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Fire Fighting Robot

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Abstract: Firefighting robots are getting to be progressively imperative instruments for combing fires, especially in unsafe environment. The robot is outlined to work in situations that are ordinarily blocked off or perilous for firefighters. This paper audits the most recent headways in real-time remote firefighting robots. We discuss different fire quencher alternatives past conventional water based frameworks to address the confinements of water in quenching particular fires. Also, the paper analyzes the part of real-time communication for farther control and information transmission, empowering firefighters to make educated choices and guarantee their security amid operations.

Keywords: MLX90614; 5V Relay Module; Flame sensor; L298n Driver: ESP32-CAM Camera Module; Arduino uno R3; BO motor

I. INTRODUCTION

One of the most critical parameters in re calamity is life, Le. lives misplaced in sparing somebody else life. It is sometimes inconceivable for fire-fighters staff to get to the location of fire since of unstable materials, smoke, and tall temperatures. A quick reaction to identify the fire can maintain a strategic distance from numerous sad things. From the given statics, it is watched that fire can take put at household as well as at mechanical level. A typical start can produce a gigantic fire breakout [1]. Not as it were lives of mechanical individuals but moreover the lives of domestics. People are at hazard since of destitute fire administration framework. But it can be dodged utilizing legitimate fire controlling strategies. For such situations, fire-fighting robot is proposed. In today's era a parcel of robots are proposed and planned to expel the human figure from perilous and dangerous work. The utilize of robots is getting to be exceptionally common that securely completes the work seriously or dangerous work for human beings. A Fire Quenching Robot is based on IOT Innovation [2]. In Fire Quenching robot, we proposed to construct a framework that seem quench a little fire by detecting and moving to the area itself. It will automatically identify the fire with the offer assistance of fire sensors. Once it recognizes the fire breakout area, it navigates itself appropriately to reach the re source and quenches there by utilizing built-in re extinguishing framework. For fire discovery it is utilizing three fire sensors. To begin with one for the cleared out heading, moment one for the forward course and third one for the right heading [3]. Fire quenching framework will get activated when fire discovery framework recognizes fire. It at that point comes to the breakout point and water pump will start catapulting the water when it recognizes fire. The key highlights of this framework is to give observation of fire, so that major fire mishaps can be anticipated and misfortune of human lives gets minimized [4].

II. LITERATURE REVIEW

A. Design and Implementation of RF Based Fire Fighting Robot[3] In this paper, the project supposes a movable robotic vehicle with a remote controller by using RF module and microcontroller 8051. The robot operates in two mode navigation mode in which we control the robot and in second mode i.e. arm control mode in which we control the arm and the spray action of the robot. The mode can be known by the indicating LED, which when 'on' indicate that robot is in arm control mode. On the remote control we have 4 buttons, namely up, down, right and left.

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B. War Field Fire Fighting Robot with Fire Fighting Circuit [4] The project is designed to develop a robotic vehicle using Bluetooth. Basically the project is designed to develop a robotic vehicle named War Field Spying Robot using RF technology for remote operation attached with smart cell phone having IP web cam application for monitoring purpose. The robot along with smart cell phone can wirelessly transmit real time video and will give confidential information regarding opposite parties. An 8051 series of microcontroller is used for the desired operation. The commands are sent to the receiver, at the transmitter side with push buttons, to control the movement of the Robot to move forward, backward and left or right. Two DC motors are interfaced, at the receiving side to the microcontroller, which control the movement of Robotic vehicle.

C. Fire Fighter Spy Robot [5] The Fire Fighting Robot is designed to search for a fire in a small floor plan of a house of the specific dimensions, extinguish the fire with the help of the front fan of a toy hovercraft, and then return to the front of the house. The circuit implemented consists mainly of two different sub-circuits. The first part comprises of making the robot follow a black strip. This was done using a comparator circuit using the LDR whose reference voltage was fixed using the potentiometer. This was based on the phenomenon that the resistance of the LDR decreases as the intensity of light falling on it increases. In our case, the light reflected from the white surface is more than that from the black surface. Therefore, the voltage in positive terminal of the comparator remains high as long as the robot is moving on white surface. If the black surface come under one of the two LDR's the motor corresponding to that LDR stops, the other making it move away from the black line. But as the other LDR crosses the black line, its motor stops, the other forcing it in other direction, resulting in it's following the black line thus using a source follower circuit. The second part comprised of using LDR's and IR Receivers to detect flame

D. Automatic Fire Fighting Robot [6] "Automatic Fire Fighting Robot" project employs the electrical thermostat technology for the controlling the fire 24 hrs. The system is cost effective, has a wide applications which when implement can show good and effective result. It can be use deliberately in industrial applications, commercial and in domestic sectors where the requirement of automatic work demands. Synchronization of various equipment involve in the system i.e Thermostat Sensor, water jet, wireless remote and wireless android device WiFi enabled Camera. This is mean to simulate the real world operation of Robot performing a fire extinguishing function. Fuzzy logic provided an appropriate solution to the otherwise complex task of mathematically deriving an exact model for the non linear control system upon which conventional control techniques could then be applied. Making Robot wireless increases the effective area of operation, thereby making it possible to control the robot from remote location. Keeping all above factors in mind the Robot is capable of being remotely controlled and live video buffering i.e. possessing a multimedia interface was convinced and developed.

E. Control of an Autonomous Industrial Fire Fighting Mobile Robot [7] The robot performs analog to digital conversion on 5 infrared sensors: two to control the motion of robot and three for candle detection. The infrared sensor is used as input sensor which is connected at different levels of the robot chassis. The infrared sensor senses the infrared rays coming out of the fire and it feeds the signals to the microcontroller. The microcontroller in turn control the extinguishing system. The pumping motor in extinguishing system controls the flow of water. Infrared sensors are used to control the movement of robot. These sensors send the signal to the microcontroller whether they are on the black line or white line. Accordingly the microcontroller performs a set of operations and controls the robot movement through D.C. geared motors. This is fully automatic process and no manual support is needed. Microcontroller Atmega 32 is used for this purpose.

III. METHODOLOGY

Initially we require to make beyond any doubt all the components are associated and deliver control supply through an outside device. The robot remains sit still at first, afterward it begins turning in 360 degrees to identify the nearness of protest with the offer assistance of re sensor [1]. If the question is not inside the extend it moves ahead and at that point once more checks the nearness of protest inside the extend [2]. Page 1 of 3 The flag is detected to the one of the five channel fire sensor and at that point robot moves if it signals to center sensor so that we can move to the protest precisely. After detecting the fire, it moves to certain separate and once more checks the run of remove until it moves

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close to the fire protest. After it comes to it at that point in turn actuates fire quencher or water pump to sprinkle the water on fire question [3].



Fig 1.1 Block Diagram

A. HARDWARE IMPLEMENTATION

This robot comprises of a few sorts of sensors and the imperative portion of this robot is Arduino mega2560 which controls all other components. Fig appears that Arduino is utilized as a microcontroller associated with other components, Engine Driver is utilized to enact the moving of the DC engine. It too comprises of fire sensor and IR separate sensor. As input of the framework [3]. Fire quencher is mounted on robot to decrease fire.

1) Fire Sensor: This sensor is primarily outlined for recognizing as well reacting to the event of a fire or fire. It identifies the fire with 5fire sensors which are organized with 30 degrees. Discovery range is 700-1100nm. Location point is 600 [3].

2) 5V transfer Module: A 5V hand-off is a programmed control switch that is commonly utilized in a programmed control circuit and to control a high-current utilizing a low-current flag. The input voltage of the relay arranges from 0 to 5V [4].

3) Temperature sensor: MLX90614 is an infrared thermometer for non-contact temperature measurements [5].

4) L298N Driver: The L298N is a double H-Bridge engine driver module that can control the speed and direction of DC engines, it can drive engines with a voltage between 5 and 35V Dc [6].

5) ESP32 CAM: It is a exceptionally little camera module with the ESP32-S chip. It is reasonable for assortment of application counting, remote video checking, wi-fi picture transfer, facial acknowledgment [7].

6) Arduino Uno R3: It is the microcontroller board [8].

7) BO Engine: It is moreover known as battery worked engine or BO adapt engine. It is a DC engine that's designed for battery fueled applications [9].

B. FLOW CHART

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Fig. 1.2 Flowchart of Robot

EXPLANATION TO THIS FLOWCHART :

This flowchart traces the rationale for a framework planned to identify and react to fire or deterrents utilizing sensors and motorized development. Here's the step-by-step clarification:

1. Begin: The prepare starts with the framework being actuated.

- 2. Engine Run: The engine is initialized, permitting the framework to perform developments.
- 3. Sensors Start Checking:
- Temperature Sensor: Checks for the nearness of adjacent objects based on temperature variations.
- ✤ Fire Sensor: Recognizes the in the region.
- 4. Way Choice:

◆ If the temperature sensor identifies the question: The framework turns to recognize the correct position of the question.

* If no protest is identified: The framework moves forward. If the temperature sensor identifies a protest: The framework pivots to recognize the correct position of the question.

✤ If no question is recognized: The framework moves forward.

5. Fire Location:

If the re sensor recognizes re: The framework stops and moves to the user-intervention arrange.

♦ If no re is identified: The framework proceeds moving forward.

6. Separate Observing:

- The framework ceaselessly checks if the separate to a question is 40 cm.
- ♦ If the separate is 40 cm: The framework stops.
- ♦ If the remove is not 40 cm: The framework proceeds moving forward. Page 2 of 3

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7. Halt and Client Mediation:

Once halted, the client distinguishes the appropriate activity to take, such as confirming the circumstance or planning the framework to handle the issue.

Client quenches fire: The framework gives control to quench the fire physically or with client direction.

8. Conclusion:

The framework concludes its operation after settling the identified issues. This flowchart likely speaks to a firedetection robot or a shrewd security framework with independent and user-controlled functionalities. The combined utilize of temperature and fire sensors guarantees both question discovery and fire security capabilities.

IV. CONCLUSION

This extend portrays approximately the genuine time firefighting robot which moves in a consistent speed, distinguish the Page 1 of 2 fire and at that point quench it with the offer assistance of pumping component. It has beneficial highlights such as capacity to identify area of re naturally other than having a compact body and lightweight structure [2]. The robot can be utilized at a put that has a little entrance or in little spaces since it has a compact structure. The framework can possibly be valuable to go with re warriors and avoid the flare-up. The administrator is able to quench fire utilizing farther control from longer remove. Administrators can moreover screen the environmental conditions amid the prepare of firefighting by utilizing the camera. From the exploratory results, the robot can sense smokes and fire precisely in a brief time [3].

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