ISSN 2395-1621

Fire Fighting and Controlling Robot using IOT Application

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ABSTRACT

The fire fighter's work entails detecting and extinguishing fires. In this rapidly evolving technological age, the world is gradually moving toward automated systems. Fire fighters, on the other hand, are often in danger of losing their lives. The majority of the deaths were caused by toxic gases found in the fire fighting environment. As a result, in order to resolve these issues, our system was developed. Fire incident is a disaster that can potentially cause the loss of life, property damage and permanent disability to the affected victim. They can also suffer from prolonged psychological and trauma. Fire fighters are primarily tasked to handle fire incidents, but they are often exposed to higher risks when extinguishing fire, especially in hazardous environments such as in nuclear power plant, petroleum refineries and gas tanks. They are also faced with other difficulties, particularly if fire occurs in narrow and restricted places, as it is necessary to explore the ruins of buildings and obstacles to extinguish the fire and save the victim.

ARTICLE INFO

Article History

Received: 23rd May 2022

Received in revised form : 23rd May 2022

Accepted: 25th May 2022

Published online : 26th May 2022

Keywords- Fire-Fight Robot, IoT, ESP8266, Flame Sensor, Motor

I. INTRODUCTION

Now a days mobile robots are very useful in construction sites, warehouses and manufacturing plants. Previously Fire Fighting Robots were controlled by using different electronics devices. But this reduces the scope of control of fire fighting robot. In this way it acts like a life saver project and minimize the loss when fire is detected. The project that is being presented is focused on a firefighting robot. Robots are capable of performing tasks in a more efficient, cost-effective, and accurate manner than humans. It has grown in popularity as technology has advanced, making human work simpler. The firefighting robot is programmed to scan for and extinguish fires in affected areas. The consequences of fire cannot be prevented, and they can occur in both young, newly formed forests and mature natural forests. Fire has a focused impact on plant growth because it destroys undesirable vegetation, allowing other species to emerge.

To occupy Gas sensor, tank which consists of water A wireless robot can conduct successful work, allowing the robot to be operated from a distance As a result of a fire outbreak (or) fire explosion, we are demanding that we use human resources that are not secure to put out the fire. It is very much possible to replace human work in putting out a fire in a dangerous environment by using higher technology, specifically robotics . This strategy would free firefighters from dangerous tasks, increase their efficiency, and reduce the number of fires. it will discourage human lives from being jeopardized. Forth is, we'll create an Arduino based firefighting robot that will detect the fire and it will begin to pump water on the fire detected area using sprinkle
A robot is an automated device which performs functions usually attributed to humans or machines tasked with repetitive or flexible set of actions. Numerous studies have shown that robot can be beneficial in medicine, rehabilitation, rescue operation and industry. Over the years, robotics has been introduced in various industries.

The industrial robots are multi-function manipulators designed for more specialized materials, divisions, gadgets or devices through various programmatic movements to perform various tasks. In line with the Fourth Industrial Revolution (4IR), there is demand for a one system that can control, communicate and integrate different robots regardless of their types and specifications. Machine learning has also heated up interest in robotics, although only a portion of recent development in robotics can be associated with machine learning. Recent robotic development project has embedded machine learning algorithms to increase the intelligence in robots.

II. LITERATURE SURVEY

Tawfiqur Rakib, M. A. Rashid Sarkar [1]Design and fabrication of an autonomous firefighting robot with multi sensor fire detection using PID controller In this movable robot consists of sensor like LM35 and Arduino Flame Sensors are used to detect the fire and distances on its way towards fire. In this for the mobility of the Robot , two wheels made of Nylon and a caster ball is used. This is mainly a rear wheel drive type of vehicle.

Khaled Sailan , Prof. Dr. Ing. Klaus- Dieter Kuhnert [2]Obstacle avoidance stratergy using fuzzy logic steerig control of amphibious autonomous vehicle A fuzzy controller is used to control an obstacle avoidance of Vehicle. The aim is to guide the Vehicle along its path to avoid any static environments containing some static obstacles in front of it. Obstacle avoidance in real-time is a mandatory feature for Vehicle in an unknown environment.

Shivam Agrawal ,Nidhi Agrawal [3]Interfacing of robot with android app for to and fro communication In this the human can control the robot by using the Bluetooth module. The Bluetooth module is work with the android application. In this the Bluetooth model communicate android application by using driving motor, Arduino mega, voltage divider, tires , Bluetooth, motor driver.

TakkedasilaJohny, M. Maruthi Prasad Reddy [4]Android controlled intergrated semi autonomous fire fighting robot In this there are three different types of system unit is use 1. Locomotion system 2. Fire detection system 3. Extinguishing system 4. Communication system. The Locomotion system is used for obstacle detection and four ultrasonic range finder to find the distance between obstacle and system. Fire detection system is used for the detection of fire in this the gas sensor is used. Extinguishing system is for successfully extinguish the fire.

Robot is activated through DTMF transmitter and receiver Control Of An Autonomous Industrial Fire Fighting Mobile Robot is developed by H.P. Singh [5]The paper describes the construction and design of mobile fire fighting robot. The system contains two optically isolated D.C. motors. Robot performs analog to digital conversion of the data provided by infrared sensors. Five infrared sensor are used. Two sensors control the motion of the robots and three are for flame detection. The extinguisher comprises of D.C water pump and a water container. The basic theme of the paper is to sense the flames of fire and extinguish it. For this infrared sensor is used as input sensor which senses the infrared rays coming out of the fire. The microcontroller controls the extinguishing system.

Wireless fire fighting robot is developed by Swati Deshmukh[6]. It comprises of machine which has ability to detect fire and extinguish it. The fire fighting robot can move in both forward and reverse direction and can turned in left and right directions. Thus fire fighter can operate the robot over a long distance and there is no need for human near the area on fire. Light dependent resistors are used for detection of fire. These resistors are highly sensitive devices and are capable of detecting very small fire. The robot provides security at home, buildings, factory and laboratory. It is an intelligent multisensory based security system which contains fire fighting system in daily life.

Cell phone controlled robot with fire detection sensors developed by Lakshay Arora[7] consist of mobile phone which controls a robot by making a call to the mobile phone which is attached to the robot. During the call activation period, if any button is pressed on the phone, the tone corresponding to the button pressed is heard at the other end of the call that is placed on the robot. The robot perceives Dual-Tone MultipleFrequency (DTMF) tone with the help of phone mounted on the robot. The received code is processed by the microcontroller and then the robot performs actions accordingly. In the proposed system DTMF technology is used to position the shaft of motor at a required point with different sensors, each performing its own task. Rugged, Simple and cost effective system is proposed here.

Android Phone controlled Robot Using Bluetooth is developed by Arpit Sharma [8]. Various techniques of HumanMachine interaction using gestures are presented. Gestures are captured by using the accelerometer. The paper analyses the motion technology to capture gestures using an android smart phone which has inbuilt accelerometer and Bluetooth module to control kinetics of the robot. The microcontroller controls the signals of the Bluetooth module. Features like user friendly interface, lightweight and portability OS based smart phone has overtaken the sophistication of technologies like programmable glove, static cameras etc making them obsolete.

III. PROPOSED SYSTEM MODEL

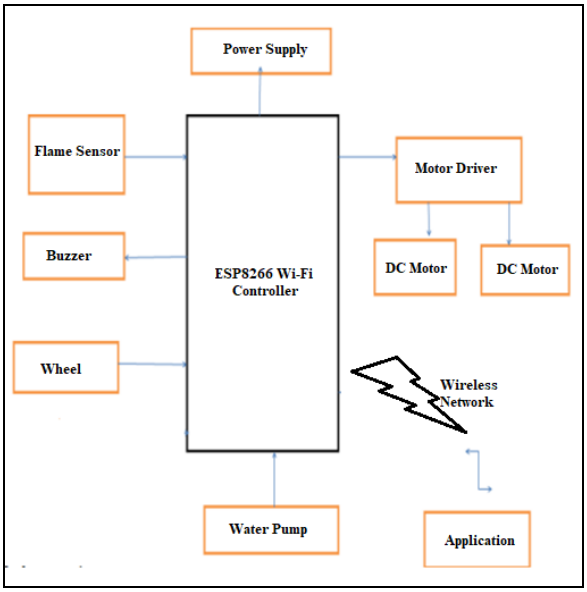

Fig 1. Block Diagram

Now a day, fire accidents are very common and sometimes it becomes very difficult for a fireman to save someone‟s life. It is not possible to appoint a person to continuously observe for accidental fire where robot can do that. In such cases firefighting robot comes in picture. Robot will detect fire automatically. These robots are mostly useful in industries where probability of accidental fire is more. The proposed vehicle is able to detect presence of fire and extinguishing it automatically by using gas sensor and

temperature sensor. Once it detect the fire it alert with the beep sound. Relay circuit is used to control the pump. Arduino is an open source prototype. Software will operate in Arduino IDE Computer code can be written and upload to the physical board. Arduino board is a board that can be functioned via Arduino IDE by sending a set of instructions to the microcontroller on it. For controlling motion of robot. We are using GUI, for that purpose Android application needed. For arduino programming we are going to use Embedded C. We are going to build robot in Embedded C and for controlling that robot we are using Android environment.

Hardware Requirements:

The hardware of the system is based on the Arduino Uno platform. Two Arduino Uno boards are employed one used for controlling wheels of the boat & taking input from the sensors; another one for controlling the robotic arm. The hardware requirements are discussed in the following section.

1. ESP8266 Wifi Controller

The ESP8266 module works with 3.3V only, anything more than 3.7V would kill the module hence be cautions with your circuits. The best way to program an ESP-01 is by using the FTDI board that supports 3.3V programming.

2. Motor DC

30RPM 12V DC motors with Gearbox,12V DC Supply,6mm shaft diameter with threaded hole & screw,Same size motor available in various RPM,2kgcm torque,No-load current = 60 mA(Max), Load current = 250 mA(Max)

3. L293D Driver IC

Power Supply: Over FRC connector 5V DC,External Power 9V to 24V DC,Dimensional Size: 44mm x 37mm x 14mm (l x b x h)

4. Flame Sensor

This tiny Flame sensor infrared receiver module ignition source detection module is Arduino compatible can use to detect flame or wavelength of the light source within 760nm~1100nm also useful for Lighter flame detect at the distance 80cm

5. Water Pump

Micro DC 3-6V Micro Submersible Pump Mini water pump For Fountain Garden Mini water circulation System DIY project. This is a low cost, small size Submersible Pump Motor which can be operated from a 3 ~ 6V power supply. It can take up to 120 liters per hour with very low current consumption of 220mA.

Software Requirements:

The system is designed around the Arduino IDE. This tool is discussed in the following paragraphs.

1. Arduino IDE: It is an open-source integrated development environment (IDE); allows users to program the compatible boards. In the proposed work Arduino boards are programmed using Arduino IDE to read the sensor inputs & control the wheels and robotic arm. It is also compatible with the Blynk app for controlling mechanism.

IV. RESULT

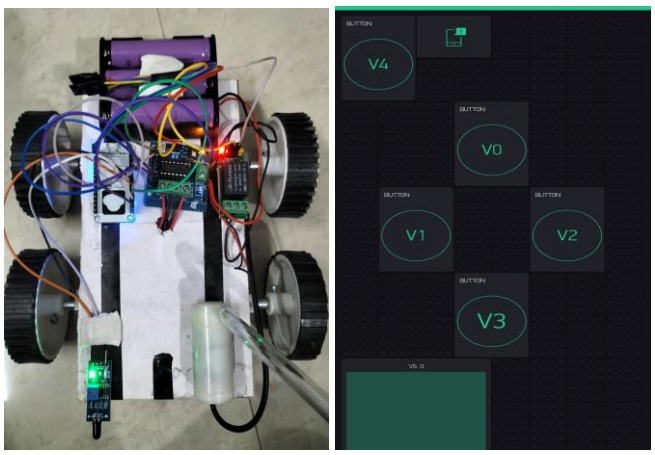

Fig 2. Hardware setup and Software Application

V. CONCLUSION

A robot which will be used for firefighting purpose. This proposes a great chance for automation and will be useful at places where human cannot reach or is dangerous. This robot will be helpful in automation industry also. Proposed approach of modular design strategy was a good solution in implementing the firefighting robot to help people at the critical condition. The proposed robot makes movements in forward, backward, left, right and stop also. It reduces the human efforts and also protect their property. Robot detects fire and extinguish the fire with the help of water sprinkler pump.

VI. REFERENCES

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