Wireless Controlled robot for Bomb Detection and Defusion

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Abstract - *Now-a-days, Automated systems have less manual operations, flexibility, reliability and accurate. Detect the bomb by sending the robot to the respective place. A person can operate the system from personal computer through wireless RF control. The IR sensor is a pair sensors has a receiver and a transmitter sensor. In the present scenario of war situations, unmanned systems plays very important role to minimize human losses. This robot is fitted with motors. A micro controller is used to control all operations. According to the motor operations the robot will operate as specified in program. The key features of the robot include an intuitive user interface which provides additional sensor feedback and enhanced visual awareness compared to existing systems, an on board three degree of freedom manipulator arm providing an enlarged workspace, and a dexterous gripper allowing for the removal of detonators.*

KeyWords: **Metal Detector, Robotic Arm, Wireless RF controller, etc.**

1. INTRODUCTION

The landmine crisis is globally alarming since there are presently 500 million unexploded, buried mines in about 50 countries. Governments are looking into this situation seriously since landmines are claiming the limbs and lives of civilians every day. The purpose of this project is to design a robot which is capable of detecting buried land mines and marking their locations, while enabling the operator to control the robot wirelessly from a distance. A land mine detection robot is needed to be designed to employ in peace support operations and in the clearance of contaminated areas. Also the robot shall be able to detect 50-90% of landmines (Anti-personnel mines) and mark the locations of the mines within a tolerance of 5cm. For the safety of the operator, the designed robot must be able to operate remotely moreover, must be equipped with wireless data transmitting capabilities. Landmines are easy-to-make, cheap and effective weapons that can be deployed easily over large areas to prevent enemy movements. Mines are often laid in groups, called mine fields, and are designed to prevent the enemy from passing through a certain area, or sometimes to force an enemy through a particular area. While more than 350 varieties of mines exist, they can be broken into two categories, namely, anti-personnel mines and anti-tank mines. Anti-personnel mines are designed to kill or injure enemy combatants. They are usually buried 10mm to 40mm beneath the soil and it requires about 9 kg minimum pressures to detonate them. The face diameter of most the anti-personal mines ranges from 5.6cm to 13.3 cm. The main goal of the project is to provide safety to the bomb disposal squad by providing an extra line of defense. Provide a remote monitoring and controlling application for analysis of a suspicious packet (or bomb).Allow the user to manipulate the packet using the robotic arm. To provide visual feedback from the site of the packet. The operation of robot is control by using wireless module so it can provide more range of operation. Also construct a basic bomb diffusing robot which can handle simple tasks like cutting wires, flip on switches, lift light objects, etc. and a simple autonomous robot to help in the transit of the bomb. Also gives video feedback to us so effective handling of robot can be possible. This paper details the design and implementation of an intelligent robot to provide law enforcement agencies with a cost effective and Due to this more security will provide to bomb disposal squad. Also it more applicable for police, nuclear radioactive material handling, also for military purpose.
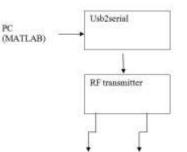
1.1 Block Diagram

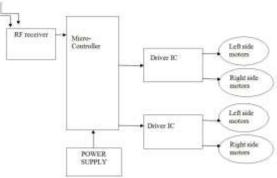

Fig 1: Schematic diagram for Transmitter block.

Fig.2: Schematic diagram for Receiver block.

1.2 Specification

◆ RF module operating range is 30 meter with onboard antenna. Operating temperature range 40 to +85°c.

◆ Microcontrollers (AVR-ATMEGA 16), display units(LCD) are used to perform the coordination between various blocks. Operating voltage of ATmega16 is 4.5 to 5.5 V.Speed grade for ATmega16 is 0 to 16MHz.

◆ Motor driver L293D is used to control a set of two DC motors simultaneously in any direction. It has the internally fitted diode.

◆ CC2500 low-cost, low-power 2.4 GHz, SPI interface

◆ RF Transreciver is used communication between transmitter and receiver robot.

◆ LMP91300 has ainternal volatage regulatorallows the device to operate with a supply rom 6.5v to 40v.

2. HARDWARE DESIGN

Microcontroller(ATmega 16)

•High-performance, Low-power AVR® 8-bit Microcontroller

• Advanced RISC Architecture

• High Endurance Non-volatile Memory segments

    – 16K Bytes of In-System Self-programmable Flash program memory

    – 512 Bytes EEPROM

    – 1K Byte Internal SRAM

• On-chip Boot Program

• Programming of Flash, EEPROM, Fuses, and Lock Bits through the JTAG Interface

• Peripheral Feature

•Two 8-bit Timer/Counters with Separate Prescalers and Compare Modes

• Real Time Counter with Separate Oscillator

Sensors

The LMP3100 is a complete analog front end (AFE) optimized for use in indutsrial inductive proximity sensor. It directly convets the R_p of external LC tank into digital value. The temperature dependence of the sensor is digitally compensated, using an external. Temperature sensor. The LMP91300 provides programmable thresholds, programmable temperature compensation and programmable oscillation frequency range. Due to its programmability, the LMP91300 can be used with a wide variety of external inductors and its detection thresholds can be adjusted to the desired detection. It Supports NPN and PNP Modes distances.

Motor driver LM298D

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. Main difference between L293 and L293D , D in L293D indicates an internally fitted diode (Output Clamp Diodes) meaning that we don't need to add any external components. But if using L293 external diode has to be added. This diode is used for Inductive Transient Suppression.
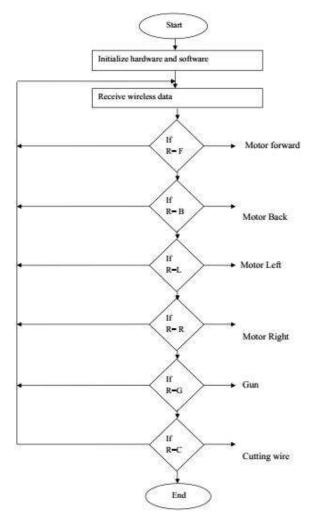
CC2500

The CC2500 is a low cost 2.4 GHz transceiver designed for very low power wireless applications. The circuit is intended for the 2400-2483.5 MHz ISM (Industrial, Scientific and Medical) and SRD (Short Range Device) frequency band. The RF transceiver is integrated with a highly configurable baseband modem. The modem supports various modulation formats and has a configurable data rate up to 500 kBaud. Excellent receiver selectivity and blocking performance. Frequency range: 2400–2483.5 MHz

Power supply design

An ideal regulated power supply is an electronic circuit designed to provide a predetermined voltage Vo, which is independent of load current, temperature and also of any variations is line voltage   Power supply is a vital part of all electronic systems. This circuit is required to drive the various components on the board. It is normal voltage regulator built with ubiquitous Transformer-Bridge Rectifier-Filter-Regulator assembly. We required a 5v supply for digital IC's. A step down transformer in the block diagram decreases the value of primary mains voltage at 50 Hz and applies a pure sign wave with 0 average values to a rectifier circuit. The circuit converts such wave forms to a pulsating DC wave forms having a non-zero average or DC value. Such a ripple containing DC waveform is applied to a filter which reduces the ripple factor and improves the DC contents in the waveform. If the output waveform across filter is directly connected to a load, without the regulator block, the load is said to be connected to an unregulated power supply.

3. SOFTWARE DESIGN

Flowchart:

```
              ┌─────────┐
              │  Start  │
              └────┬────┘
                   │
     ┌─────────────────────────────┐
     │ Initialize hardware and software │
     └─────────────┬───────────────┘
                   │
     ┌─────────────────────────────┐
     │    Receive wireless data    │
     └─────────────┬───────────────┘
                   │
              ◇ If R=F ◇ ──────────→ Motor forward
                   │
              ◇ If R=B ◇ ──────────→ Motor Back
                   │
              ◇ If R=L ◇ ──────────→ Motor Left
                   │
              ◇ If R=R ◇ ──────────→ Motor Right
                   │
              ◇ If R=G ◇ ──────────→ Gun
                   │
              ◇ If R=C ◇ ──────────→ Cutting wire
                   │
              ┌─────────┐
              │   End   │
              └─────────┘
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RESULT AND ANALYSIS

This paper served two purposes. First it helps to detect the bomb using inductive proximity sensor and it help in preventing human loss. Second it will defuse the detected bomb by cutting wires through the commands given by the controller wirelessly.

Fig -1

4. CONCLUSION

The project "Wireless controlled robot for bomb detection and defusion" has been successfully designed and tested. It has been developed by integrating features of all the hardware components used.

REFERENCES

[1] Prof. Vaibhav joshi, Sonali Katore, Yogini Bhandare, Amol Kanade. "Wireless Bomb Defusing Robot with camera interfacing" International journal of scientific research engineering and technology(IJSRET) ISSN 278-0882 Volume 5, Issue 4, April 2016

[2] Sushith.R[1],MandaviDubey[2],Vaishnavi.S[3],NithinAthreyas[4], Dr.M.Levy[5]"Wireless controlled robot for explosive detection and diffusion using GSM module" International Journal of Advance research in science and engineering(IJARSE) Volume No. 07, Special Issue no. 07, April 2018

[3] Tamilmani[1], Manikandan "Bomb Detection Robotics using Embedded Control" IRG-International Journal of Mechanical and Civil Engineering(IRG-IJMCE) –Volume 1 Issue 1, 2015