IOT Based Fire & Gas Detection Robot

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Abstract - **This paper presents a robot capable of detecting and fighting fire in our homes, our industries as well as office facilities in which human access is not possible. The novelty and non-obvious in this appliance are the robot which is free to move in the area of fire either in our home's closets where human feasibility is not a possibility. This robot will fight both fire and harmful gases with an infrared sensor and gas sensor and when the robot detects a fire or a gas inside the construction of houses or offices, it will fight with poisonous gas using the appropriate sensor and simultaneously sending the message to using either SMS or GPRS Packs services. The robot is controlled by an IOT server using PCs, laptops or mobile phones.**

keywords - **Detection of fire, Internet of Things (IoT), Obstacle avoidance, L293D driver**

A. INTRODUCTION

People are becoming more driven to use automation systems as technology advances. The task is made simple and dependable by the automation system [1]. Depending on their comfort, different people use the automation system for different purposes. Some use it to make their lives easier, such as designing automatic door closers, automatic fan speed controllers, and home automation systems, and others use it to make tasks easier, such as automatic railway crossing gate controllers or automatic smart phones in metros[2],[3],[4]. However, without the internet of things, none of these systems or gadgets could function. (IOT). The designs are based on GSM and GPRS innovation, as well as public subservience communication goods [5]. It's a gas or firefighting robot that may be used to protect our homes, industries, offices, and other buildings from fire or dangerous gases. When no one is at home or at work, our robot will move in the region of a suffocating fire or toxic gases in our homes or in buildings of other offices. This robot will detect the presence of fire using an infrared sensor LM35 and a gas sensor MQ6, and when the flame or fire is detected, it will fight the fire using fans and send the message to an IOT server in the form of a signal.

These gadgets can be employed in a variety of situations where human feasibility is extremely problematic. All of this must be regulated without disrupting the ecology. The GSM module incorporated in the Arduino UNO is used to remotely control the building and design of the fire or gas fight robot. The use of an "Embedded System in Communication" resulted in a slew of eye-catching apps that ensured our lives were comfortable and safe. The major goal of this study is to build an SMS-based Fire/Gas Battle Robot that can replace traditional flame-fighting devices. The device detects the flame and sends a message to the house's landlord; this device is made more efficient by a SIM card inserted in the user's phone for sending texts, allowing the user to be notified during a fire [6].

This paper is organized consisting of these sections: Section II Discusses System Description in this area. Section III discusses the Construction and Working & Results. Section IV summarizes the conclusion and lastly, the references used in writing thispaper.

II.SYSTEM DESCRIPTION

The data collected by sensors attached on the robot is transmitted through GSM modem. Because the robot is semiautonomous, it responds to the data by doing some pre-programmed behaviors. When data suggests that there is a fire or a gas leak, for example, the fan will turn on. The commands for paying attention are sent to the technological devices. The electronic equipment then sends the saved messages from the wireless module back to the wireless module. The micro controller examines the IoT command and, after validating it, executes additional tasks on the robot or device [7],[8].The ATMEGA 328 integrated in an Arduino UNO board is the microcontroller utilized in this project. The entire gadget will activate when the user requires information or data in the form of notifications such as "Harmful danger detected" via the SIM card put in mobile phones or smart phones [9],[10].

- *Block Diagram of the system*

Figure 1 depicts the block design of an IoT-based firefighting robot, which includes a number of sensors, an Arduino uno, a dc motor, and a gsm module.

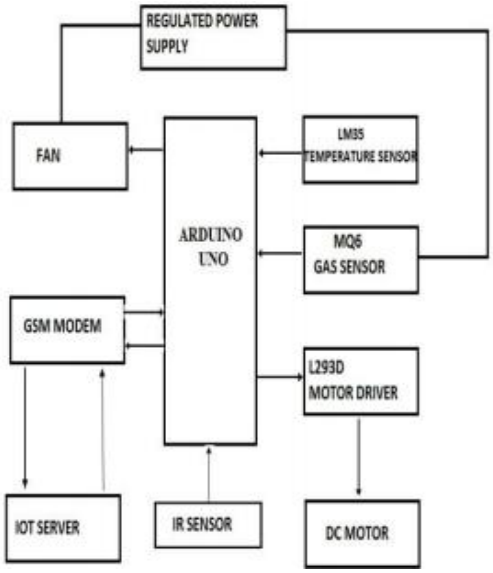

Fig.1 block diagram

The term "power offer" refers to the provision of electricity. A device that supplies electricity or other forms of power to power an output load or a number of installed components. The supply is often injected into voltage-consuming components, with mechanical parts and other parts receiving less attention. All electronics-related components in this gadget receive 12V DC power. The smoothing of generated 12V DC power necessitates the use of a step-down electrical device, rectifier, transformer, and filter circuit.

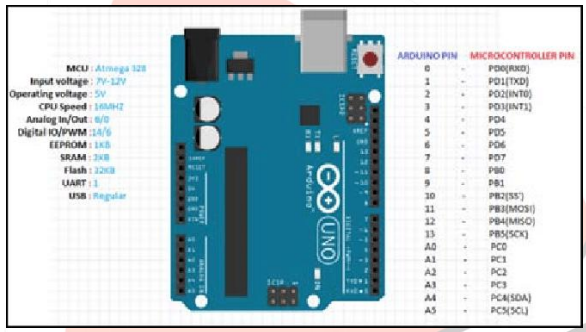

Fig.2. Arduino Uno pinout

The Arduino Uno is a microcontroller board that uses the ATmega328P processor. It contains fourteen digital input or output pins (half of which can be used as PWMoutputs), a sixteen megacycle per second quartz, a USB connection, an influence jack, an ICSP header, and a reset button [11].

DC Motor

The most important thing to remember while building a robot is that it must be able to move on the ground. For this, we can utilize either a DC motor or a stepper motor. When a DC motor is connected to a microcontroller, there are numerous possibilities. All of these functions are performed by a single Driver IC.

Fig.3. DC Motor and Wheels

The structure of the "H-Bridge" matches that of the switching circuit that will control the motor's movement.

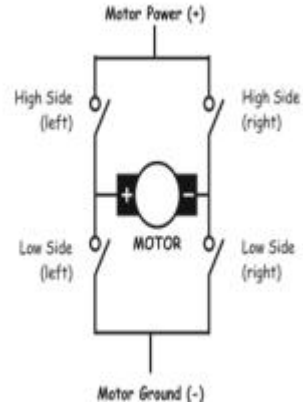

Fig.4. H-Bridge of Dc Motor

III. CONSTRUCTION AND WORKING & RESULTS

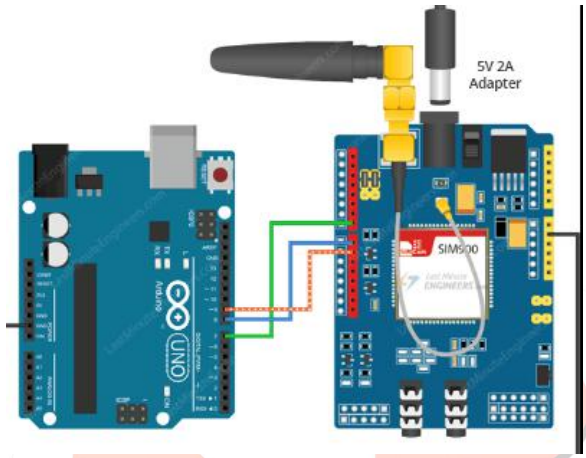

Fig. 4. Arduino and GSM connection

An IoT-based firefighting robot that detects fire or dangerous gas in a specific region and alerts the operator . To make this function work, we'll need to combine several sensors and technologies. The Arduino, GSM modem, MQ6 gas sensor, LM35 temp sensor, IR sensor, L293D motor driver, and DC motors are all used in the design and building of this robot. All of these parts are attached to a motor chassis. An IOT server is used to access this robot from a remote place. Programming is required to enable connectivity between all of the components and the IoT server.

All of the sensors' data is collected via Arduino. All of the sensors' data is collected via Arduino. The GSM modem is set up to function as a GPRS module andcommunicate with the IoT server through the internet. The antenna on the GSM electronic module is used to receive and broadcast messages from the IOT server.

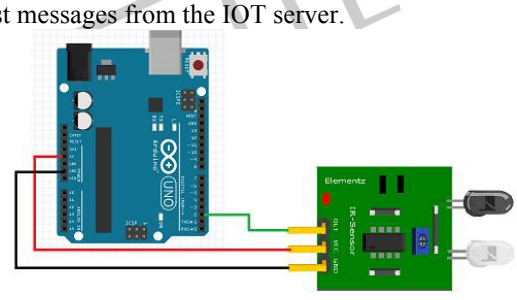

Fig. 5. Arduino and IR sensor connection

The impediment is detected using an infrared sensor, and the microcontroller is programmed to avoid it. The above diagram depicts the connection. For Arduino, 5v is given to the IR sensor, and the ground pin is linked to GND. The signal pin is linked to a digital pin of any kind.

L293D is made up of two half bridges. It is used to regulate the motion of both dc motors at the same time. It has two digital pins attached to the Arduino, one for each motor.

An external battery or an Arduino board can be used to provide power. The robot control panel, which is provided for this purpose, is used to control the motor operation from the server.

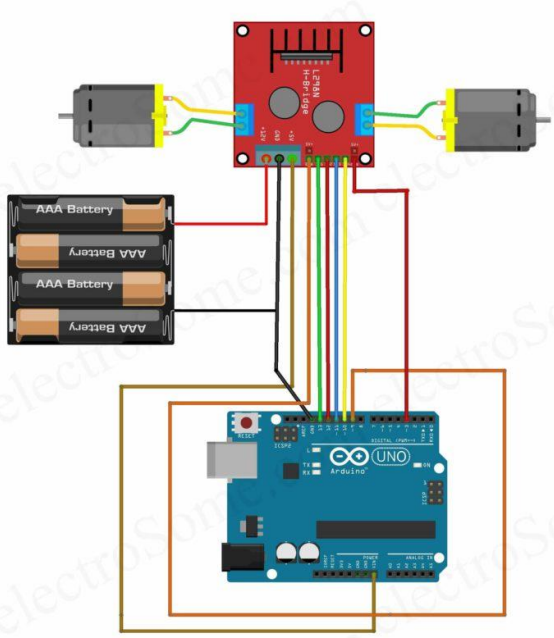

Fig. 6 Connection of Arduino and Motor driver

.IOT server is developed with necessary programming in order to operate the robot from anywhere in the world. Figure 6 depicts an IoT web server for robot control. The dc motor connected with the robot may be readily operated with the help of IOT and an appropriate web server.

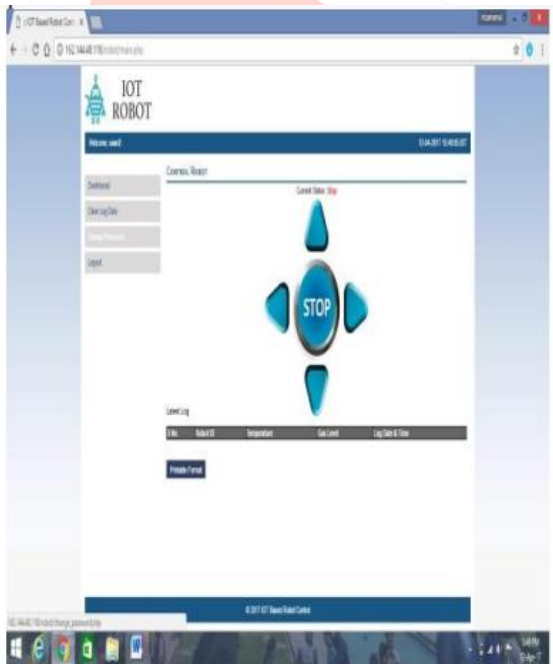

Fig. 6 IoT server and robot controller

IV. CONCLUSION

The goal of this document is to improve the protection of homes and businesses against dangerous gas leaks and fire flames.This device is incredibly durable and can alert the user if there is a gas leak or a fire.It sends a direct message to the user when a person is not at home or at work.The proposed robot can be readily controlled from anywhere in the world by sending commands to the micro controller.Attention commands are used to observe these commands, and appropriate action is done.The major goal of this study is to design a semiautonomous electronic IoT-based firefighting robot that can take the place of traditional human firefighters and protect them from firefighter dangers.The robot will send a message to the controller and will take emergency measures to protect firemen.The device is made more efficient by sending the message via SIM card to user so that the user could be automatically alert when he/she is out of home or office.

V. REFERENCES

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