

IMPLEMENTATION OF FIRE FIGHTING ROBOTIC VEHICLE

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Abstract— The fundamental reason for this undertaking is shielding fire from industry. With the improvement in the field of apply autonomy, human interruption has gotten less and robots are in effect broadly utilized for security reason. In our everyday life, fire mishaps have gotten normal and now and then may prompt dangers that make it hard for the fire fighters to ensure human life. In such cases, a firefighting robot is utilized to watch human lives, riches, and surroundings from the fire mishaps. This firefighting robot venture is a propelled task for industry. This undertaking joins RF innovation for remote activity and furthermore utilizes Arduino. A firefighting robot is fit for recognizing fire, temperature, gas spillage. On the off chance that a house or industry bursts into flames, temp or gas while somebody is in the business, by methods for this firefighting robot, individuals and properties can be spared from fire mishaps through water and gives the ringer caution.

Keyword— *Arduino Microcontroller, Flame sensor, Temperature sensor, Smoke sensor, RF.*

I. INTRODUCTION

Presently a days, versatile robots are valuable in building destinations, distribution centers and assembling plants. Portable robots can likewise be utilized in material taking care of utilizations which applications are developing step by step. For breaking down various things and for dealing with materials portable robots can be utilized. Remote route is additionally workable for developments of versatile robot, can be controlled through android. Fluffy rationale control component is utilized to control robot. That model needn't bother with any numerical model controlling. Beforehand, Fire Fighting Robots were constrained by utilizing distinctive gadgets.

In any case, this decreases the extent of control of firefighting robot. Be that as it may, with the propelled strategies we can construct a similar robot by utilizing android application to control the activities of the robot. With the assistance of such robots, fire fighter's work truly diminished and developments of robot are so a lot of compelling. By utilizing an android application fire fighter man distinguish the fire and can ready to smother it. Simultaneously robot can recognize the deterrents and can keep away from them by utilizing ultrasonic

sensors. With the consistently expanding innovation, the advancements are expanding even with the circumstances that cause human life. Consistently, the robot business rises as a model that is delivered as an option in contrast to human component in another branch. - Flying, robots, wheeled robots legged robots, human droid robots, submerged robots are only some of them.

Our proposition is intended to fabricate an android application,

which can control tasks of the firefighting robot. Fire fighter can send directions to robot through Bluetooth module which is mounted on robot itself. Advanced cells have office of Bluetooth, through that Bluetooth fire fighter can control the development of firefighting robot. For fire discovery it is utilizing two sensors. One is temperature sensor and second is smoke alarm. Fire smothering framework will be get actuated when fire recognition framework recognizes fire sprinkler will begin sprinkling water when it identifies fire. At the transmitting end android application is utilized and at accepting end two engines are interface to small scale controller.

II. SYSTEM ARCHITECTURE

The block diagram of the project and design aspect of independent modules are considered such as Power supply, Arduino UNO, RF remote, LCD, Buzzer, Fire sensor, Temperature sensor, smoke sensor. As we can observe the block diagram of transmitter section as well as receiver section are almost similar.

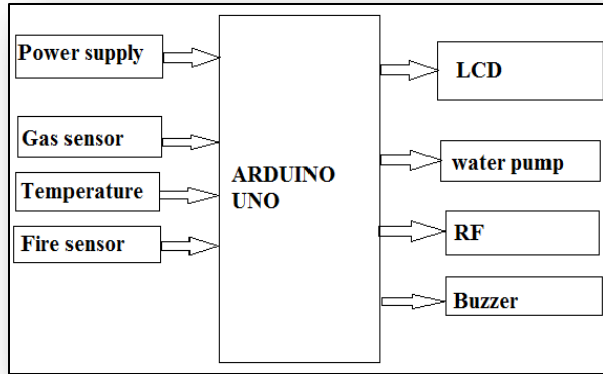


Figure 1: Block diagram of receiver section

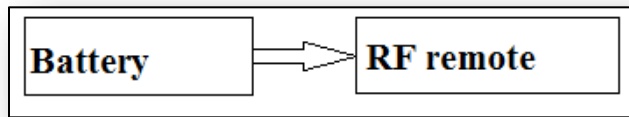


Figure 2: Block diagram of transmitter section

A. Arduino UNO

Arduino is a solitary board microcontroller intended to make the way toward utilizing hardware in multidisciplinary extends increasingly open. The equipment comprises of a straightforward open source equipment board planned around a 8-piece Atmel AVR microcontroller. Arduino Uno is a microcontroller board dependent on the ATmega328P. It has 14 computerized input/output pins (of which 6 can be utilized as PWM yields), 6 simple sources of info, a 16 MHz quartz gem, a USB association, a force jack, an ICSP header and a reset catch. The Arduino Uno can be modified with the Arduino Software (IDE). The ATmega328 on the Arduino Uno comes prearranged with a boot loader that enables you to transfer new code to it without the utilization of an outside equipment developer.

B. RF

Radio frequency (RF) is a frequency or price of oscillation within the range of about three Hz to 300 GHz. This variety corresponds to frequency of alternating contemporary electrical alerts used to produce and discover radio waves. Since maximum of this variety is beyond the vibration charge that maximum mechanical structures can reply to, RF usually refers to oscillations in electrical circuits or electromagnetic radiation.

C. Temperature Sensor

In order to display the temperature continuously and evaluate this with the set temperature pre-programmed in the microcontroller, initially this temperature price has to be read and fed to the microcontroller. This temperature cost must be sensed. Thus a sensor has for use and the sensor used in this task is LM35. It converts temperature cost into electrical indicators.

LM35 collection sensors are precision integrated-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 requires no external calibration on account that it's far internally calibrated. The LM35 does now not require any external calibration or trimming to offer common accuracies of $\pm 1/4^{\circ}\text{C}$ at room temperature and $\pm 3/4^{\circ}\text{C}$ over a complete -55 to $+100^{\circ}\text{C}$ temperature range.

D. Flame Sensor

A flame detector is a sensor designed to discover and reply to the presence of a flame or hearth, permitting flame detection. Responses to a detected flame depend on the set up, however can consist of sounding an alarm, deactivating a gas line (including a propane or a herbal fuel line), and activating a fire suppression device. When used in applications including industrial furnaces, their position is to offer confirmation that the furnace is running nicely; in those cases, they take no direct action past notifying the operator or control system. A flame detector can often reply quicker and extra as it should be than a smoke or warmth detector due to the mechanisms it makes use of to stumble on the flame.

E. Smoke Sensor

MQ2 flammable gasoline and smoke sensor detects the concentrations of combustible fuel in the air and outputs its studying as an analog voltage. The sensor can degree concentrations of flammable gas of three hundred to ten,000 ppm. The sensor can perform at temperatures from -20 to 50°C and consumes much less than 150 mA at five V.

Connecting five volts throughout the heating (H) pins continues the sensor warm sufficient to characteristic

successfully. Connecting five volts at both the A or B pins reasons the sensor to emit an analog voltage on the alternative pins. A resistive load among the output pins and ground sets the sensitivity of the detector. Please note that the image within the datasheet for the pinnacle configuration is incorrect. Both configurations have the same pin out consistent with the lowest configuration. The resistive load must be calibrated for your particular utility the use of the equations inside the datasheet, however an awesome starting price for the resistor is 20 okay Ω .

F. LCD Display

LCD (Liquid Crystal Display) screen is an digital display module and find a huge range of applications. A 16x2 LCD show may be very fundamental module and could be very commonly used in numerous devices and circuits. These modules are preferred over seven segments and different multi segment LEDs. The motive being is LCDs are cost-efficient; without problems programmable. A 16x2 LCD manner it could show sixteen characters according to line and there are 2 such traces. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has registers, namely, Command and Data.

The LCD calls for three manage strains as well as both 4 or 8 I/O strains for the facts bus. The person may additionally pick out whether the LCD is to perform with a four-bit records bus or an 8-bit statistics bus. If a four-bit information bus is used the LCD would require a complete of seven facts lines (3 manage lines plus the four strains for the records bus). If an eight-bit data bus is used the LCD will require a total of 11 records strains (three control strains plus the 8 traces for the facts bus).

G. Buzzer

Digital structures and microcontroller pins lack sufficient current to force the circuits like relays, buzzer circuits and many others. While these circuits require round 10milli amps to be operated, the microcontroller's pin can provide a maximum of one-2milli amps modern-day. For this motive, a driving force consisting of a electricity transistor is placed in between the microcontroller and the buzzer circuit.

III. WORKING PRINCIPLE

In this project the main heart of the system is Arduino. It controls each and every module's functionality.

The main goal of this project is to design a firefighting robot by using RF technology for remote operation. This robot is loaded with a water tanker and a pump controlled

through wireless communication to sprinkle water. For the desired operation, an Arduino microcontroller is used.

At the transmitter end, push buttons are used to send commands to the receiver end to control the robotic movement, either in forward, backward, right or left direction. The RF transmitter acts as an RF remote control that has the benefit of adequate range up to 200 meters with apposite antenna, while the decoder decodes before feeding it to another microcontroller to drive DC motors via motor driver IC for necessary work.

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.

In future, this project can be developed by interfacing it with a wireless camera so that the person can view the controlling operation of the robot remotely on a display.

IV. RESULTS

In this project, we check in the environment whether there is temperature or smoke exceeded than the limit.



Figure 3: Kit demonstration

When the temperature or smoke levels are exceeded, the sensors will activate and buzzer gives the beep sound. At the same time, the lcd glows and shows the temperature or smoke levels on its screen as shown in Fig:4.

Automatically, the water pump sprays the area where the fire accident takes place. The kit has been subjected to different room temperatures which are shown in the following below figures.

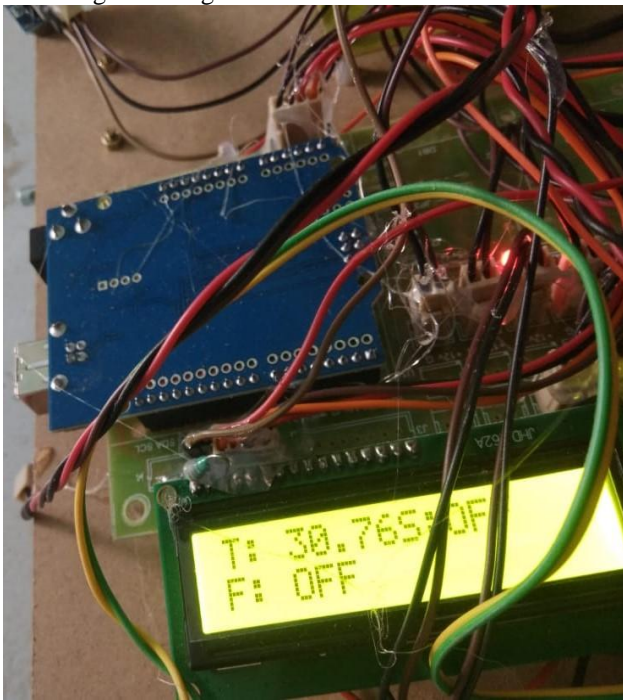


Figure 4: Final result

The above figure shows the final result. If there is any smoke or temperature detected than the exceeded limit, it is shown on the lcd's screen. The experiment is performed at different room temperatures and the values of temperatures are displayed on lcd as shown below.

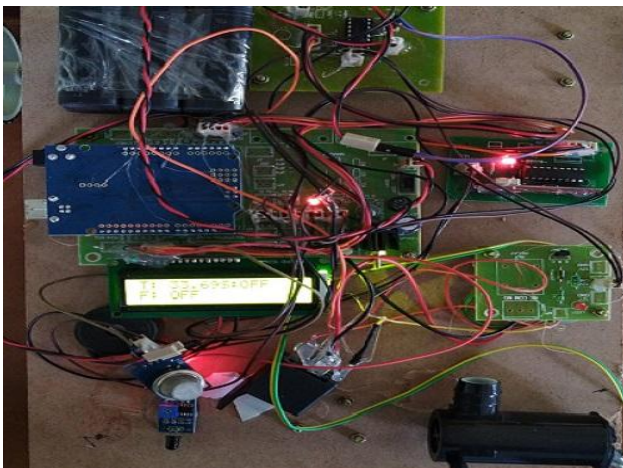


Figure 5: Displaying the variation of temperature on lcd

As seen in the above figure, the temperature has been increased from 30°C to 33°C at room temperature.

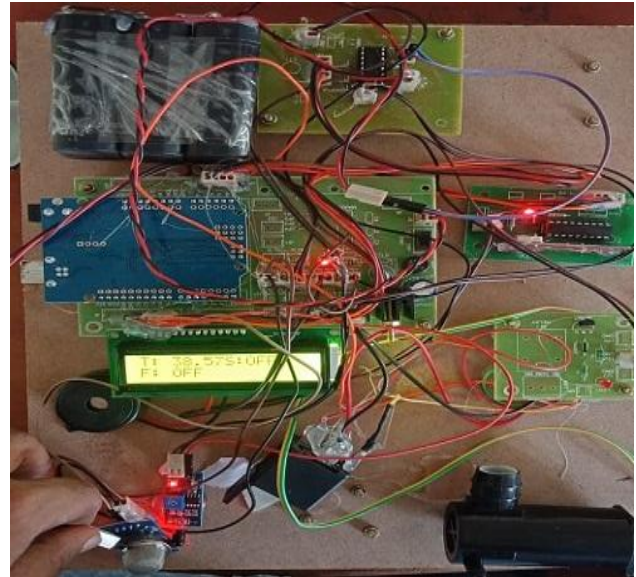


Figure 6: Displaying the another variation of temperature on lcd

Now we are able to see about the any other variant of the temperature on lcd as it's miles subjected to exceptional room temperatures. The fig:7.Four suggests that the temperature has been increased from 30°C to 38°C.

The threshold price need to no longer exceed 50 °C at outside temperatures.

V. CONCLUSION

This Paper gives a firefighting robotic the use of RF communique and it's miles designed and implemented with Arduino microcontroller (MCU) in an embedded device domain.

Experimental work has been finished cautiously. The result indicates that better performance is certainly accomplished using the embedded gadget. The proposed method is verified to be distinctly beneficial for the security motive and industrial motive.

At gift the robot is able to throwing water with high waft price handiest. At future the robot will even able to throwing water with controlled robot palms and the item detection using cameras on it. It may be used as further extension of the undertaking to achieve all of the functions.

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