

Design and Implementation of Sensor based Automated Fire Extinguisher Robot

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Abstract: *Firefighting in hazardous environments poses paramount risks to human lives and property, authoritatively mandating innovative solutions that leverage robotics and automation. This research introduces the "Fire Extinguisher Robot," an autonomous and remotely operable system designed to detect, navigate, and suppress fires efficaciously. The robot integrates advanced hardware and software components, ascertaining efficient fire detection and extinguishing capabilities. The Arduino Uno microcontroller facilitates system control, DC motors and an L293 motor driver provide precise locomotion. Fire detection is achieved utilizing flame sensors and an MQ2 gas sensor, enabling the identification of flames and deleterious gases. A mini pump activated through a relay module, accommodates as the extinguishing mechanism. Additional an SG90 servo motor positions the nozzle for precise fire suppression. The robot is powered by two lithium-ion batteries and built on a compact, custom-designed chassis to ascertain mobility in confined and hazardous spaces. Navigation is achieved through motor control algorithms programmed in Arduino IDE. The modular design employs jumper wires for seamless interconnections, enhancing ease of assembly and maintenance. Testing under simulated fire scenarios validated the robot's efficiency in detecting and extinguishing fires, navigating challenging environments, and minimizing reliance on human intervention in high-risk areas. This project represents a pivotal advancement in fire safety technology, offering a scalable, adaptable, and cost-efficacious solution for diverse firefighting applications.*

Keywords: Fire Extinguisher Robot, Arduino Uno, Flame Sensor, MQ2 Gas Sensor, Autonomous Navigation, Robotics in Firefighting, Fire Safety, Authentic-Time Fire Detection, Automation.