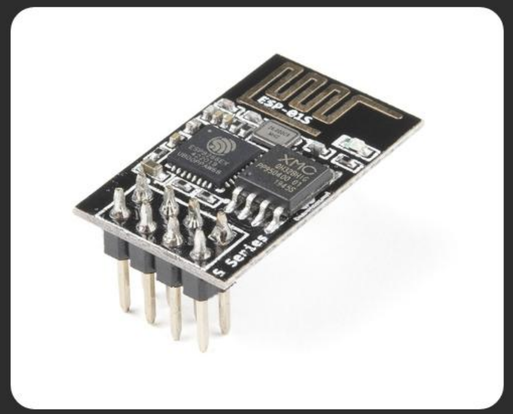


System Architecture: Hardware



Arduino Uno

Central Microcontroller

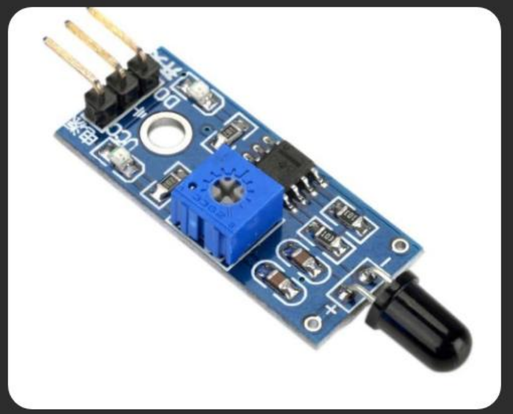


ESP8266

WiFi Connectivity

Motor Driver

Movement Control



Flame Sensor

Hazard Detection

System Architecture: Software

Flask Server

Hosts remote dashboard & sends commands to broker.

MQTT Broker

HiveMQ cloud broker for real-time message delivery.

ESP Firmware

Receives commands via WiFi & forwards to Arduino.

Arduino Logic

Controls motors, servo scanning, and buzzer alerts.

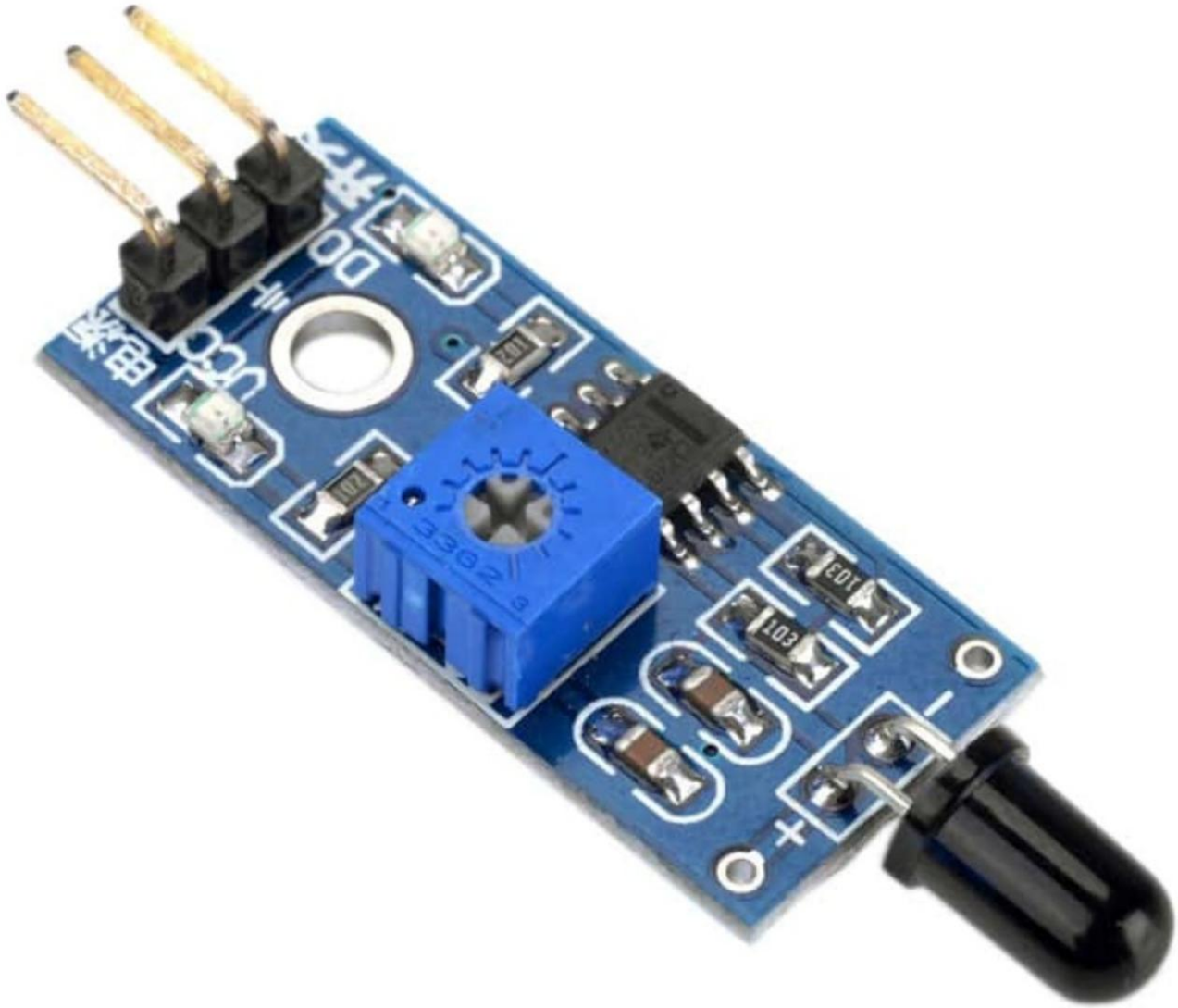
Key Features

- **Remote Driving:** Complete control over movement via mobile-optimized dashboard.
- **Autonomous Scanning:** Integrated servo enables automated environmental surveillance.
- **Emergency Stop:** Immediate halt and alert triggering upon flame detection.
- **Automatic Resume:** Intelligently resumes operations once the threat subsides.
- **Static IP Support:** Reliable network presence for continuous connectivity.

Flame Scanning Logic

The intelligent safety logic ensures effective response:

- **Scan:** Servo rotates to detect heat signatures.
- **Detect:** System identifies flame presence.
- **Reaction:** Car stops, servo locks on target, buzzer alerts.
- **Resume:** Once clear, scanning restarts automatically.



Remote Control Dashboard

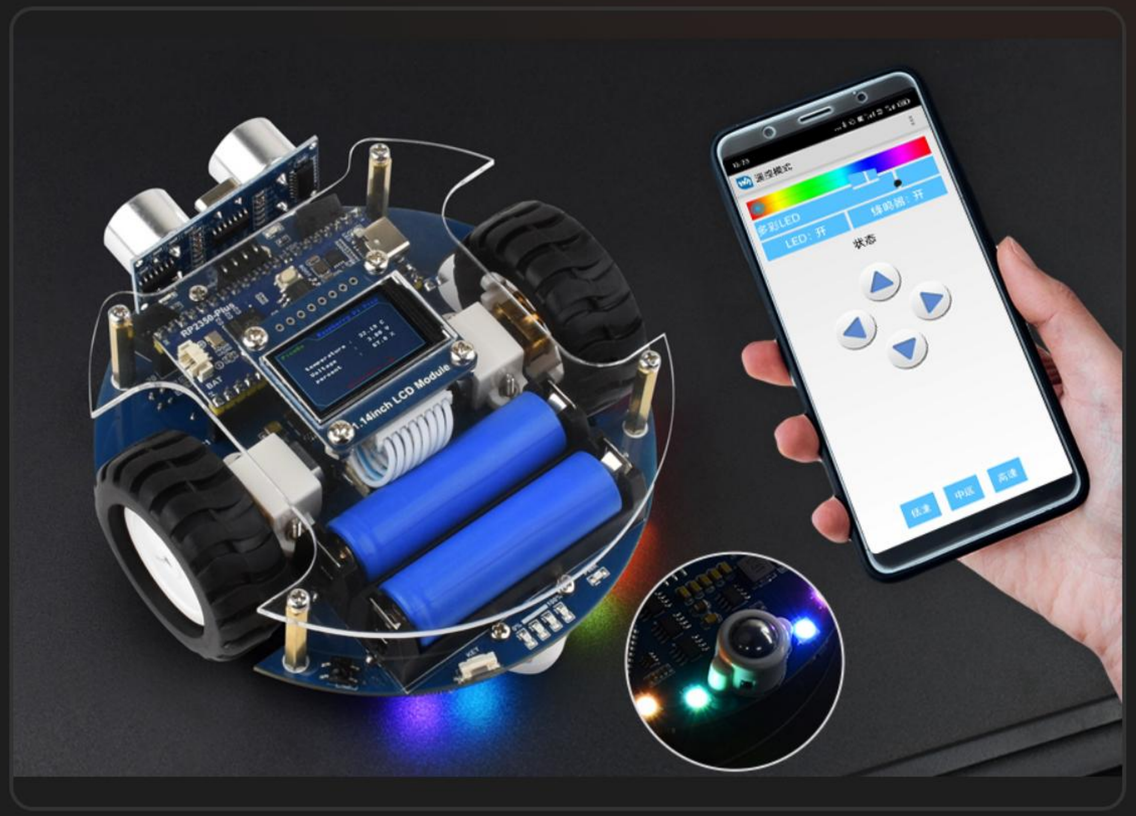
A Flask-based intuitive interface for controlling the smart car from any device.

F / B
Forward / Back

L / R
Left / Right

STOP
Halt Movement

SCAN
Auto Mode



Problems Solved

Efficiency

Replaces slow manual detection with autonomous scanning, drastically reducing response time.

Human Safety

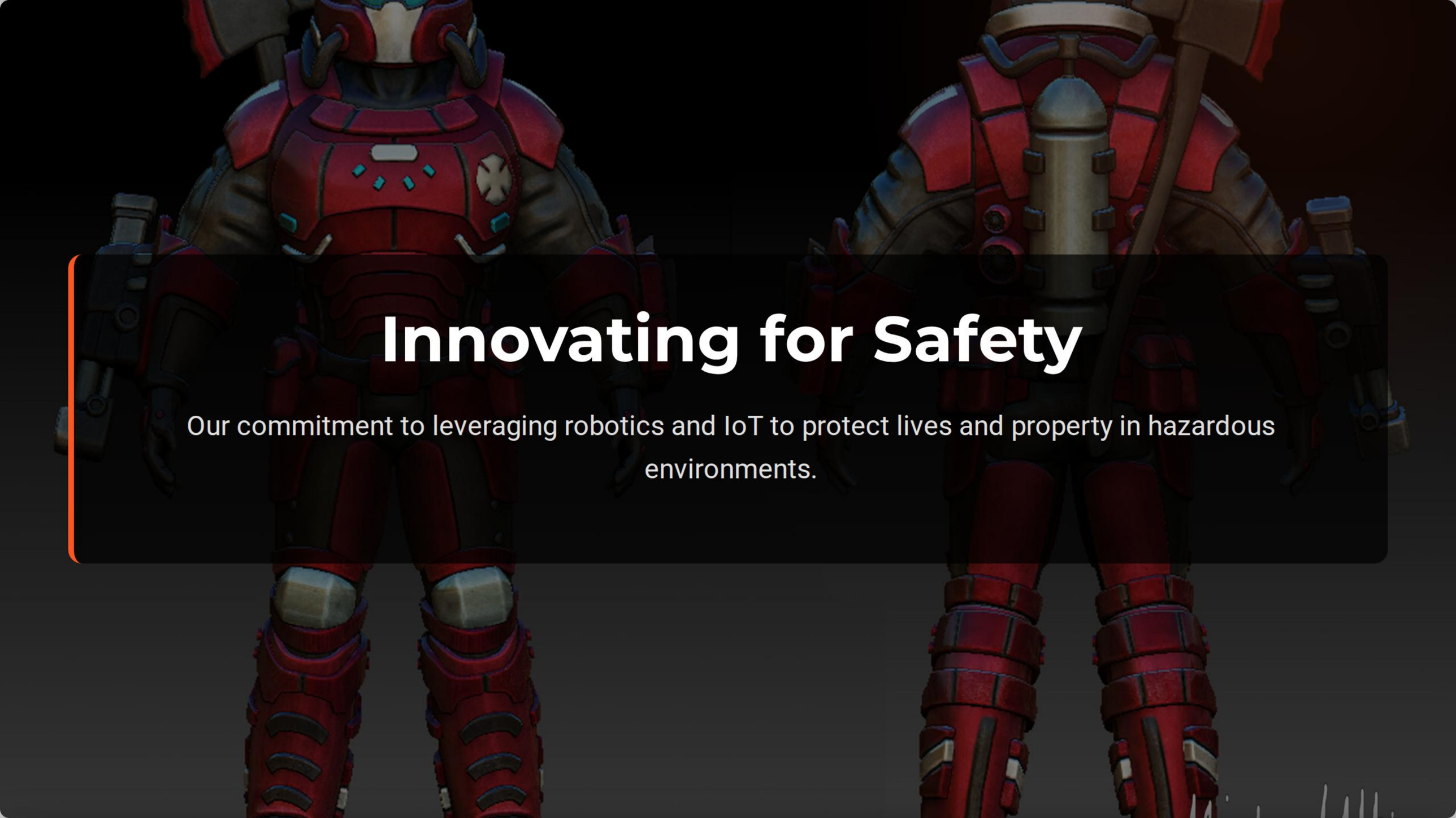
Remote inspection keeps operators safe from dangerous environments and potential hazards.

Precision

Servo accurately freezes at the fire source direction, aiding rapid intervention efforts.

Challenges & Solutions

Challenge	Solution Implemented
Motors Not Responding	Fixed serial pin conflict by disconnecting ESP TX during upload.
Continuous Buzzer	Resolved active-LOW logic by initializing pin state correctly.
Auto-Rotating Servo	Prevented default loop by initializing scan mode to false.
ESP Upload Errors	Removed TX/D0 connections temporarily to stop interference.



Innovating for Safety

Our commitment to leveraging robotics and IoT to protect lives and property in hazardous environments.

Questions?

Thank you for your attention.

Fire Fighting Smart Car Project

Image Sources

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