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Vehicle for Industrial Warehouses Equipped With IOT-Based Firefighting Robots

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ABSTRACT: Even though there are many safety measures in place to prevent fire mishaps, both natural and man-made catastrophes nonetheless happen sometimes. When a fire breaks out, we are compelled to employ unsafe human resources to rescue victims and extinguish the flames. Robots might very well take the place of people in the firefighting process because to technological advancements, particularly in robotics. This would increase firefighters' effectiveness and keep them from endangering people's lives.

Here, we're going to use Arduino to create a fire-fighting robot that will automatically detect a fire and turn on the water supply. In this project, we'll learn how to construct a basic Arduino robot that can walk towards a fire and spray water around it to douse it. It is a very basic robot that would instruct us in the fundamentals of robotics.

KEYWORDS: Firefighting Robot; IR Distance sensor; Flame sensor; OV7670 Camera

Module; Arduino mega2560; DC motor; Driver module

I.INTRODUCTION

Robots are automated devices that carry out tasks often done by humans or machinery assigned to repetitive or flexible sets of activities. Numerous studies have demonstrated how useful robots can be in the fields of industry, medicine, rehabilitation, rescue operations, and more. Robotics has been used by a number of sectors throughout the years. The multi-purpose manipulators known as industrial robots are created for more specialised materials, divisions, tools, or equipment through varied programming motions to carry out diverse jobs. According to the Fourth Industrial Revolution (4IR), there is a desire for a single system that can integrate, control, and interact with several robots of all sorts and specifications. Even though only a portion of recent advancements in robotics can be attributed to machine learning, interest in this field has also increased.

II.EXISTING METHOD

The common conventional firefighting methods involve fire brigades, portable fire extinguisher (hand held) and sprinklers. These conventional methods consume lot of time to reach the place of the mishap like the fire brigade must be deployed from the fire station and should get through the traffic and reach the fire struck area, the portable extinguisher is also no gift because it is generally place at one off the corners of the building which may be difficult to reach and it needs constant maintenance. On the other hand the sprinkler and smoke detector set up is very non reliable method because the sprinkler pipes has any defect may not provide enough pressure and it is suited to cover large areas

III.PROPOSED SYSTEM

The proposed model is able to detect presence of fire using flame sensor and calculates object distance using ultrasonic sensor and moves the robot to fire accident location. It contains gear motors and motor driver to control the movement of robot. When it detects fire it communicates with microcontroller (Arduino MEGA) and the robot will move towards the fire affected area. The fire extinguisher is mounted on the robotic vehicle which is then controlled over the wireless communication so that it extinguishes the fire automatically.

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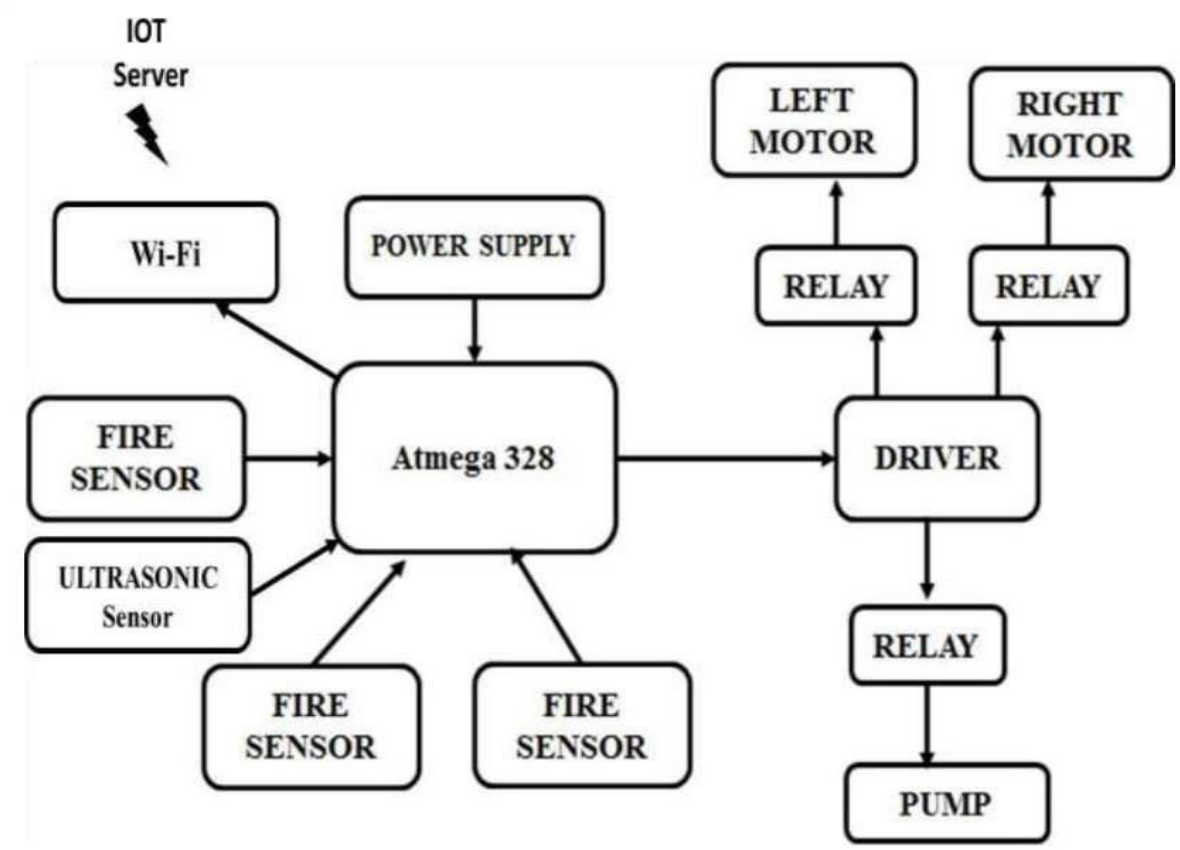
IV.BLOCK DIAGRAM



V.WORKING PRINCIPLE

For the robot unit in this project, a battery is used as the primary source of power. The power supply unit in our project is utilised to control the supply voltage from +12V to +5V. The atmega328 controller, the project's brain, manages the whole operation.

A microcontroller is a little, working computer. It has a processing core, memory, and peripherals with programmable input and output.

Fire sensor is connected to controller directly. When a fire occurs, a signal is sent to the controller by the fire sensor.

Because the signals coming from the controller are low in amplitude but the motor units need large amplitudes, a motor driver IC is interfaced to the microcontroller. The low voltage is driven into the motor working level by this driver IC. Two motors are utilised to move the vehicle at the receiving end, where they are interfaced to the microcontroller through the driver unit.

On the robot's body, a water tank and pump are installed, and they are controlled by signals sent from the controller unit. The Wi-Fi is linked to the microcontroller's ports D0/Rx and D1/Tx, which are used to link the system with a remote server so that the user may access the robot and its data.

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VI.COMPONENTS REQUIRED

A.FRAME

Frame is an important mechanical component of any structure. It determines the strength, stiffness, rigidity and the weight of the structure. Now the frame of a chair is very basic and easy, so is the frame of a bed. But the challenge is to merge these two frames into one frame.

B.WHEEL

A caster (or castor) is a single, double, or compound wheel that is not powered by a motor and is intended to be connected to the bottom of a larger item (the "vehicle") to allow for movement of that object. They come in a variety of sizes and are frequently constructed from rubber, plastic, nylon, aluminium, or stainless steel.

C.ARDUINO

Arduino is an open-sourcecomputer hardwareand software company, projectandusercommunitythatdesignsandmanufacturesmicrocontroller-based kits for building digital devices and interactive objects that can sense and control objects in the physicalworld. The project is based on microcontroller board designs, manufactured by several vendors, using various microcontrollers. These systems provide sets of digital and analog I/O pins that can be interfaced to various expansion boards ("shields") and other circuits. The boards feature serial communications interfaces, including USB on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on the Processing project, which includes support for the C and C++ programming languages.

D.FIRE SENSOR

The Fire sensor, as the name suggests, is used as a simple and compact device for protection

E.ULTRASONIC TRANSMITTER/RECEIVER

Ultrasonic sensors have an acoustic transducer which is vibrating at ultrasonic frequencies. The pulses are emitted in a cone-shaped beam and aimed at a target object. Pulses reflected by the target to the sensor are detected as echoes.Thedevicemeasuresthetimedelaybetweeneachemittedandechopulse to accurately determine the sensor-to-targetdistance.

F.RELAYS

Relays are switching devices. Switching devices are the heart of industrialelectronicsystems.Whenarelayisenergizedoractivated,contactsare made or broken. They are used to control ac or dc power. They are used to control the sequence of events in the operation of a system such as an electronic heater, counter, welding circuits, and X-ray equipment, measuring systems, alarm systems and telephony. Electromagnetic relays are forms of electromagnets in which the coil current produces a magnetic effect. It pulls or pushes flat soft iron armatures or strips carrying relay contacts. Several relay contact can be operated to get several possible ON/OFFcombinations.

G.DC MOTOR

The direct current motor or the DC motor has a lot of application in today's field of engineering and technology. Starting from an electric shaver to parts of automobiles, in all small or medium sized motoring applications DC motors come handy.

H.PUMP

Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work moving the fluid. Pumps operate via many energy sources, including manual operation,electricity, engines,orwindpower,comeinmanysizes,frommicroscopicforuseinmedical applications to large industrialpumps.

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VII.PICTURE

VIII.CONCLUSION

Fire results in severe damage, loss of life, and destruction of property. Because of explosive substances and smoke, it is occasionally hard for the firefighting personnel to get the sight of the fire. This leads us to the conclusion that robots can be used in situations when human lives are at danger. In a relatively short amount of time, the robot can work in an area that is inaccessible to humans. Firefighting robots can be beneficial in such settings for putting out fires. It is

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particularly effective for detecting something or someone at the site in the case of an emergency since a camera is used for observing the site from the outside while being linked to the IOT server and the robot can be controlled through it. Shortly after the fire is discovered, the robot quickly and precisely locates the fire.

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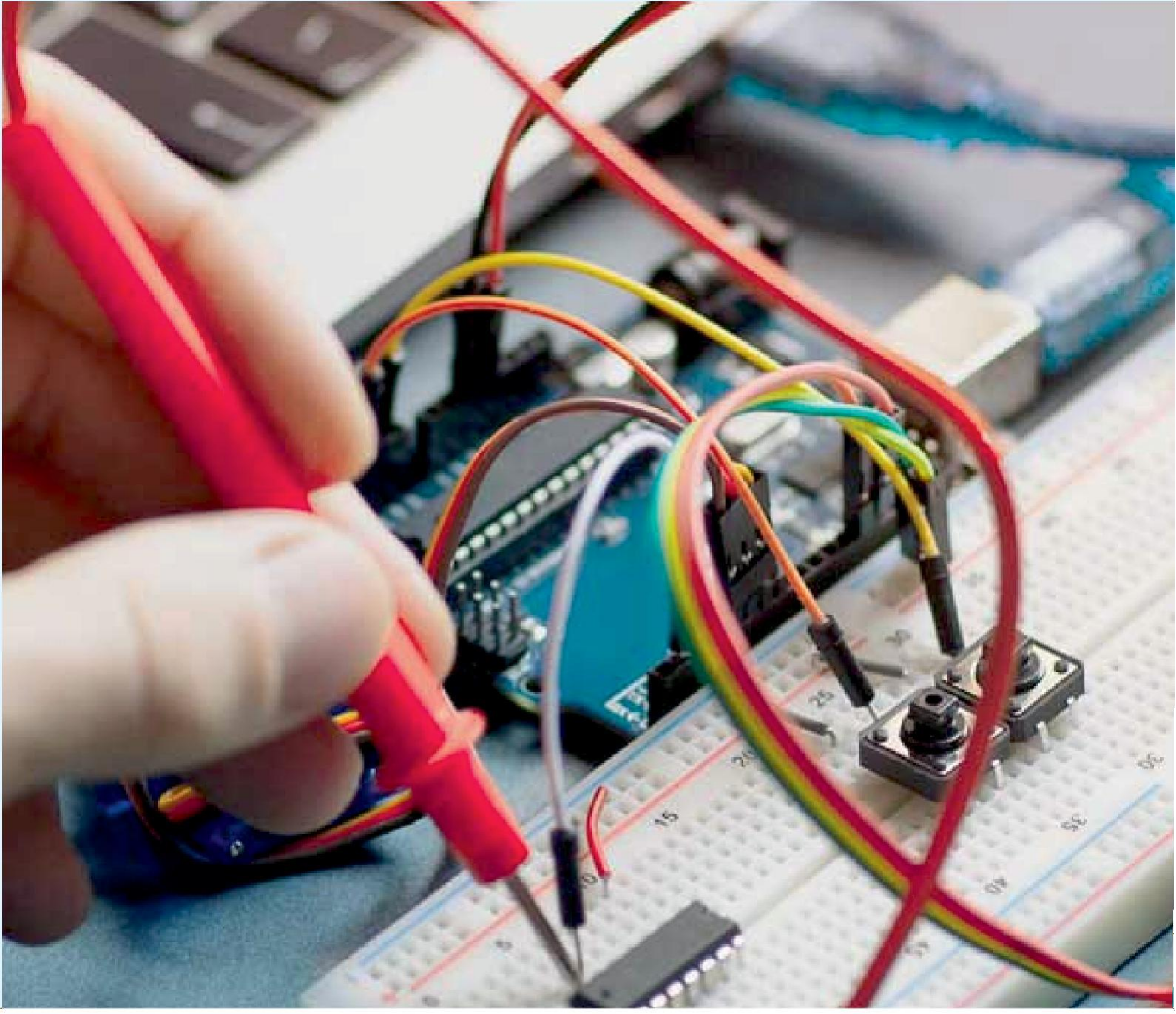

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