

IoT Based Fire Fighting Robot using Arduino, Bluetooth

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Abstract: *The main purpose of this project is to protect industry from fire accidents and to avoid causing severe casualties. This fire fighting robot equipped with the remote controls to operate by the use of Bluetooth and send the alerts using the Wi-Fi communication methods. This project also has the ability to extinguish the fire by pumping the water with the equipped submergible motor. This project is totally remote controlled based so no fire fighter men will be injured also this robot is compact enough to go through the buildings and put the fire out*

Keywords: Arduino, Wi-Fi communication, Bluetooth controls, Display Message Status, LCD, Fire Sensor, Automation, IOT, Internet

I. INTRODUCTION

Nowadays the robotics evolving into possibly every area of industry, medical, defence and not to mention the day to day life problem solving areas. So, we concluded that the robotics can be used for the rescue operations by minimizing the loss of life of the victim also the rescuer[1]. The project we are proposing is the best one for such cases. Especially when there can be a minimal loss of life considered. Increasing infrastructure in the country also comes with the great risk of the fire accidents, so this project is a solution for fire extinguishing by remote control without having the fire fighters go into the fully burning places, houses, buildings etc. For analyzing different items and for handling materials mobile robots can be used[2]. Wireless navigation is also possible for movements of mobile robot, can be controlled through android. Fuzzy logic control mechanism is used to control robot. That model does not need any mathematical model controlling. But this reduces the scope of control of firefighting robot. However, with the advanced techniques we can build the same robot by using android application to control the actions of the robot. With the help of such robots, fireman's work really decreased and movements of robot are so much effective [3-5]. Therefore for smart IoT applications with sensors, the arithmetic circuits like multipliers and dividers should be more energy efficient for real time signal processing applications [6-10].

II. LITERATURE SURVEY

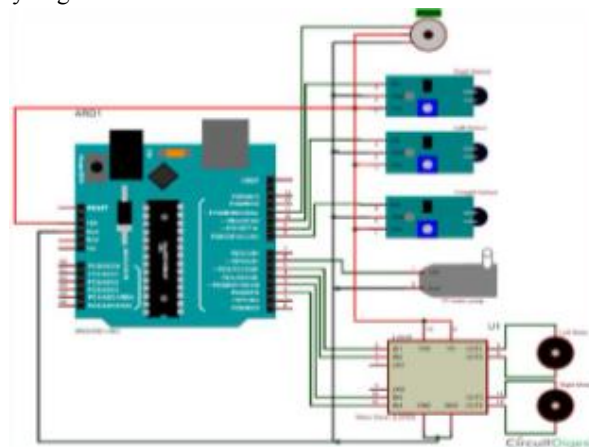
Tawfiqur Rakib, M. A. Rashid Sarkar The proposed portable robot contains the LM35 sensor and the Arduino Flame sensors used to detect fire and distances in the fire path. For this Robot trip, two nylon wheels and a caster ball are used. This is a type of car with a rear wheel drive. The water container has the capacity to hold at least 1L of water. It is made of strong cardboard with waterproof material. An obscure controller is used to control to avoid car obstacles. The purpose of the proposed solution given in the paper is to guide the vehicle in its course to avoid any standing areas containing specific obstacles in front of it. Avoiding obstacles in real time is a mandatory feature of the Car in an unknown location. Shivam Agrawal, Nidhi Agrawal suggested that one can control a robot using a Bluetooth module. The Bluetooth module works with the Android system. In this Bluetooth model it connects to the Android system using the driving engine, Arduino mega, voltage divider, tires, Bluetooth, car driver. Saravanan P., Soni Ishawarya said there are three types of operating system unit 1. Locomotion system 2. Fire detection system 3. Extinguishing system 4. Communication system. The Locomotion system is used to detect obstacles and four ultrasonic range devices to determine the distance between the obstacle and the system. The fire detection system is used for fire detection in this gas sensor. An effective fire extinguisher system. S. Jakthi Priyanka, R. Sangeetha suggested using Arduino



(UNO R3), gas sensor, car driver, gear engine, Relay driver, Bluetooth module, pump and sprayer. To configure Arduino UNO R3 software for open source Arduino IDE is required. Detection and disconnection is made with the help of Arduino where the heat gear sensor engine and its driver, transmission driver etc. are connected. "Android-controlled fire extinguisher" is useful in everyday life such as houses, research centres, parking lots, and supermarkets, companies, shops, shops, etc. The most important function of a robot is to watch. Robot limit Bluetooth range and water volume [11-12]. The system controls four DC Geared motors powered by tmega2560 and is automatically controlled by a Roaming system that combines integrated ultrasonic and infra-red sensors. The bot captures the wireless camera and captures the video and transmits it to the base station. The fire detection system contains LDR and a temperature sensor. When a fire is detected then the bot will be moved to the source and begin extinguishing it. The Extinguishing System is equipped with a BLDC engine with a water tank. In the worst cases, SABOT is also used manually.

III. CONNECTIONS

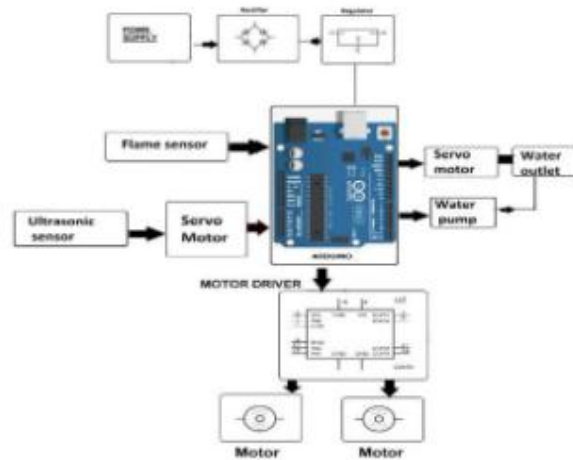
The most common type of Arduino is Arduino Uno. This board is what most people talk about when they refer to Arduino. Uno is one of the most popular boards in the Arduino family and a good choice for beginners. There are different versions of Arduino Uno, details below are the most recent version (Rev3 or R3). Arduino Uno is a microcontroller board based on ATmega328. It has 14 digital input / output pins (6 of which can be used as PWM output), 6 analog input, 16 MHz ceramic resonator, USB connection, power jug, ICSP header, and the reset button. It contains everything needed to support a microcontroller just connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.



The LCD display is interfaced to the Arduino digital pins, it will indicate the status of the fire on the screen and displays the message. The Wi-Fi module ESP32 will be interfaced to the software serial defined pins of the Arduino used for the IoT communication in case the fire is detected. The Bluetooth module Hc-05 is interfaced to the serial pins of the Arduino for the remote wireless controlling the robot movement [13]. The DC motor driver L293D is interfaced to the digital pins of the Arduino for the directional driving if the DC gear motors. The Flame infrared sensor is interfaced to the analog pins of the Arduino for reading the fire intensity which is analogous in nature.



IV. BLOCK DIAGRAM



WORKING

A. Step-1

The Bluetooth connection will be made from our mobile phone using the android tools and once the connection is established successfully, then we are enabled with the navigation control and the robot movement controls.

B. Step-2

The next step is to establish the Wi-Fi connection from our mobile by using the same android tools that are used to connect to the Bluetooth. After connection is established, we have to fetch the ip address of the Wi-Fi module.

C. Step-3

Now we have to connect to that ip address by using the android application called TCP Telnet. Now we are enabled with the fire status monitoring.

D. Step-4

Now we have to send the remote Bluetooth commands for the movement of the robot and after reaching the fire incident places, the fire sensor [16] will detect and send an alert via Wi-Fi.

E. Step-4

After the fire detecting, the submergible motor pump will be turned on hance the attempts to extinguish the fire will begin.

VI. RESULTS

The submergible motor will be the output and the message indicating the fire detected message will be displayed on the LCD display and the serial monitor of the Wi-Fi remote communication. Hence the people around can get to know the fire accident and will clear the premises and also the additional personal will be deployed at the scene to increase the efforts to put the fire out.

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