Wireless Bomb Detection and disposing Robot

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Abstract - **This paper presents the wireless bomb disposal robot which will help to improve defense of our nation from terrorist, suicide bombers and other such activities. The bomb detectors and disposal system works manually. But this way of analyzing takes more time and make risk to life of technician. The Wireless Bomb Disposal Robot uses a control application, at the user end to control the robot remotely using Wireless technology. The bomb controls by the robot using this application at control site. Input from the user is transmitted over zigbee to the Receiver, where it is received, identified and given to the appropriate module (Robot) to act. The Robot consists of a Base, a robotic Arm and a wireless camera on it. We have used DC motors for the elbow and the gripper of the robotic arm. As we are not risking the life of a bomb expert or any other commando. Hence introducing the safest way for disposing the explosive to save life of common people.**

Keywords: Wireless technology, zigbee, robotic arm, bomb disposal.

I. INTRODUCTION

For many years, humans have been the motivation for the development of robots. It surely had many challenges and limitations with the robotic researches that had taken place thus far. Many efforts have been taken for the development of robots to be used as a replacement for humans to do tasks that are a bit critical and risky to human life who have been constantly exposed to methods like bomb disposing, machine cuttings ,etc. Our basic idea is to provide a robot that can be used for bomb diffusion and disposal where it can be controlled from a distance by a bomb disposal expert so that the bomb is carried by the robotic arm by the robot and disposed at a place which is out of the danger zone, away from human population. The robot that we are going to made is a both command and control robot. Commands are taken from the user in the form of control signal sand performs the required action. The idea behind this is to provide a line of defense to a bomb disposal squad against the life threatening risk, faced by them in the event of an explosion. It provides the squad to maintain a safe distance from the bomb to dispose, which he normally has to do with his bare hands [1]. Although the idea of our project is original, a number of projects with similar functionalities can be found. For

Example the British Police have a bomb disposal robot, the Israeli Army has it and it is also being used by bomb disposal squads and a number of states of USA. The main idea of this robot is to provide the bomb disposal squad with safety and security from the risks that they face every day. The bomb disposal squads of Pune have metal detectors and other equipment for bomb detection and disposal, but they have to risk their lives by approaching the bomb or the suspicious packet without any safety and precautions.

Our robot provides an extra layer of protection to the bomb disposal squad by allowing them to check and analyze a suspicious packet before actually approaching it for disposal. Mobile robots reduce or eliminate a bomb technician's time-on-target. A robot takes risk out of potentially deadly scenarios and lets the bomb technician focus on what to do to an explosive device rather than on the immediate danger to life and limb. Even if a robot cannot reach an item for disruption, it can still be used to relay information to aid in tool and procedure selection to moving downrange. In addition, events recorded by a robots camera can provide evidence for further analysis.
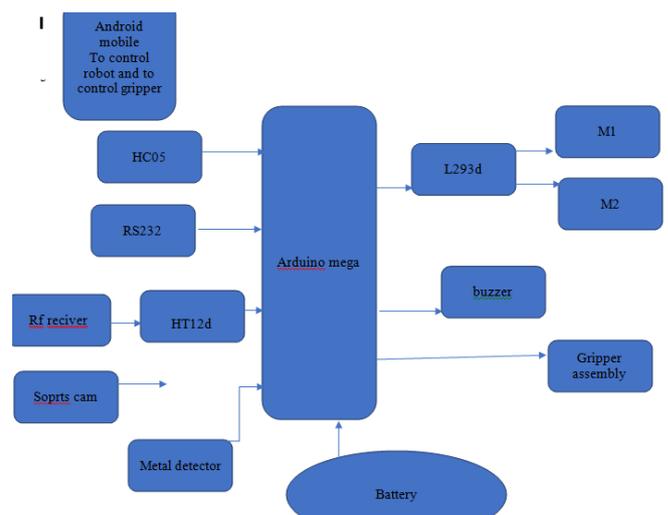
II. METHODOLOGY

Figure 1: System Architecture

ATMEL AT328

The Atmel AT328 microcontroller is used for the controlling the robot. We have termed it the brain of our robot.

The reason for choosing this microcontroller is its reliability and availability. Moreover it has three data ports, which are used for controlling of the different components of the robot.

5804B Stepper Controller

For the robotic arm we have used two unipolar stepper motors. The 5804B is a unipolar stepper motor controller, which generates all the necessary signals to control and run the stepper motor. It also has an enable pin for turning on/off the motor and a direction pin for changing the direction. Using the IC saves the number of port pins of the microcontroller, which can be used for other purposes. It also provides the appropriate current (maximum 1.2A), which is required to generate the appropriate torque by the motor.

BC 107

General purpose, Small signal NPN bipolar transistor. In this component, B stands for Sillicon and second letter „C" indicates the type of component, which in this case is a transistor.

L293D

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoides, DC and stepping motors) and switching power transistors.

TIP122

The HTIP122 is designed for use in general purpose amplifier and low speed switching applications.

Wireless Transmitter

The TXM wireless transmitter has been used to transmit serial data from the control application, over a wireless link using radio frequency, to the robot. The transmitter uses Amplitude Modulation at 433MHz. The reason for choosing for an off the shelf module for wireless transmission, is to save time and cost. By using this transmitter a lot of time and energy have been saved, and reliability has increased. These modules are available online.

Wireless Receiver

The wireless receiver has been used in conjunction with the wireless transmitter to receive serial data transmitted by the control application. The receiver is connected to the microcontroller, which receives the serial data over its serial port. It uses Amplitude Modulation at 433MHz.

IV. RESULTS AND DISCRIPTIONS

In this work we made a bomb detection and diffusion robot controlled by a Zigbee. We know that the whole the digital devices in the world are transformed in to wireless systems, as it is more versatile, flexible and easy to control and it is an open source network. Here the robot is controlled wirelessly by zigbee called through zigbee modules. The main feature of this robot is the wire cutter at robotic arm. We know that when handling the explosive items like bomb it should be handled carefully. Excessive pressure will cause explosion. It is a very low cost robot used to monitor the Warfield. The robot can be moved in all the directions using the PC wirelessly. The robot system is also used for bomb detection and diffusion using robotic arm. This robot has metal detector which can detect bombs. The robotic arm movements can be observed by a wireless camera and commands were given further accordingly. The hardware model functioned as desired.

V. CONCLUSION

The Wireless Bomb Disposal Robot has been designed in such a way that it can cater to the needs of the bomb disposal squad, the military, the police and also for the personnel who handle radioactive materials. It has countless applications and can be used in different environments and scenarios. For instance, at one place it can be used by the bomb disposal squad, while at another instance it can be used for handling mines. While another application can be to provide up to date information in a hostage situation.

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Citation of this Article:

Jahida Subedar, Prathamesh Patil, Pruthu Ninawe, Tanmaye Patil, Abhijeet Ughade, "Wireless Bomb Detection and disposing Robot" Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 5, Issue 5, pp 92-94, May 2021. Article DOI https://doi.org/10.47001/IRJIET/2021.505016

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