Zigbee Based Landmine Detector using ATmega 16

Prof. J. Jeyavel
Department of Electronics & Telecommunication Engineering
Bharati Vidyapeeth College of Engineering, NaviMumbai, Maharashtra, India

Mr. Sandesh Patil
Department of Electronics & Telecommunication Engineering
Bharati Vidyapeeth College of Engineering, NaviMumbai, Maharashtra, India

Mr. Mahesh Rawat
Department of Electronics & Telecommunication Engineering
Bharati Vidyapeeth College of Engineering, NaviMumbai, Maharashtra, India

Ms. Ankita Patil
Department of Electronics & Telecommunication Engineering
Bharati Vidyapeeth College of Engineering, NaviMumbai, Maharashtra, India

Ms. Aditi Salunke
Department of Electronics & Telecommunication Engineering
Bharati Vidyapeeth College of Engineering, NaviMumbai, Maharashtra, India

Abstract

This project demonstrates the problem and effects of landmines in defense fields. We are proposing a robot that has the aptitude to detect the buried mines and lets user to control it wirelessly to avoid human causalities. The main objective of the project is on the safety of humans by well-equipped and designed robot with special range sensors that help in avoiding obstacles in the field by specifically detecting the position of obstacles. For the fabricating the project, a special type of prototype made of lightweight temperature resistant metal is used to carry all the objects. A Camera is used on the robot which gives live streaming of the field. Microcontroller commands the robot. This technique has the practical benefit of reducing the number of causalities. After the implementation of the techniques, the robot can be controlled efficiently and it robustly determines the position of the obstacles. Here, we can use the ATmega16 microcontroller as the brain of the robot. The robot system is embedded with metal detector capable of sensing the landmine and buzzer for producing a warning alarm to the nearby personnel in that area. The locomotion of the robot is carried out by the DC motor. The robot is interfaced with the pc with help of a ZigBee device. Thus, user can identify the position of the landmines which is designed using the Visual basic 6.0 software and the programming is done using Embedded C.

Keywords: ATmega 16, Sensors, ZigBee, Robot Mechanism

I. INTRODUCTION

Land mine is a bomb explosive device that is kept secret under the ground and designed to destroy or disable the targeted enemy, which goes from warriors to vehicles and tanks or near it. This type of device usually blows automatically by pressure when it is targeted or mounted, although other explosion processes are used. Land damage can be damaged by the impact of the explosion directly, pieces that are thrown by the explosion, or by both. The name occurs from ancient customs of military mines, where the bogs were dug under double boundaries or the bounds of the tribe. The above-erosion bogade first collapsed to destroy the targets, but later they were filled with explosives and explosions to bring more blasts. Nowadays, land mines typically refer to devices that are specifically designed as anti-workers or anti-vehicle weapons. Many types of explosive devices ("IED") have been classified as technical, but my land is reserved for devices designed for use by recognized military services, whereas the use of IED is being used by paramilitary potato rebels or terrorist group land mines due to possible weapons due to their swift weapons. That's it. They can be dangerous for many years after the conflict ends, damages the economy and the citizens. The World Movement on the Conservation of the Prohibition on the Pros ion on the Prohibition of the Act-Persons Mines and Transitions on the Day of Personnel Mine and their destruction due to the global movement to ban their use due to pressures of several campaigns organized by the International Campaign for Ban Landmarks, also Ottawa Known as the contract. So far, 162 nations have signed the treaty. Soil mines are generally classified in two types, based on the type of blast that has to be inspired. Anti-tank mines. They are designed to immobilize or destroy vehicles and their residents. In US military terminology, the vehicles are destroyed as catastrophic death, while the movement is only called a death violation. Anti-tankers are typically larger than anti-personnel mines and require more pressure to explode. The high trigger pressure, which usually requires 100 kg (220 lbs), prevents pedestrians from disabling or making smaller vehicles less important. Most modern anti-tank mines use positive loads to concentrate and increase the penetration of explosives into shields. Anti-personnel mines Anti-personnel mines are designed primarily to kill or

injure people, unlike vehicles. Are often designed to damage rather than kill in order to increase logistical support (evacuation, medical) Load on opposite force. Some types of combat Individual mines can also damage the tracks or wheels of armored vehicles. This agreement, which is an effort to implement, produce, store or transfer unemployed mines and ensure that it is being destroyed. At the beginning of 2015, 164 countries agreed. Thirty-five countries, including the People's Republic of China, the Russian Federation and the United States, with multi-million anti-mining companies, are not a party.

II. LITERATURE SURVEY

There are many functions on damaged robot sites, oversight of ZigBee, robots available in books. In this chapter, the search engine optimization work in the previous fields is being explained. The authors explore robots of damaged soil.

Bharath J, a well-known world robot that uses a microcontroller. This page describes the challenges they face in 70 countries. The purpose of this letter is to address the problems of the mine. The purpose of this paper is to make a display robot capable of viewing the site and replacing its location, allowing the driver to monitor the robot at a distance. This method combines the metal drilling area into robot for land mining. The steel system combines with the robot and leaves it in the center of the digestive field that needs to be found in mining metals. The main task of this project is that we can create a cheaper and more robot.

Michael coli. Rachkov, Lino Marques, Anibal T. Standard. A document is placed in the advanced demining robot many noises. The robot in the transport system is based on a simple structure using pneumatic drive elements. It has a robust robot that is capable of transporting up to 100 kg of advice from, and in the fields of demining equipment, it is difficult to overcome the site of. At the same time, due to the need and the possibility of grabbing pedipulators obstacles, the robot can adjust the position of Minesweeper sensors or a free space diarrhea. The detection unit for the metal detector and infrared and explosive detector need sensor. The entire process is controlled by an interactive remote robot station operating method. The results of the experimental transport systems, robot control and the public have been presented. The main disadvantage of the robot knife factors sounds too heavy, Pat Seong Kang, Jun Choi, Suh Seung-Beum, Sungchul Kang, Italian political mine detection robot in the field of mining. This work represents critical design restrictions for mine-detecting robots for the Korean minefield. As part of the development of demining robots, the Korean environment of minefields has been explored and requests for proper robot design have been identified. Most land mines in the Korean minefield are buried near the demilitarized zone (DMZ) more than half a century ago. The areas are not urbanized at all by the Korean War, and potential locations of explosives with military tactics are covered by vegetation. Therefore, the target areas were explored at the initial stage of the development of the demonical robot system, and the design was designated for the Korean minefield. The design includes a platform with a simple mobile hand and a mine detection sensor (it consists of metal detectors and GPR at this stage). In addition, in order to maintain an effective distance between mine and land surface sensors, a technique for detecting the distance to adaptability of land has been developed and briefly presented in this document. The general design of this robot is determined by the speed.

III. PROPOSED METHOD

A robot is needed to detect landmines, designed to be used to support peace, operations and clean contaminated areas. For operator safety, Android is controlled with the help of computers that use the ZigBee module. The robot has an ultrasonic sensor to locate and avoid obstacle. The mine can be located with the help of the latitude and longitude of the GPS sensor. The structure of the robot consists of a material that can withstand a rush to a certain extent. The robot produces a warning alert for nearby individuals with the help of a bell installed on the robot. The robot performs with a high-power DC motor powered by a bridge circuit that allows the robot to move in any direction.

A. Block Diagram

A general block diagram is shown in Figure 3.1 and 3.2 and the system consists of several electronic parts. The system includes the brain of the robot, the ATmega 16 microcontroller, the ultrasonic sensor, the gas sensor, the DC motors for the action, ZigBee to control through PC, the metal detector for the detection of mines. These complete components are mounted on the robot mechnism.

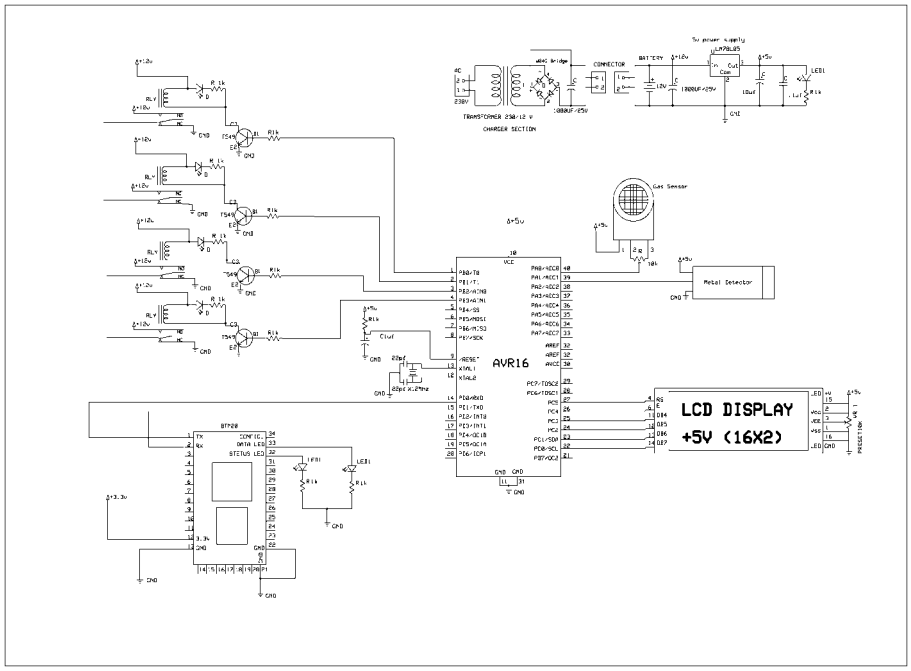


Fig. 3.1: Transmission section of the robot.

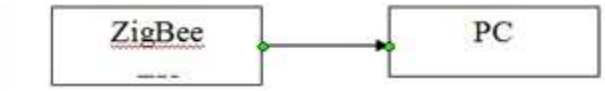


Fig. 3.2: Receiving section of the robot

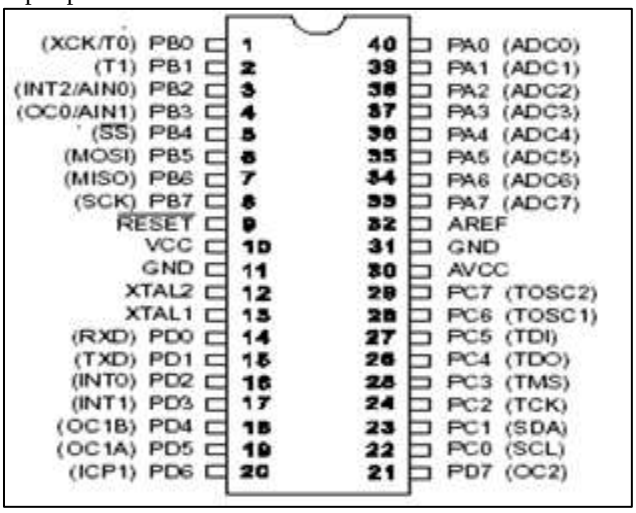
The following components are used in the robot for the detection of landmines.

1) ATmega 16 Microcontroller:

ATmega16 is an 8-bit high-performance microcontroller from the Atmel Mega AVR family with low power consumption.

Atmega16 is based on the improved RISC architecture (Computation of small instruction sets) with 131 powerful instructions. Most instructions are executed in a machine cycle. Atmega16 can work at a maximum frequency of 16MHz.It 16 has 16 KB of programmable flash memory, static RAM of 1 KB and EEPROM of 512 bytes. The resistance cycle of the flash memory and EEPROM is 10,000 and 100,000, respectively, it is a 40-pin microcontroller. There are 32 I / O lines (input / output) that are divided into four 8-bit ports designated PORTA, PORTB, PORTC and PORTD.

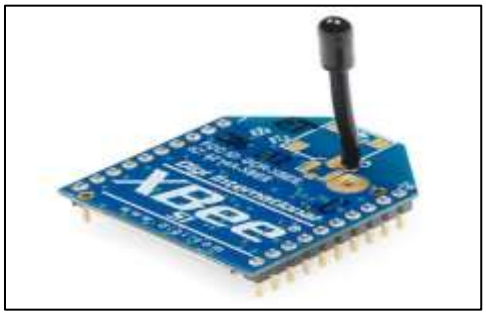
ATmega16 has several built-in peripherals such as USART, ADC, analog comparator, SPI, JTAG, etc. Each I / O pin has an alternative task related to the built-in peripherals.



2) ZigBee:

ZigBee is a specification based on the IEEE 802.15.4 set of High-level communication protocols used to establish personal networks with small digital radios and low power. In our project, we use the XBee module, which has been developed to comply

with IEEE 802.15.4 standards and supports the unique needs of low cost and low cost wireless sensor networks. Units require minimal power and reliable data connection between devices.



3) Gas Sensor :

Device that detects the presence of poisonous gas in an area,often as part of a security system. This type of equipment is used to detect gas leakage or other initials and can interact with a control system so that a process automatically closes.

4) DC Motor :

An engine controller is a device or group of devices that serves to govern in a predetermined manner the performance of an electric motor. In this project, we use the DC motor model with planetary gear RMCS-2006, since it provides the speed required for the robot to move and provides a high torque at the rated and current speed.

5) Metal Detector :

A metal detector is an electronic instrument that detects the presence of metal nearby. Metal detectors are useful for finding metal inclusions hidden within objects or metal objects buried underground. Often they consist of a handheld unit with a sensor probe that can be moved to the floor or other objects. If the sensor is approaching a piece of metal, it indicates a changeable tone in the handset or a needle moving around the display.

IV. RESULTS AND SIMULATION

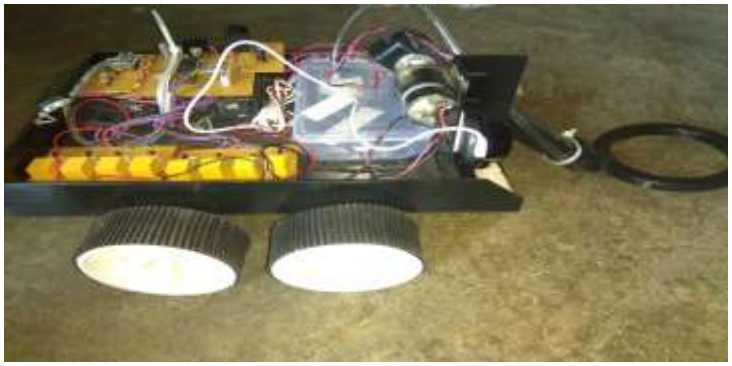
This project shows the problem and effects of mines in the field of defense. We are proposing a robot that has then aptitude to detect the buried mines and lets user to control it wirelessly to avoid human causalities. The main objective of the project is on the safety of humans by well-equipped and designed robot with special range sensors that help in avoiding obstacles in the field by specifically detecting the position of obstacles. For the fabricating the project, a special type of prototype made of lightweight temperature resistant metal is used to carry all the objects. A Global Positioning System (GPS) sensor is added to the robot which identifies and broadcasts the present location of the robot. Microcontroller commands the robot. This technique has the practical benefit of reducing the number of causalities. After the implementation of the techniques, the robot can be controlled efficiently and it robustly determines the position of the obstacles. Here, we have used Atmega16 microcontroller as the brain of the robot. The robot system is embedded with metal detector capable of sensing the landmine & gas sensor to sense gas leaking through landmine. The locomotion of the robot is carried out by the DC motor. The robot is interfaced with the control room panel with help of a ZigBee device. Thus, user can identify the position of the landmines.

V. PROJECT SNAPSHOTS

The snapshot of the final robot with all the components attached is shown below in the following figures in all the views

A. Top View

B. Side View



C. Front View

VI. CONCLUSION

This document describes the general design of robots with mine detection and deployment wheels. The robot with wheels is cheaper, robust and useful in the military for inspection and monitoring purposes. The future range focuses on improving body design by placing a suspension system on impacts of irregular surfaces. The robot is equipped with a camera for controlling the robot status. The energy system is being developed by replacing the battery with solar panels in order to produce uninterrupted power. The robot is equipped with a robotic arm for broadcasting.

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