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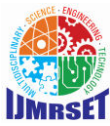
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Fire Fighting Robot Car

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ABSTRACT:- Now days the advancement in technology will be going to increases. Hence with the advancement in technology the humans are replaced with the robots and they are helpful to do the various works. Large factories, warehouses & industrial production facilities always run the risk of fires breaking out. In recent days automation plays a major role in many areas. Autonomous systems reduce human effort & help people in all possible ways. Hence this remotely controlled robot is used to reduce human efforts. Firefighters risk their lives to save people in the event of fire. Firefighter robot proposals were made to reduce the loss of life of firefighters & citizens. In real life there is a danger of fire unpredictable. This robot is used as fire extinguisher. This robot is control with remote & also we communicate with person in fire area with the help of smart camera.

KEYWORDS: Fire Fighter Robot, Extinguisher, Control, Communication.

I. INTRODUCTION

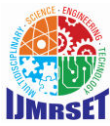
This project structure is one type of mini fire extinguisher device the only thing is this robot is extinguish the fire with the help of remote so it can reduce the human effort. The main aim behind this robot car is to extinguish fire in small areas and in very difficult fire areas where the fire fighter can't go. Hence we made this remote controlled fire fighting robot car to reduce human efforts. To run this robot we use the wi-fi module microcontroller. The main component of this system is the microcontroller also it is called as brain of system. This robot is also very important for indoor fire accident areas to extinguish fire. If someone is inside the fire area it is impossible to see them hence we use the smart camera in this project. It is placed on the front side of robot car to see the fire area. With the help of smart camera we can communicate with the person who is inside the fire area. And with the help of camera we can throw the water towards the person or any important equipment's.

In recent days automation plays a major role in many areas. Autonomous systems reduce human effort & help people in all possible ways. Hence this remotely controlled robot is used to reduce human efforts. Firefighters risk their lives to save people in the event of fire. Firefighter robot proposals were made to reduce the loss of life of firefighters & citizens. A fire extinguisher is a device used to extinguish a fire. Nowadays even different chemicals mixed together can cause fire. A specially this project is made for use in less space area & more difficult places where the no one can go. This robot can go their easily. This project made in such a modern way does very well important work.

II. LITRATURE SURVEY

1. Autonomous Fire Fighting Robot

Firefighters risk their lives to save vulnerable people in the Event of a fire. Firefighting robot designs have been proposed to reduce the loss of life for Firefighters and citizens. In real life, fire hazards are unpredictable. It is better to extinguish the fire while it is small. This firefighting robot uses an effective fire spray extinguishing mechanism to Extinguish both electrical and normal fires. This autonomous system is equipped with infrared Flame sensors, microcontrollers, and ultrasonic sensors. The proposed system detects fire in all three directions, left, right, front. It has a special ability to detect and avoid obstacles.



2. Fire Fighting Robot

With the advent of technology, humans are replaced with robots in life-threatening situations. We aim to design a robot capable of detecting and suppressing fires. By designing and implementing an autonomous robot capable of detecting and extinguishing flames, disasters can be avoided with minimal risk to human life. In this research, we illustrate an autonomous robot capable of detecting flames indoors and maneuvering towards the flame to extinguish it with the help of carbon dioxide. Currently, the world has been gradually moving towards automation and self-driving cars, putting firefighters in constant mortal danger.

3. Design & Manufacturing of Indoor Intelligent Fire Fighting Robot

Remote control is carried out with the camera and the WIFI module connected to the Internet. The experimental results show that the control of the robot through the WIFI wireless module is stable, achieving the expected effect of extinguishing agent injection, reducing the workload of firefighters to a certain extent, effectively reducing household fire risk and reducing social losses.

4. IOT Based Fire Fighting Robot

With the advancement in the field of mechanical technology, human interruption has become less and robots are being utilized for various works and for welfare of beings. Nowadays, fire mishaps keep happening frequently, cause danger to human life and property, also cause difficulties for firefighters to save lives. In such cases, a firefighting robot is utilized to protect human lives, wealth, and surroundings from the fire mishappenings. This model is an IOT based firefighting robot that detects fire. After being informed the authorities can start visualizing the fire location and can communicate with people stuck with a help of an automatic receiver installed.

5. Arduino Based Autonomous Fire Fighting Robot

This advanced firefighting robotic system independently detects and extinguishes fire. In the age of technology, the world is slowly turning towards the automated system and self-travelling vehicles, fire fighters are constantly at a risk of losing their life. Fire spreads rapidly if it is not controlled.

III. PROPOSED WORK

The objective of proposed model is to design an Fire Fighting Robot Car which can replace the humans. This robot will operate remotely with the help of Wi-Fi based microcontroller module. The system can be easily handled with the help of android application. The communication process is done by the smart camera. The purpose of communication with the people stuck in the location where fire has occurred is done with the help of smart camera.

In the proposed system, an android application is used to send commands from the transmitter end to the receiver end for controlling the movement of the robot in forward, backward, right or left directions. At the receiver side, two motors are interfaced to the Node MCU microcontroller where in two of them are used for the movement of the vehicle and the remaining one to place the arm of the robot. This robot is loaded with a water tanker and a pump controlled through wireless communication to sprinkle water. A water tank with Pump is placed on the robot body and its operation is carried out from the microcontroller o/p through the proper signal from the transmitting end. The entire operation is controlled by a Microcontroller. A motor driver IC is interfaced to the microcontroller through which the controller drives the motors.

Fire fighting robot car mainly operated with Android application. By using the android application we can run the robot car. By using the interface of application take car front, back, left and right. If the fire is inside any house or industry where the fire fighters go inside is very harmful then robot car using is very good for extinguishing fire. By using camera we can check where there is people inside the fire then start water flow first on to the people. By using that we can send message to people. We connected extra pipe connection to car at the back end so it will be easy for fire fighters to fill up the car tank again. It is important to have an extra connection for car when there is water from tank is totally empty. Hence this project is very much important for indoor fire where the fire fighters entry is harmful to individuals. In this project microcontroller is used to control the signals. This robot is loaded with a water tanker and a pump controlled through wireless communication to sprinkle water. A water tank with Pump is placed on the robot



body.

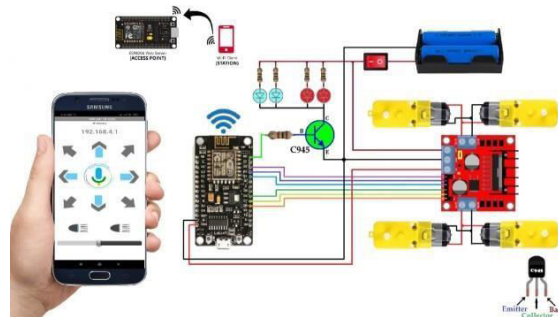


Fig. 1. Connection Diagram

The brain of system is microcontroller. It is microcontroller with wi-fi capability. The code is inbuilt in microcontroller and all instructions are given in the code. The microcontroller is connected with android application with the help of wifi. So by starting the system node mcu module sends the control signal to motor driver through its pin. In the code all functions of motor driver are coded means front, back, left and right. Depends on instructions microcontroller send control signal to motor driver and depends on that car wheels are working. Motor driver is connected with 12V gear motor to control the speed of the car. The 5v relay also used in this circuitary. The main source of supply is 12V rechargeable battery. It is used to give power for light of vehicle and motor. In the android interface there is an motor pump on button is included by starting the button the nozzle spray is going to start the waterflow. The camera is working with other application. In that we can see objects inside the fire event.

3D DESIGN OF ROBOT CAR

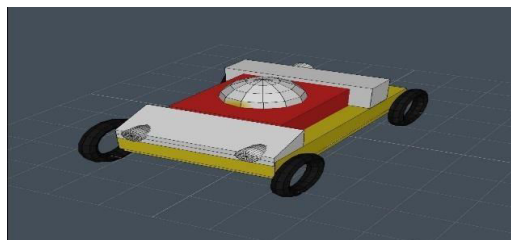
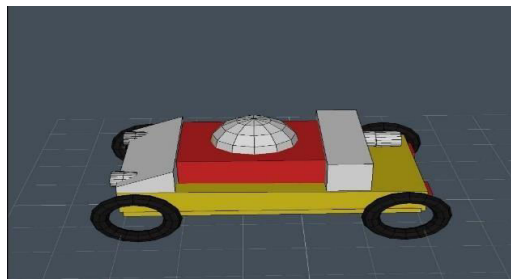


Fig. 2. 3D Design of robot car



IV. METHODOLOGY

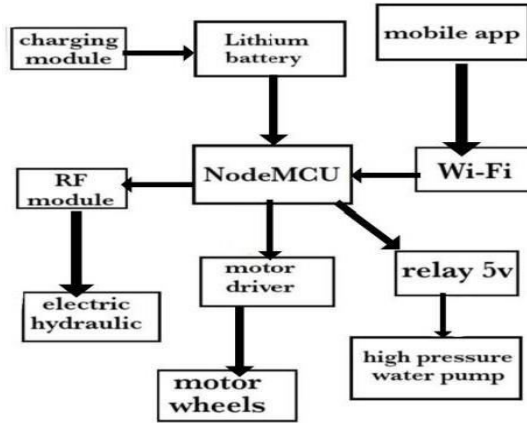


Fig. 3. Block diagram of fire fighting robotcar

The main component of whole system is NodeMCU. It is microcontroller with wi-fi Capability. The NodeMCU module sends the control signal to motor driver through its pin. Motor driver used to control motion of motor. It has two input pins for controlling direction of Motor. Motor is connected with the wheels of car by using that the speed of car can increase or decrease. Relay is used as switch on or off. Relay is used to control load. High pressure water Pump is used to handle high pressure water flow. It's function is to transfer water between two Points. By applying high pressure fire fighting systems water is forced through nozzles at very High pressure to create a effectively fire. It can minimized water damage. NodeMCU is connected with mobile app through wi-fi. This robot is loaded with a water tanker and a pump Controlled through wireless communication to sprinkle water. A water tank with pump is Placed on the robot body and its operation is carried out from the microcontroller o/p through the proper signal from the transmitting end. We have used four Wheels in the model. We have used a metal gear motor to rotate those wheels. This allows us to carry a Lot of burdens. In this we have used high pressure 12 holt motor. Through this we can shoot water up to 10 to 15 feet long with pressure. In this, electric hydraulics are made at this place to target the fire and bring it down. With this you can pipe water up, down. It is RF remote c It is provided with 5v power supply.

V. HARDWARE IMPLEMENTATION





VI. RESULTS

Table no. 1 Technical specifications for small sizerobot

Specification	Discription
Weight	10 Kg
Height	18 cm
Length	60 cm
Width	52 cm
Power source	12 V rechargeable battery
Fluid flow rate	2 litres per minute
Range of nozzle	15 feet
Speed	3.6 Km/hr
Pressure	100 psi/ 5.5 bar



Table no. 2 Technical specifications for large sizerobot

Specification	Discription
Weight	200-500 Kg
Height	140 cm
Length	160 cm
Width	120 cm
Fluid flow rate	700 litres per minute
Range of nozzle	15 – 30 m

VII. APPLICATIONS

- The Firefighting Robot is a compact and portable emergency responder robot that assists firemen in fighting high-rise fires, especially in highly dangerous environments where it is not safe for people to enter.
- Fire fighter robot can be used to control the fire. This robot can detect the fire by itself and control the fire by throwing water. There are some sensors we are using that can detect fire and robots can move there to fire extinguish.
- Detection of fire and measurement of distance from fire source while the robot is on its way to extinguish fire.
- It is used to extinguish fire where possibility of explosion is more.
- It used as home security application.
- It is used in server rooms in offices.
- It is useful in disaster area monitoring and rescue.
- It is used in kitchen rooms of restaurants.

VIII. FUTURE SCOPE

The firefighting robot will have future scope that it can work with firefighters, which greatly reduce the danger of injury to victims. It is a innovative work in the field of robotics that operates towards a sensible and obtainable access to save the lives and prevents the danger to property. The future of firefighting robots is very promising. In the coming years, it is expected that robots will become increasingly autonomous and will be able to navigate dangerous environments, detect and analyze fires, and take action to extinguish them. One of the most significant advantages of firefighting robots is that they can reduce the risk to human life. Firefighters face a wide range of risks when working in hazardous environments, such as exposure to toxic chemicals, high temperatures, and smoke inhalation.

IX. CONCLUSION

Fire has always been a devastating phenomenon but the technology advancements it become easier to tackle it. Firefighters try their best to respond quickly to case of fire and event put their lives at risk of they endeavour to save human life and protect property from the fires. Some attempts have been made to automatic fire fighting for the navy (ship board autonomous fire fighting robot). This describes one such solution to the problem of fire fighting with help of 360 degree fire protection system. In conclusion there are many possible ways to put out fires but it always safer to use the constantly this idea to reduce the involvement of firefighters thereby decreasing the risk of physical injuries and life threats. Comparing this prototype with the existing technology we implement the sensor and wireless technology. Nowadays the fire fighting technologies are fully manual. In scope of future we implement wireless technology to control the fires. The robot can operate in the environment



which is out of human reach in very short time, the delay employed is very minimal. The robot accurately and efficiently finds the fire and within minimum time after the fire is detected it is extinguished.

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