International Journal of Technical Research and Applications e-ISSN: 2320-8163,
www.ijtra.com Special Issue 39 (KCCEMSR) (March 2016), PP. 24-26

WIRELESS CONTROLLED ROBOT USING ARDUINO AND RF MODULE

[1]Chirag Jain, [2]ReemaKadechkar, [3]Sachin Chaturvedi, [4]Susmita Pradhan
[1,2,3,4] Department of Electronics
K. C. College of Engineering & Management Studies & Research, Thane
[1]cchopda62@gmail.com,
[2]kadechkar.reema@gmail.com
[3]shchaturvedi49@gmail.com
[4]sspradhan@gmail.com

Abstract— **The wireless communication technologies are rapidly spreading in too many new areas, including the automation and the importance of the use of wireless technologies in the data acquisition, building control, and automation of manufacturing processes will grow. Robots are also useful to do jobs in areas and in situations that are hazardous for human. This project outlines the strategy of establishing wireless communication between a remote control and a robot. The main aim is to build a wireless robot using Arduino which can detect obstacles, flames and chemicals and the robot can be controlled by a remote control through RF module. The detected information can pass through RF to operator and will glow one LED.**

I. INTRODUCTION

Our motive is to implement the fundamental concept of wireless communication on a small scale. The remote control application of RF has been extended to operate a bot. The main aim of the project is to implement a wireless robot which can be controlled through remote control using RF module and navigates around the areas and tries to detect obstacles, flames of fire and chemicals. In this project we will use a 433 Mhz Tx and Rx pair to allow the Arduinos on both the ends to communicate wirelessly with each other. Here the Robot can detect the obstacles through the use of ultrasonic sensors. Apart from this the Robot can detect flames of fire through the use of flame sensor. Also it will be able to detect chemicals likeH2, LPG, CH4, CO, or propane through the use of a sensor. The robot will be able to implement one of these three functions at a time.

II. COMPONENTS

The Controller Board:-

1. Arduino MEGA board.
2. One 433MHz OR 315MHz module (both work the same way) Tx and Rx pair.
3. A breadboard for the controller pad.
4. Push button switches X 8.
5. Connecting wires.
6. 9V battery to power the Arduino on the Tx end.

The Receiver Board :-

1. Arduino board.
2. One 433MHz OR 315MHz module (both work the same way) Tx and Rx pair.
3. Breadboard and connecting wires.
4. 12V battery pack to power Motors
5. 100uF Electrolytic Caps X 4.
6. L293D motor driver chip X 2 (Each chip controls 2 motors bi-directionally).
7. 0.1uF ceramic caps X 12 (3 for each motor), for eliminating noise between the controller and motors.
8. A 9V battery for powering the Arduino on the Rx end.

Robot Chassis and Drive Train:-

1. DC Motors X 4
2. Robot chasis.
3. Wheels X 4

Sensors:-

1. HC-SR04
2. HUB360
3. MQ-2

III. BLOCK DIAGRAM

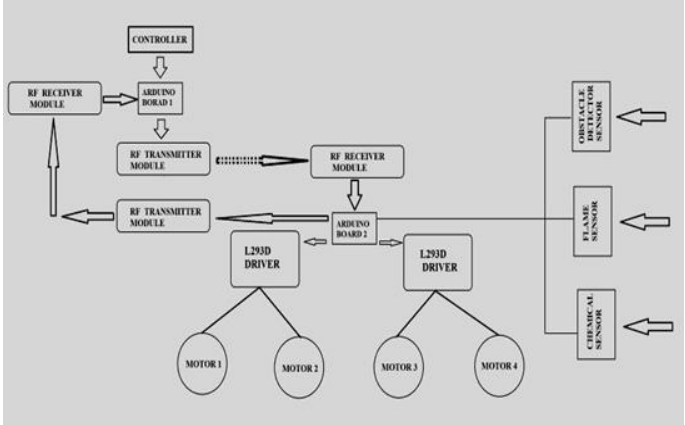


Fig.1. Block diagram

IV. WORKING

Transmission process:-

The operator gives the commands through the controller board i.e. remote control which consists of eight push button switches. The code which is programmed into Arduino reads whenever a button is pressed since the corresponding digital pin goes LOW. The Arduino generates a signal depending on the command given and this signal is then given to the transmitter module (Tx) which transmits the command. The transmitter module has four pins namely Ant, Vcc, Data, Gnd.

Reception process:-

The transmitted command is received at the receiver end by the receiver module (Rx) which is interfaced to another Arduino board.The transmitter and receiver communicate across a 433MHz frequency. The code receives the transmitted byte and based on the command received, a signal is generated and the sensor which is activated will perform the task simultaneously which makes the two l293d motor drivers drive each motors connected to them accordingly. Motors are controlled using the L293D motor driver, with digital write commands. We are introducing three sensors i.e obstacle detector, chemical and flame sensor. Now let us discuss working of each sensor separately with Arduino and RF module.

1. Obstacle detection: What the sensor does is calculating the distance from an object by sending bursts of ultrasound towards it and measuring the time it takes to the sound waves to get back (distance=velocity*time). We can use this information in order to determine whether there's a close "obstacle" near the robot and then avoid it.

2. Flame sensor: HUB 360 flame sensor module we are using when there is Flame the LED and Buzzer will automatically turn ON and when there is no flame amount Arduino automatically turns off LED and Buzzer. Threshold value should be 100.

3. Chemical sensor: The MQ series of gas sensors use a small heater inside with an electro-chemical sensor. They are sensitive for a range of gasses and are used indoors at room temperature. The output is an analog signal and can be read with an analog input of the Arduino. The MQ-2 Gas Sensor module is useful for gas leakage detecting in home and industry. It can detect LPG, i-butane, propane, methane, alcohol, hydrogen and smoke.

V. ADVANTAGES

1. Offers productivity, convenience and cost advantage over traditional wired technology.
3. No need for manual retrieval of data.
4. Availability of real time data.

VI. LIMITATION

1. The superior nature of this scheme depends on many environmental factors, such as operation scenarios, specific data types etc.

2. More research work needs to be done in future to find the respective application scenarios for this scheme with all the related factors taken into consideration. This technique needs to be implemented in a wireless sensor network with mobile nodes, since mobility was not taken into account in this work.

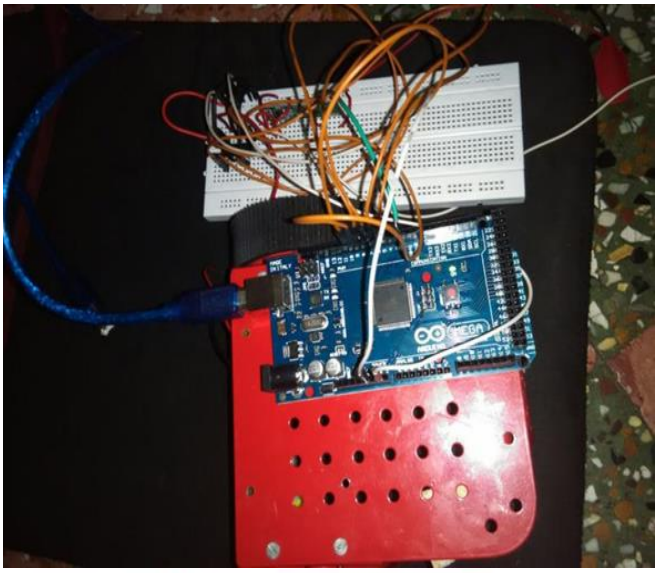
VII. APPLICATIONS

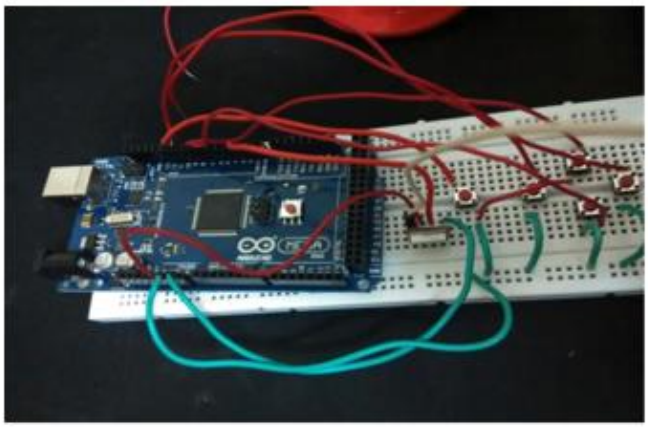
1. Industrial applications- Industrial remote controls, alarm systems and wireless transmission for various types of low-rate digital signals, industrial data acquisition systems.

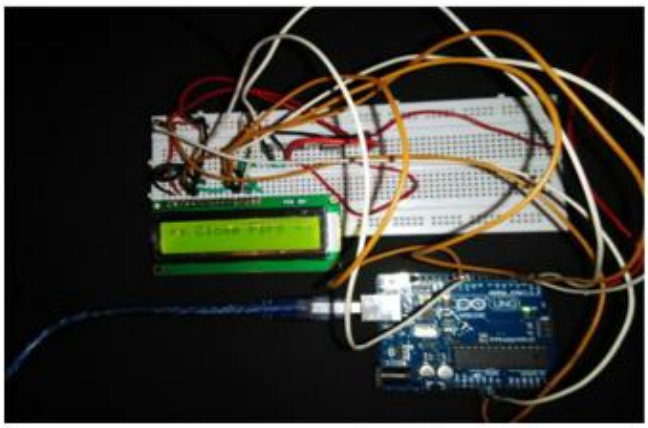
2. Monitoring applications- The applications include environmental monitoring, biomedical applications, habitat monitoring, battlefield management, wireless fire protection systems.

Household applications:Alarm systems and wireless transmission for various types of low-rate digital signal, remote controls for various types of household appliances and electronics projects and several other applications related to RF wireless controlling.

VIII. PROJECT IMPLENTATION







IX. CONCLUSION.

The combination of multiple sensors on a single robot is the highlighted feature which makes it efficient and very cost effective. The project serves as a basic prototype for several other applications. Arduino being an open source hardware is a versatile and easy platform for this project. The project is an excellent tool for detecting fire and gas leakage. Another good feature is that the robot can be controlled remotely.

X. FUTURE SCOPE

This project can be further extended to sense various other kinds of sensor data such as humidity, light intensity, air quality etc.

Multiple sensors can be interfaced to an Arduino board in order to provide ease to a user for performing specific task. Future work on this robot could include a completely redesigned power management system with a regulator that can handle the changing actuation of multiple sensors without negatively impacting the operation.

REFERENCES

[1] PrithvirajShetti et al, “On New Approach in Using 433MHz Radio Modules ”International Journal of

COMPUTER SCIENCE AND MOBILE COMPUTING, VOL.3, PP.3405-345, APRIL-2014.

[2] Larry Mathies, Alonzo Kelly, “Obstacle Detection for Unmanned Ground Vehicles: A Progress Report,PP.475-

[3] MichaelMcRoberts”BeginningArduino”,USA

ISBN-13 (electronic): 978-1-4302-3241-4, pp.81-96.

[4] M. Daily et al. Autonomous cross-country navigation with the ALV. In Proc IEEE Int’ Conf on Robotics and Automation, pages 718- 726. IEEE Computer Society, April 1988.

[5] Rui Santos, “Guide for RF 433MHz Transmitter/Receiver Module With Arduino”.