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Gas, Fire & Intruder Detection by an Unmanned Robot using IoT

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Abstract: ***This paper presents a robotic device that can detect and fight fire in our homes and workplaces. Its non-human design makes it free to move in the area of fire even if we cannot access it. The device is equipped with sensors that can detect infrared and gas levels. The robot is constrained by an IoT worker utilizing PCsor cell phones. It can also send and receive text messages.***

Keywords: Detection of fire, Internet of Things (IoT), Obstacle Avoidance, L293D driver

I. INTRODUCTION

As technology progresses, people are getting increasingly compelled to employ automated systems. The task is made simple and straight forward. The automation system is reliable [1]. Different people prefer different things, depending on their level of comfort. The automation system is used for a variety of purposes. various goals It's used by some to produce such as designing, to make their life easier. Auto-closing doors, auto-fan speed. Home automation systems and controllers. Others utilize it to make activities easier, for example. For instance, a pre-programmed train line crossing advanced door regulators or programmable advanced door regulators. Metros with cellphones [2],[3],[4]. The internet of things, on the other hand, would not be possible without it. None of these devices or systems could work (IOT). The model is reliant on. The development of GPRS and GSM, as well as open compliance correspondence items and public acquiescence transmission. A gas or firefighting robot might be useful [5] be used to protect our homes, businesses, and other assets workplaces, as well as a variety of organizational structures a fire or poisonous gases When there is no one else around.
Our robot will walk in the same direction whether it is at home or at work. A suffocating fire or toxic chemicals in our environment, dwellings or in various constructions workplaces. This robotwill be able to identify the Detecting the presence of fire with an infrared sensor. When the LM35 and the MQ6 gas sensor are combined, the when a fire or flame is discovered, it will fight it.

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Using fans to create a fire and transmit the word to in the form of a signal, an IOT server. These devices can be put to use incredibly troublesome All of this must be regulated without causing ecological harm. The GSM module built into the Arduino UNO is used to control a device from afar. The construction and design of the fireplace or gas fireplace robot vs. The application of an "Integrated Communication system "as a result of a plethora of attention-getting apps that secured our success. It was a nice and secure existence. The review's main goal is to assemble a GAS or FIRE-based SMS. A fighting robot that can take the place of traditional fighter's devices for fighting fires. The device recognizes the flames and leaves a mark on the property manager for the residence; this device is aided by a mobile network a card inserted in a person's messages can be sent via phone, which is convenient. During a fire, the client should be notified [6]. The following sections make up this paper's structure: This subject is covered in Section II, which is devoted to System Description. The third section looks at the building and working process, as well as the outcomes. The conclusion and recommendations are summarised in Section IV. Finally, I'd like to mention the sources I used to create this article paper.

II. SYSTEM DESCRIPTION

The data collected by the robot's sensors is sent to a central server. GSM modem is used to connect to the internet. The robot is because, it responds to data in a semiautonomous manner. Performing a set of pre-programmed actions at a point at which data suggests. For instance, if there is a fire or a gas leak, The fan will be activated. Paying instructions, the technical is being emphasized devices. Then there's the electrical gear that sends the note that was stored from a remote location. Return to the remote module with this module. After approving the IoT command, the micro controller performs additional tasks on the device or robot [7], [8]. The ATMEGA 328 is a microcontroller that is built into an integrated circuit. This project makes use of an Arduino UNO board as a microcontroller. When the customer requests data or information, such as "Dangerous risk identified," the entire object will activate via the SIM cardinstalled in smart phones or cell phones [9], [10].

III. BLOCK DIAGRAM OF THE SYSTEM

Figure 1 shows the block design of an industrial-grade firefighter robot using IOT that consists of a number of sensors, a motor, a GSM module, an Arduino uno.

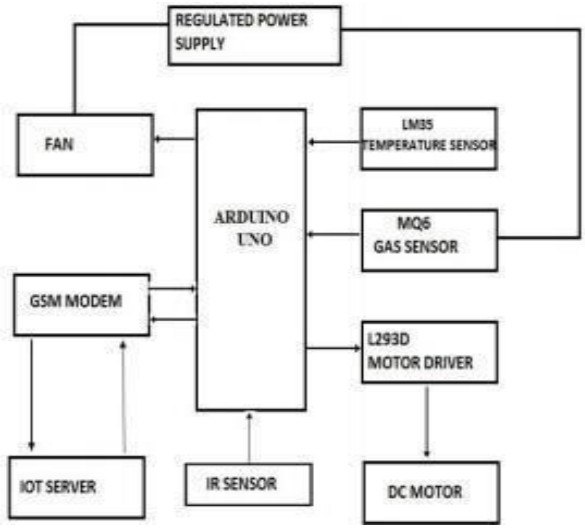

Fig.1blockdiagram

A gadget that supplies electricity or other forms of power is referred to as a power offer. It may power a variety of devices, with mechanical and other components requiring less attention. This device runs on 12V DC power for all electronics. A filter circuit, transformer, rectifier, and step-down electrical device are all required for smoothing out generated 12V DC electricity.

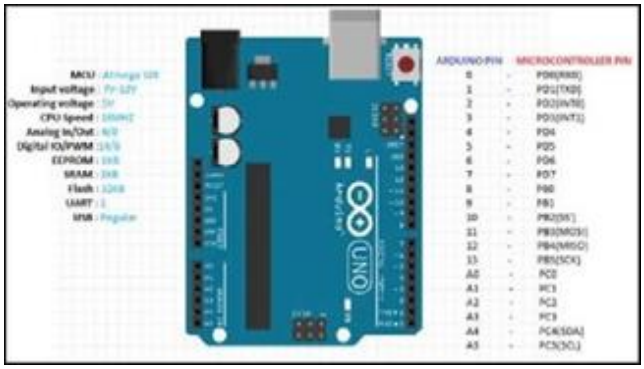

Fig.2 ArduinoUnopinout

The ATMega328P processor is used in the Arduino Uno board. It contains 14 digital input and output pins (half of which can be utilised as PWM outputs), a 16 megacycle each subsequent quartz, a reset button, an influence jack, an ICSP header, and a USB connection.

DC Motor.

When creating a robot, keep in mind that it must be able to move on the ground. Either a DC motor or a stepper motor can be used to do this. There are several options available when a DC motor is coupled to a microcontroller. A single Driver IC handles all of these responsibilities.

Fig.3. DC Motor and Wheels

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

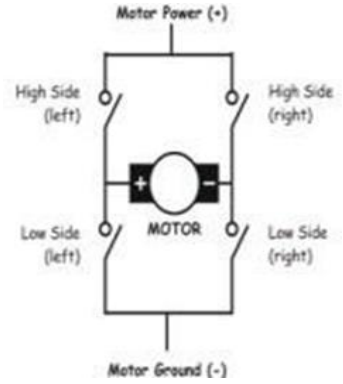

Fig.4. H-Bridge of Dc Motor

An Internet-of-Things-based firefighting robot that detects fire or dangerous gas in a specific district and alerts the administrator. We'll have to combine a few sensors and inventions to make this capability function. In the design and operation of this robot, the Arduino, GSM modem, LM35 temperature sensor, IR sensor, MQ6 gas sensor, L293D motor driver, and DC motors are all used extensively. All of these components are held together by a motor chassis. An IoT server is utilised to connect to this robot from afar. To link all of the components to the IoT server, programming is required. The Arduino is used to collect all of the sensor data. The Arduino is used to collect all of the sensor data. The GSM modem is configured as a GPRS module, and it communicates with the IoT worker over the internet. The GSM electronic module's receiving wire is used to receive and communicate messages from the IoT server.

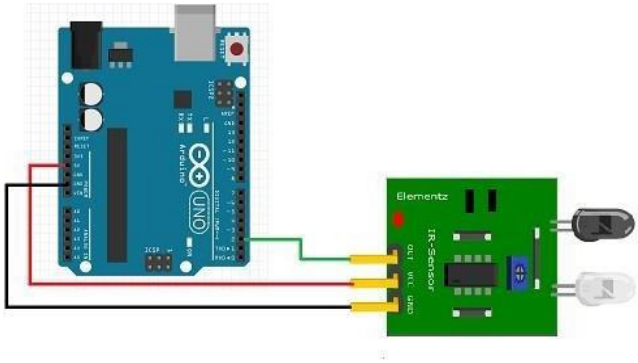

Fig. 5. Arduino and IR sensor connection

An infrared sensor detects the obstruction, and the microcontroller is commanded to stay away from it.The link is depicted in the diagram above. The IR sensor is powered by 5 volts, and the ground pin is connected to GND on the Arduino.

The analogue pin is connected to any type of computerised pin. L293D is made up of two half bridges. It is used to control both dc motors at the same time. The Arduino is connected to two digital pins, one for each motor, Power can be provided by an external battery or an Arduino board.

The motor operation is controlled from the server by the robot control panel, which has been built for this purpose.

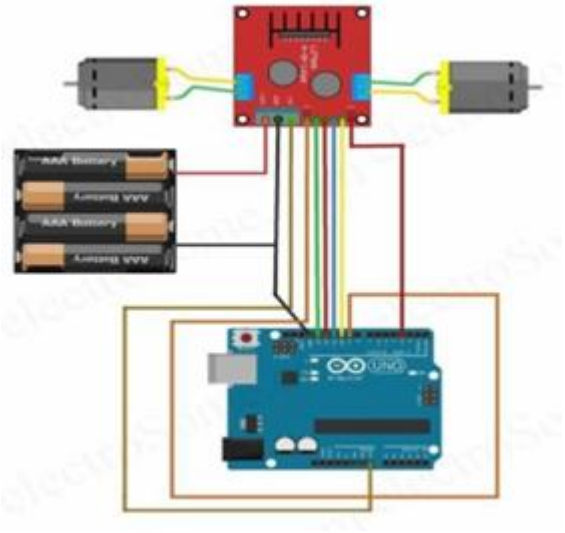

Fig. 6 Connection of Motor driver and Arduino

The IoT server is programmed to allow the robot to be controlled from anywhere on the earth. Figure 6 shows a robot control page on an IOT web server. With the use of IoT and a suitable web server, the robot's dc motor may be easily controlled.

Fig. 6 Robot controller and IoT server

This is a one-of-a-kind surveillance robot. It moves along a pre-programmed path without the use of an operator. Even if there is a barrier in the road, it moves away from it and continues to follow the same course. Because of the General Packet Radio Services (GPRS) that is implemented in it, it is feasible. The geolocation enables the robot to follow a predetermined course.
The Raspberry Pi software is utilised to move the robot wit hout the need for a human operator.
The robot is given the appropriate code to move forward, ba ckward, left, and right. The robot's movement is determined by the spinning of its wheels. The wheel rotations are caref ully calculatedand no of wheel rotations required to cover the distance is entered in the code,and so does the robot moves exactly to the place where we want it to go. in the Raspberry code to ensure that the robot does not stra y from its course.
If an object is detected in front of the robot, the ultrasonic s ensor detects it and codes the robot to move away from the obstruction and continue on its journey. The software used here is Raspberry pi 3b+, this is the latest and most advanced raspberry software compared to the other versions. The raspberry pi chip is connected with the robot which enables the programmed code to work. The raspberry pie controls the entire robot, it is the motherboard the robot.

Fig. 7 Raspberry pie 3b+

An external power source, mounted on the robot, is used to power the device. This power source is a powerbank that may be used to charge mobile phones. An C type USB cable connects the powerbank and the Raspberry Pie chip. The power is supplied to the robot for at least 6 hours, and when it runs out, the powerbank may be replenished and reconnected to the robot. This is the first surveillance robot to be powered by a powerbank, and none of the prior robots have done so. The powerbank utilised here is a 10000 mAh model because it has a longer battery life and a higher power flow than other models.

IV. CONCLUSION

The goal of this study is to improve home and organization security against flammable gas leaks and fires, this device is extremely durable and can notify the user of a gas leak or a fire and also security against intruders the device is very helpful and can notify the owner with a mail with the picture of the intruder.

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When a user is not at home or at work, it sends a direct message to the user by sending commands to the suggested robot from anywhere on the earth, it may be quickly controlled. orders to the microprocessor Attention to keep track of these orders, orders are used and the required activity has been completed. The review's main goal is to devise a strategy for implementing it. A semiautonomous electronic IoT-based firefighting robot that could replace traditional human firefighters while also protecting them from the perils of the job. The robot will leave a mark on the regulator. will take emergency measures to guarantee the safety of firefighters The device has been improved to make it more effective by sending a message to the customer via a SIM card, allowing the client to be notified when the individual leaves the house or business. The novelty of this robot is that it is a semiautonomous robot which can detect fire, harmful gas and intruders and the alerts the user within a second by sending a mail with a picture. The gsm module contacts the fire or police department if it detetcts robbers or fire breakage in the house. By this house can be saved before the owner could arrive. And also no previous robot is powered by a mobile charger powerbank. It is more efficient and less expensive than the other robots. The fully finished model of the robot and the results are attached below.

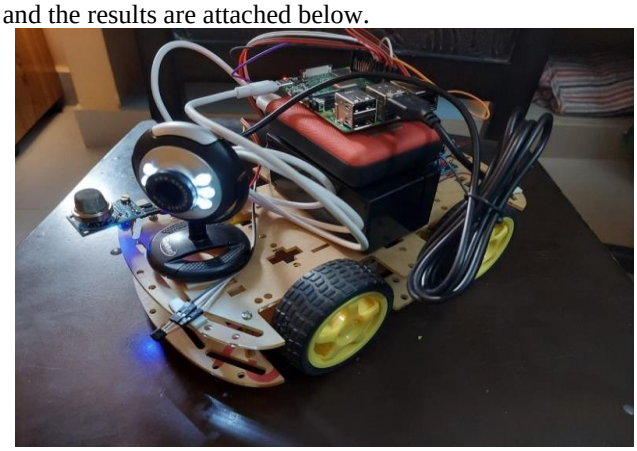

Fig 8 Final model of the robot.

Now the results of the robot during its working are attached.

Fig 9 Robot detecting objects and moving away.

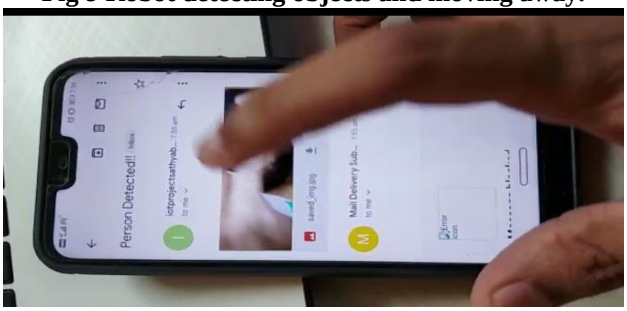

Fig 10 Robot detecting intruder and sending a picture of the intruder in mail to the owner

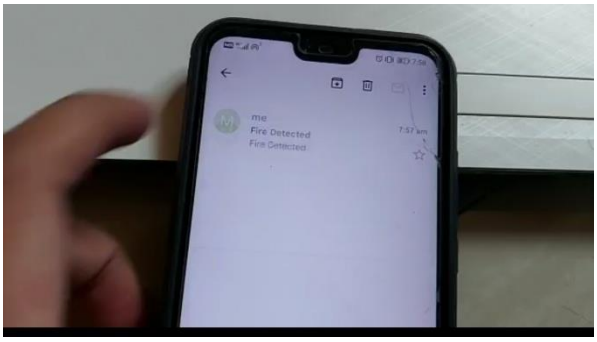

Fig 9 Robot detects fire and sends a warning mail to the owner.

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AUTHORS PROFILE

B. John, B.E Mechatronics final year. Motivating and Talented student pursuing final year in Sathyabama University. Always interested in Robotics and things related to it. Would always be curious to learn new things. I had built my first buggy car at the of 18. Always updated on the latest trends in automation and robotics.

U. Sam Thomas, B.E Mechatronics final year. Student from Sathyabama Institute of Science and Technology. Disciplined and focused on my academics. Intrested more in Robotics and Automation. Participated in many conferences. Having a cgpa of 8 till my 7th sem.

B. Kanimozhi, working as a professor in Sathyabama Institute of Science and Technology for more than a decade in the department of Mechatronics, Mechanical and Automobile. I am a Phd scholar in field of mechanical. Has published many journals and participated in many conferences. My strengths are guiding students to a better future, Always wanting to learn more and more. Has filed patents too.

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