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RF Based Pick and Place Robot

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Abstract- Pick & place Robot control through remote is an interesting proposition. Although these concept circuits based on the same were developed almost ten years back, it however became more popular with the introduction of radio frequency module. Here is a tele-remote circuit which enables switching "Forward, Backward, Right, Left" and pick & place of Robot through remote. It can be used to move the Robot from any distance, overcoming the limited range of infrared. This robot has a number of advantages as well as important features such as a pick & place; it will sense light, fire and metallic bombs and hence immediately provide an alert through LED to the remote person. The various alerts are displayed on the LCD display.

Index Terms- Microcontroller, RF module, Pick and Place arm, sensors

1. INTRODUCTION

Objective of this project is pick and place based on RF technology. Two RF modules are used, one for movements of robot and pickplace arm and another one for transfer status of sensors to the remote section and display it on LCD. Microcontroller 89c52 is used in this project. Two RF module having frequency of 433 MHz and operates within a voltage range of 3 to 12v. A pick and place robot speeds up the process of choosing an object and placing it in the desired location and thus increases the production rate. It is a robot that possesses movements like forward, left and right based on the RF commands. A remote robot is a device that is able to move and interact with the external control. Remote control robots can perform wide range of function by simply following remote control commands. Remote robots are placed and operated in hazardous and dangerous environments where human being are restricted owing to the dangers associated with such places.

2. TECHNOLOGY

This radio frequency (RF) transmission system employs Amplitude Shift Keying (ASK) with transmitter operating at 434 MHzEncoder IC (HT12E) receives parallel data in the form of address bits and control bits. The control signals from remote switches along with 8 address bits constitute a set of 12 parallel signals the encoder HT12E encodes the parallel signals into serial bits. Transmitter, upon serial data from encoder IC (HT12E), transmits it wirelessly of HT12D. The decoder then retrieves the original parallel format from the received serial data. Decoder converts the serial input into parallel output. It decodes the serial addresses and data received by an RF receiver, into parallel data and send them to microcontroller.

3. SYSTEM DESCRIPTION



Fig.1 General Block Diagram Of RF Based Pick And Place Robot.

3.1 Microcontroller

The AT89C52 is a low-power, highperformance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only

memory (PEROM). 4 Kbytes of in-System Reprogrammable Flash Memory Endurance: 1,000 Write/Erase Cycles. Fully Static Operation: 0Hz to 24 MHz 128 X8 Bit Internal RAM 32 Programmable I/O Lines. Two 16 **Bit** Timer/Counters SIX Interrupt Sources. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 and 80C52 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or conventional non-volatile by а memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C52 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many applications.

3.2 RF Transmitter

This radio frequency (RF) transmission system employs Amplitude Shift Keying (ASK) with transmitter operating at 434 MHz Encoder IC (HT12E) receives parallel data in the form of address bits and control bits. The encoder HT12E encodes these parallel signals into serial bits.

3.3 RF Receiver

The given block diagram shows control through the RF Technique using a micro-controller RF receiver receives the serial data through antenna. Send to decoder. Decoder converts the serial input into parallel outputs. It decodes the serial addresses and data received by, an RF receiver, into parallel data and sends them to microcontroller.

3.4 RF Module

The RF stands for Radio Frequency. Frequency range varies between 30 kHz & 300 GHz. In this RF system, Transmission through RF is better than IR (infrared) because signals through RF can travel through larger distances making it suitable for long range applications.IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. RF transmission is more strong and reliable than IR transmission.

3.5 Drivers

Drivers are used to control the devices because signal coming from controller is low signals to drive the motors we need a drivers so that motor will control easily. Motor driver L293D is used.

3.6 Motors

Six motors are used in this project. Four for moving purpose and two for pick and place purpose. Moving purpose motors are 30 rpm.

3.7 LCD

To display the sensors status to the remote section, LCD is use in the remote section. Another LCD is used at robot section to display project name and welcome notification.

4. EXPERIMENT RESULTS

It picks object from one location and place object to the destination. Also send the status of sensors to the remote section and display it on LCD.



Fig.2 Initial condition

At first state the robot is in initial condition, that is locating object which are going to pick. The initial condition is shown in figure 2.



Fig.3 Pick condition

In the pick condition robot is holding object by arm and moves to the destination. Pick condition is shown in figure 3.



Fig.4 Place condition

In place condition, robot is placing object to the destination. Place condition is shown in figure 4.





Sensor status from robot section is displayed on the side of remote section. Display of sensor status is shown in figure 5

5. APPLICATIONS

1. Medical applications

These robots can be used in various surgical operations like in joint replacement operations. They perform the operations with more precision and accuracy.

2. Industrial applications

These robots are used in manufacturing segments to pick up the required parts and place them in correct positions to complete the machinery fixture.

3. Defense applications

They can be used for robot performed military applications such as surveillances and also to pick up harmful objects like bombs and diffuse them safely.

6. CONCLUSION

Although this research is still a prototype only and for the demonstration purpose only. It is successfully demonstrated And also has proven to allow a two-way communication between robot and its controller which will allow a non-expert to interact with and can control it. We are currently extending this system to allow for real time control over the robot from a remote place. The speed of robotic arm is also supposed to control using PWM. At the end of the research, we will get a fully automated robot with simple control over it and can be used as a real time "RF BASED PICK AND PLACE ROBOT".

REFERENCES

- [1] Naskar S., Application of radio frequency controlled robot, published by IEM in collaboration with IEEE, 2011.
- [2] Lovine John, McGraw-Hill, second edition, "Robotics, androids, and Animatrons 12Incredible Projects You can build". Chapter- 5(DTMF IR Communication / Remote control system).
- [3] George M. Pierce II, major, USAF, Robotics: Military applications for Special Operations Forces.
- [4] Microcontroller 8051:- Kenneth J. Ayala.
- [5] Microcontroller 8051 interfacing Mazidi