

# Ground Mine Tracing and Destroying With Robot by Using Arm Processor

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**Abstract**—The aim of our work is robots provide simple solutions to protect workers from hazards in the work environments such as radioactive, toxic. This work presents a design of robot for rough terrain that can replace the human role in the demining applications. The robot enables it to move in any direction at any instant without changing the orientation of the body. If any obstacle is occurred it will detect by using metal sensor and it will divert the direction. The motion of the robot was simulated using the keil software and the robot stability margins for different conditions were found. After detection of landmines it picks with arm and threw some distance and destroys with the help of powerful laser pointer so to avoid collision with that mine. These all are observed by PC.

**Keywords**— Robot, Zigbee technology, DC motor, Powerful Laser pointer, Metal sensor.

## INTRODUCTION

Antipersonnel mines may exist in any environments near human beings, it is more difficult to detect and remove these mines especially if they exist in unstructured environments or close to crop fields. Robots have been used to perform such dangerous task instead of human. The existing demining robots have limited maneuverability; however, these robots cannot work well in rough environment. The robot presented in this work was designed to maximize both the maneuverability and stability with destroying these mines and minimize the control effort needed to perform such task.

Ground mine tracing and destroying with robot is used to detect the ground mines or explode material, and destroy those materials by using powerful laser pointer. If any obstacles are occurred it will detect with metal sensor, wireless camera (optional) and indicate through buzzer then it will take some diversion and move forward, these all are monitored by using pc. Here, zigbee transmitter and receiver are used.

## I. WORKING PRINCIPLE

The existing robot can only detect explode material or land mines. It can only pick and throw the explode material. The main drawback is that if only pick and throw the explode material and if incase they are not destroy they will occurred

problem in future. In the existing method it cannot monitor by PC.

In the proposed system robot will detect the explode or ground mines, after tracing of that explode material it will pick and throw and also destroy that material by using powerful laser pointer. These all are observed by using pc with the help of wireless camera, zigbee and one more feature is that if any obstacle is detected, by using metal sensor it will indicate with buzzer and take some diversion. Here, wireless zigbee receiver is used with LPC2148 and zigbee transmitter is used at PC.

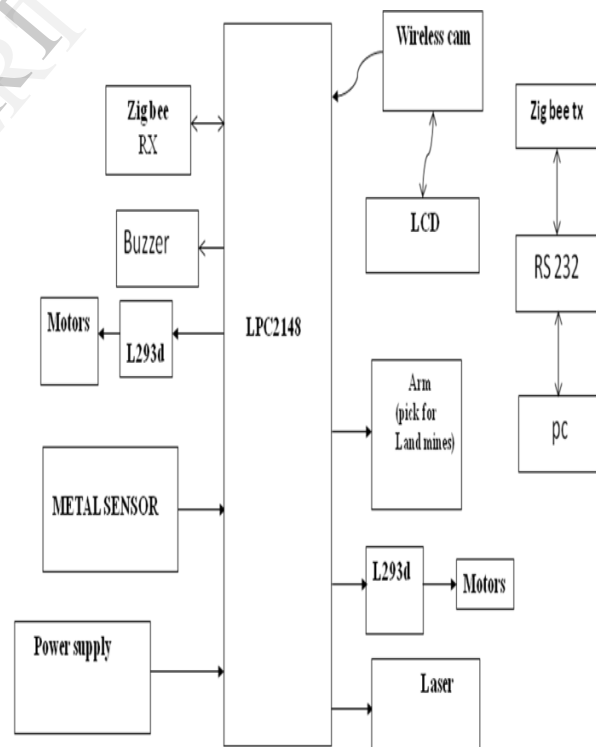


Fig-1: Block diagram of ground mine tracing and destroying with robot by using arm processor

The entire system consists of metal sensors, RS232, ARM microcontroller (LPC2148), powerful laser pointer, wireless cam (optional), dc motor, zigbee transmitter, zigbee receiver, pc and wireless LCD (optional). From the figure 1

the system consists of different modules which interfaced with the ARM (32 bit) microcontroller. The input power is stepped down to 12v DC from 230v AC power line to drive zigbee transmitter and 12v DC battery is used as the power supply source at robot. In this system, robot will detect the exploded or ground mines. After tracing of that explode material it will pick and throw and also destroy that material by using powerful laser pointer. These all are observed by using pc with help of wireless cam, zigbee transmitter and one more feature is if obstacle is detected by using metal sensor it will take some diversion.

The main aim of this work is robot monitoring and to detects the landmines or explodes materials. Whenever robot senses the landmines by using metal sensor, it will pick and throw some distance. After throwing that material it will destroy by using powerful laser pointer. The robot movement is done with the help of geared DC Motors. The obstacle avoidance of the robot is done by means of metal sensor. A wireless camera is used for visualizing the surroundings through LCD, as it is provided to get the display of the tasks carried out.

## II. IMPLEMENTATION

### A. Hardware

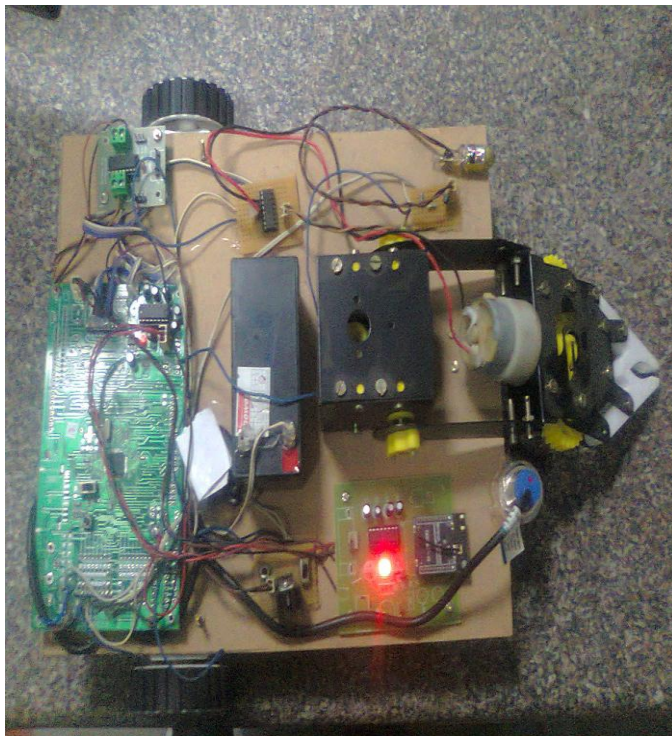


Fig-2: Hardware Implementation of ground mine tracing and destroying with robot by using arm processor

From the figure 2 the system consists of following components:

**1) Metal Sensor:** A metal sensor is a portable electronic instrument which detects the presence of metal nearby.

Useful for finding metal inclusions hidden within objects or metal objects buried underground.

**2) RS232:** RS-232 stands for Recommend Standard number 232. The serial ports use a subset of the RS-232 standard specifies a 9-pin "D" connector.

**3) Motor:** Motor is a device that creates motion. It usually refers to an engine of some kind.

**4) Powerful Laser Pointer:** A powerful laser pointer is a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation.

**5) LCD (Liquid crystal display):** This is used to display various information required.

**6) L293D:** It is a motor server dual H-bridge integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal.

**7) Microcontroller:** The LPC2148 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S. It has 64 pins with two ports namely PORT 0 and PORT1.

**8) Wireless camera:** A Wireless cameras is a wireless transmitter carrying a camera signal. The Camera is wired to a wireless transmitter and the signal travels between the camera and the receiver. This works much like radio.

**9) Zigbee technology:** ZigBee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power wireless M2M networks.

### B. SOFTWARE

- **Embedded C:** An embedded system is the one which is designed to perform a specific task and the embedded software rules the entire system. This software for a particular embedded system could be developed using various embedded programming languages. But embedded C is the well-known embedded programming language. It supports access to I/O and provides ease of management of large embedded projects. Compared to other high level languages, C offers more flexibility because C is relatively small, structured language; it supports low-level bit-wise data manipulation. Compared to assembly language, C Code written is more reliable and scalable, more portable between different platforms. Programs developed in C are much easier to understand, maintain and debug.
- **Keil Compiler:** Keil is a German based software development company. Compilers are programs used to convert a high level language to object code. After developing the software, it must be downloaded to the microcontroller through any one

of the downloading tools such as universal programmer. Hence the program should be cross compiled before downloading it into the microcontroller; the keil compiler comes into act at this place. Keil Software provides us with software development tools for the ARM microcontrollers. With these tools, we can generate embedded applications. The keil tool kit includes three main tools, assembler, compiler and linker.

C.Flow chart

• Main Flow chart

The main flowchart of the system is shown in the figure 3. It shows the system is initialized on power ON. Metal sensor is used to detect the obstacle. Whenever robot senses the landmines by using metal sensor, it will pick and throw some distance. After throwing that material it will destroy by using powerful laser pointer. The robot movement is done with the help of geared DC Motors. The obstacle avoidance of the robot is done by means of metal sensor. A wireless camera is used for visualizing the surroundings. An LCD display is provided to get the display of the tasks carried out these all are observed through PC.

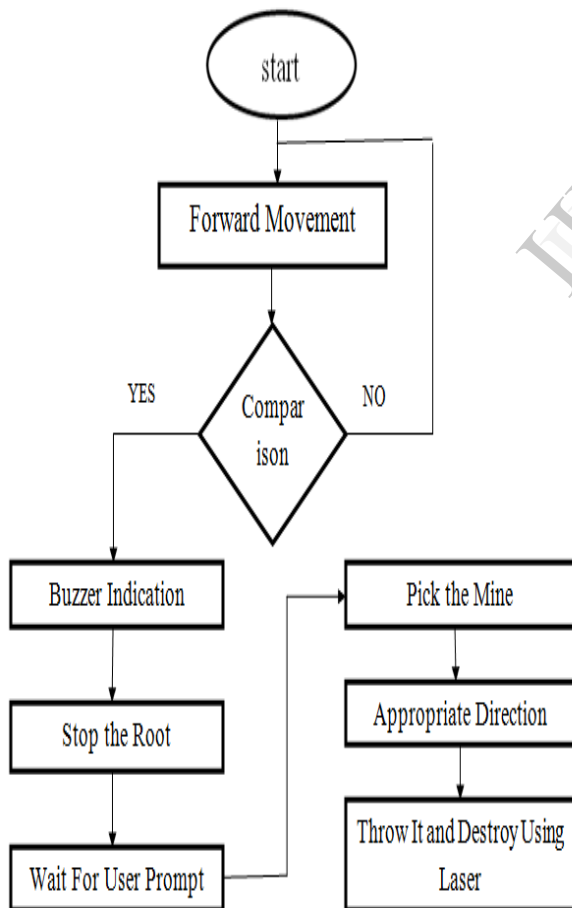


Fig- 3: Flowchart of ground mine tracing and destroying with robot by using arm processor

• Robot Main Flow:

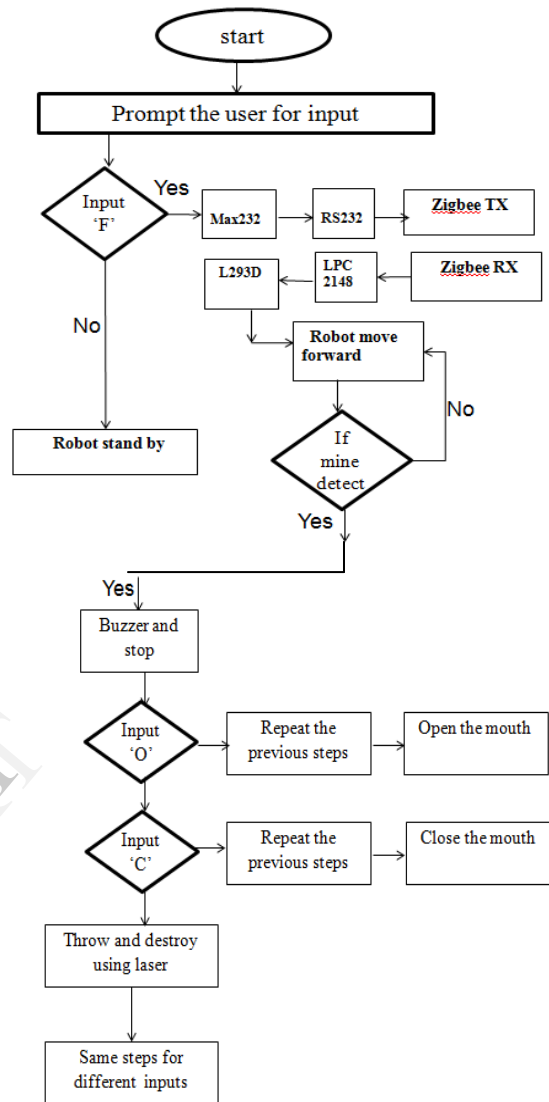


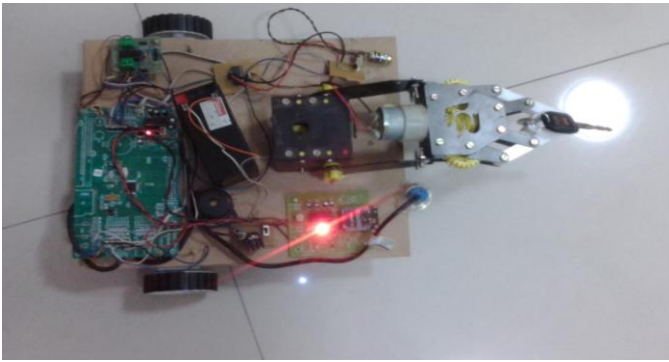
Fig- 4: Robot main flowchart of ground mine tracing and destroying with robot by using arm processor

III. RESULT

A. Robot open its arm to pickup ground mine



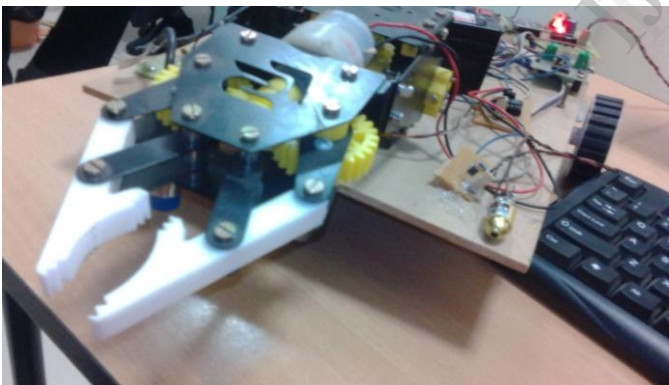
B. Robot pickup mine and move forward



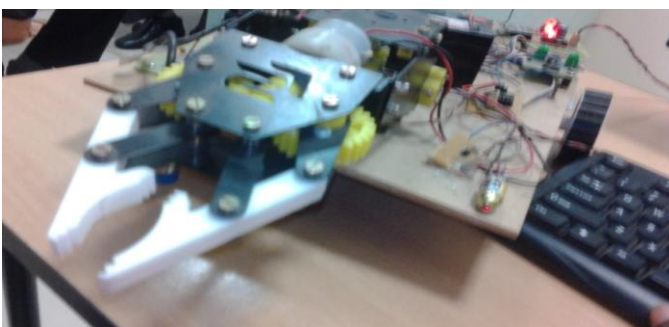
C. Robot drop the ground mine far distance



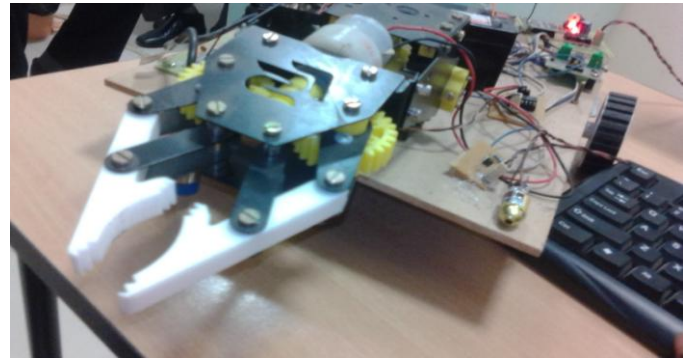
D. Robot is ready to destroy the ground mine



E. Robot destroyed the mine with powerful laser



F. Robot had completed the task and ready for next task.



#### IV. APPLICATION

These robots can be use in all telemetric services like Military Army, Space and these robots are alternative to Humans to protect from hazards like radioactive, toxics, explosive.

#### V. CONCLUSION

A working model of ground mine tracing and destroying with robot by using arm processor has been implemented successfully.

The biggest advantage is robot enables to move in any direction at any instant without changing the orientation of the body. If any obstacle is occurred it will detect by metal sensor and it will divert the direction. After detection of landmines picking with arm and threw some distance and collision that mines. These all are observed by PC.

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