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Design & Development of Wireless Smart Fire Fighting Robot for Social Safety

Falshruti R. Balsaraf, Karishma S. Dhabale, Shweta R. Virkhede,

Bhagyashri R. Doye, Sapna V. Wase, GUIDEDr.Nitin K. Choudhari

Dept. of Electronics &Communication Engineering, Priyadarshini Bhagwati College of Engineering, Nagpur, India.

ABSTRACT:**Robotics is one of the fastest growing engineering field of today. Now a days, in fire protection system humans are replaced by robots. Due to increase in human population and careless approach while handling this situation. The ratio of accidents happening these days is observed to be increased. Many times while handling this situation the person involved in this process lost their life. Looking at this scenario and recent advancement in the technology we have given a thought on very important issue and try to develop a fire fighting robot. With the invention of such device, people and property can be saved at much higher rate with relatively minimal damage cause by fire. We have designed wireless controlled robot which will detects fire automatically and then extinguish it, with the help of water sprinkle. If the power supply is interrupted or lost then it will work on solar power system.**

KEYWORDS- Fire fighting robot, Wireless controlled robot, Fire extinguish, solar power system.

I.INTRODUCTION

Robots are intelligent machine that can be controlled according to need. If an interface is provided, it further helps in navigation of the robot. As we make the robot using wireless operations which increases the effective area of operation, therefore it is possible to control the robot from a remote location. The main objective of this paper is to express fire fighting robot which are controlled by wireless remote. With the help of such robot the work of fireman will be effective and easier regardless of security. The paper is designed to develop fire fighting robot using RF technology for remote operation. The robotic vehicle is loaded with water tank and with pump which is controlled through wireless communication to sprinkle water. Push buttons are used at transmitter side to send the command to the receiver end to control the movement of robot.

II. LITERATURESURVEY

1. *Joe Davis, Ray Klundt and Paul Limpisathia,* Report of "Fire Fighting Robot ", In this there are three different types of system unit is use 1.GPS system 2. Fire detection system 3. Extinguishing system 4.Communication system. The GPS system is used for 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.
2. *William Dubel, Hector Gongora, Kevin Bechtold, Daisy Diaz, Report on "An Autonomous Firefighting Robot",*In this paper a PIC micro controller sensor, motor driver, gear motor, relay driver, GPS module, pump and sprinkler are used. To program PIC micro controller open source software PIC controller IDE is required. The detection and extinguishing was done with the help of PIC controller in which the sensor, gear motor and its driver, relay driver etc. are interfaced. The "solar powered automatic fire fighting robot" can be used easily in everyday life such as in homes, laboratories, parking slots, supermarkets, stores, shops etc. Important function of the robot is patrolling. Limitation of the robot is Bluetooth range and water capacity.

III. PROPOSEDSYSTEM

Our project is to design and develop fire fighting robot using remote operation andwireless communication. RF technology is used to control the remote operation. The metallic structure robotics vehicle is loaded with pump and a water tanker, which is controlled through wireless communication to sprinkle water. At the transmitting end using RF module, commands are send to the receiver like forward, backward, left, and right to control the movement of robot. At the receiving side three motors are interfaced to the micro controller. Where two of them are used for the movement of vehicle of robot and the remaining one is use for positioning arm of the robot. It will extinguishe fire when the robot faces a fire with the help of motorIt will extinguishes fire when the robot faces a fire with the help of motor pump connected to its water tank mounted on its metal body.The advantage of RF transmitter it acts as a remote control and it has a adequate range. All operation is controlled by 8051 micro controller.

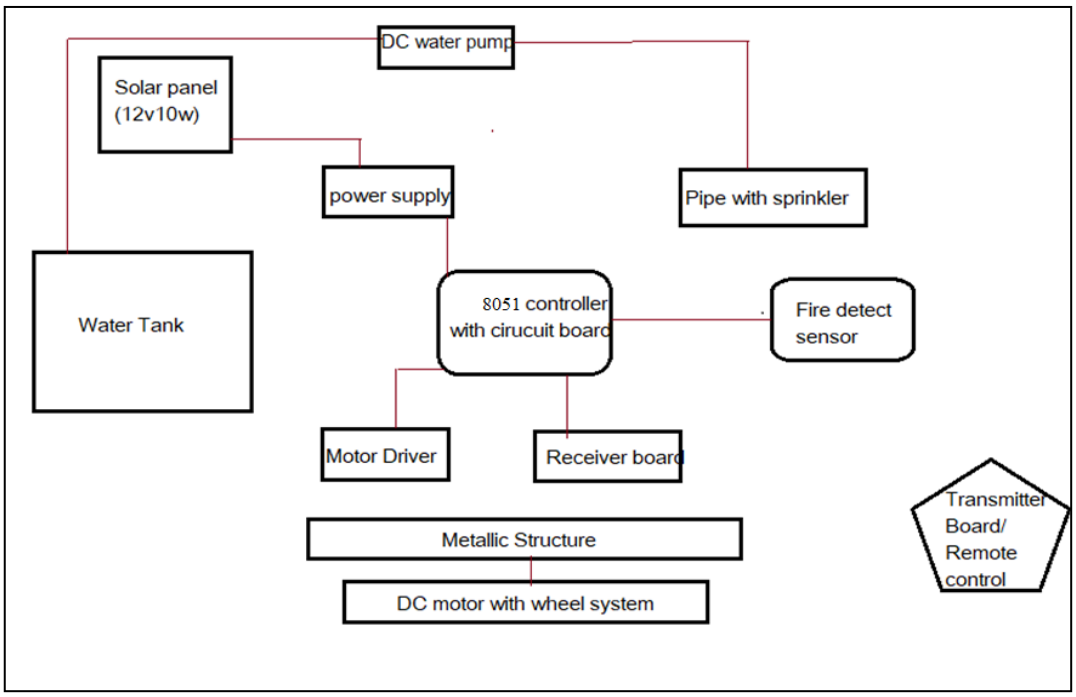


Fig:Block Diagram of Design Development ofWireless Smart Fire Fighting Robot

IV.SYSTEMARCHITECTURE

The working of robot is as follows:

- We use wireless remote to control the movement of fire fighting robot. As we pressed any key from remote i.e. of transmitter side, it send signals to receiver side and movement as done. This robot moves forward , backward, left , right and 360 direction movement. The mechanical structure is build the way it can rotate 360 direction.
- There is sensor attached at the front portion of robot. When any fire condition detect, it automatically sense the fire and sends signals to controller.
- We used 8051 controller to perform all the function. Controller process on received signals and activate the DC water pump through which fire is extinguish.
- Also we attached solar panel, for uninterrupted of power. When certain power fail or low condition is happened, solar panel works. It extract the light energy from fire and convert into electrical energy.
- This is how smart fire fighting robot works.

The components is used as follows:

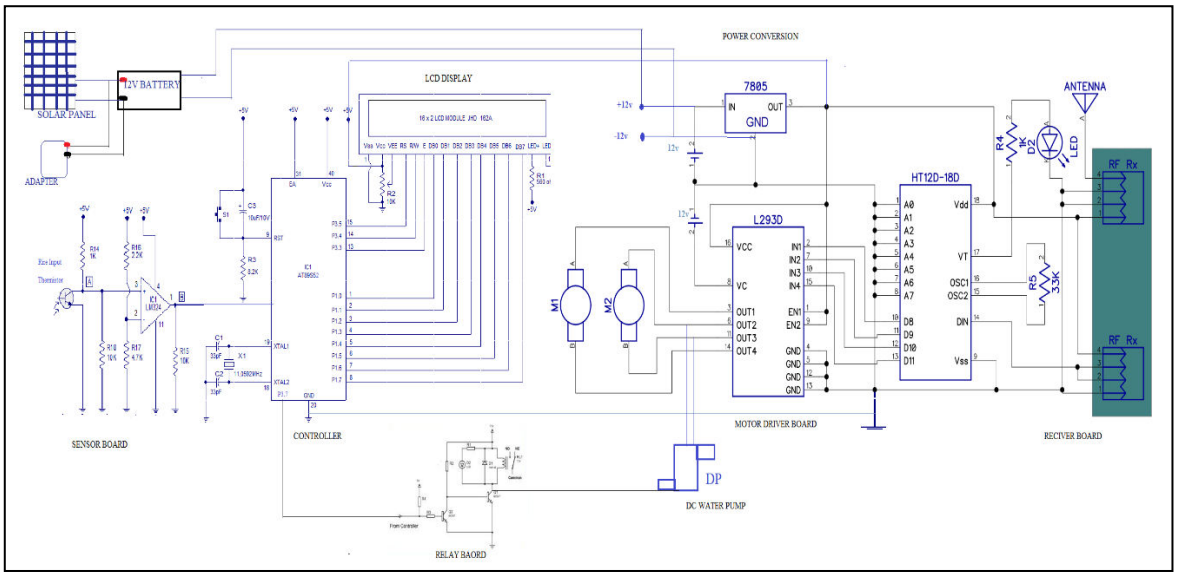
1. RF Transmitter & Receiver (Wireless Remote Control Model)
2. 8051 (AT89S52 Micro-Controller)
3. MOTOR DRIVER (L293D IC)
4. Solar Panel
5. Brushless DC Water Pump
6. 12 V Battery
7. Sensor
8. DC Motor (operates on 12V, Speed :100 RPM)

Microcontroller: It is main controller AT89S52 belongs to 8051 family. Which is used to control the signal received from any input voltage source like sensor and transmitter/receiver module.It is attached to LCD display to show the command

Sensor: LM35 is temperature measuring device having an analog output voltage proportional to the temperature. It provides output voltage in centigrade (Celsius). It does not required any external calibration circuitry. The sensitivity of LM35 is 10mv/degree Celsius. As temperature increases, output voltage also increases. LM35 gives temperature output which is more precise than thermistor output.

Motor Driver:L293D is H-bridge motor driver is a dual integrated circuit (IC). Motor driver take a low-current control signal and provide a higher-current signal as a current amplifier and itsoperates on 12 V power.

V.CIRCUIT DIAGRAM



Remote consist of two things i.e. transmitter and receiver that is used to establish connection between robot and remote operation. Command to move forward, backward, left and right to extinguish fire are send to the robot through the remote controller. Remote consist of transmitter and receiver section and command. Transmitter and receiver is use to establish a connection between robot. Commands are use to give instruction to the robot for direction and fire extinguishment.

Robotics vehicle consist of Relay latch, LCD, ATMEL AT89S52 microcontroller, motor driver IC l293D, 7805 IC is an integrated circuit, it is voltage regulator IC which is used for voltage conversion and to make device compatible to the serial port and vice versa. HT12E-18E & HT12D-18D is use as a encoder & decoder section.

VI.FEATURES

- Less cause of accident cases. Even Working is carried out automatic mode.
- Human control required is less.
- Cost of maintenance is less.
- Easy to repair.
- Improved safety.
- Protection of property from loss.

VII. FUTUREWORK

- This system can be access using secured 2-step verification and Login ID-Password system.
- The layers of protection can be added to make it more fire efficient.
- Adding wireless camera in robot, the actual footage of any location can be seen.
- The system can be added on a hovercraft to fight fires at sea due to oil spills, fire on ships etc. Which will minimize human effort to actually go deep into the sea and extinguish fire.

VIII.CONCLUSION

Thus, we have developed a robot which is used to extinguish the fire. This will be useful at places where human cannot reach or it is dangerous. Thus we have developed a fire fighting robot using wireless remote control solar power system. The project aim is to promote technology innovation to achieve a reliable and efficient outcome. The movement of the robot is controlled by the remote, to provide security of home, laboratory, office, factory and building is important to human life .This project is use to reduce the man power and save the human life.

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