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Designing an Intelligent Robot for Blast Analysis & Evacuation

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ABSTRACT
Bomb disposal and defusing has become a highly important and dangerous part of human life in recent years. Hazardous items emitting radioactivity are detected using bomb detection devices or sensors. The use of wireless bomb sensors is suggested. Bomb sensors are stationed across the city to detect radioactive bombs at all times. To deal with this, the system utilizes a theory based on a remote bomb disposal robot.The Bomb Disposal Robot is controlled remotely via Wireless technology by a control program on the user's end. On the robot, there is a base, a robotic arm, a bomb detector, and an ESP32CAM. ESP32CAM can be used to monitor the surroundings when metal is detected, and the robotic arm can be utilized to dump of it. As a result, the suggested system ensures human life security.
KEYWORDS: ESP32CAM, Arduino Uno,L293D Motor driver, Wireless Communication Bluetooth module, Internet of things.

INTRODUCTION

For many years, humans have this desire to replace life risking human works with robot system. It does has many challenges and limitations with the robotic researches and advances that had taken place thus far. Many researches 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, mining, petroleum extraction 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 Bluetooth control robot. Instructions are taken from the user in the form of control signalsand 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. Terrorists have a better impact over the lack of insecure security, because detecting terrorist threats and making decisions in good time are sometimes more expensive. Current explosive detection techniques are costly and demand regular attention from the operators for safety measures. The basic notion of explosives is pretty straightforward. An exploding is at the simplest level something which burns or dissolves very swiftly and in a short period of time generates a lot of energy and gas.A synthetic dynamite is a compound or a combination of compounds that undergoes a highly fast, high - temperature breakdown, if it is subjected to heat, friction or stress. A chemical explosive this breakdown produces gasses with great pressure expanding at high temperatures. The tasks performed by an explosive depends mostly on how much heat the blast releases. The phrase detonation shows that the explosion moves faster than the sonic velocity of the explosive, while deflagration suggests a slower reaction. A high explosive is going to detonate; a low dynamite is gone.Excepting black powder, all commercial explosives are highly explosive.

PROPOSED SYSTEM

The main technology used here for serial communication with the robot is the Bluetooth technology and Internet of Things technology. Bluetooth technology can be used to share data between two devices considering the range between two devices. The Bluetooth module HC-05 will be connected with the robot and the commands to the robot will be given through the android application [2].This is specially designed bomb detection and disposal robot system with camera which sends a image to Mail as soon as metal detector detects something and Robotic Arm is used to save human life and protect the solders from landmines or bombs. The most important things about these robots also have the capability to perform missions remotely without any danger to human lives. The design of our project encourages developing a robotic vehicle based on Bluetooth technology for the remote operation connected with the wireless camera mounted on the robot for monitoring purpose.The transmitting module consist of the Application, where we send the commands to the receiving module for controlling the movement of robot either to right, left, forward, downward.

ADVANTAGES OF PROPOSED SYSTEM

- The robot system is also used for bomb detection and diffusion using robotic arm.
- It is a very low cost robot used to monitor the Warfield.
- The robot can be moved in all the directions using the Phone wirelessly

APPLICATIONS OF PROPOSED SYSTEM

- Location monitoring for navy and Marian
- Security purpose.
- Military warfare.

BLOCK DIAGRAM

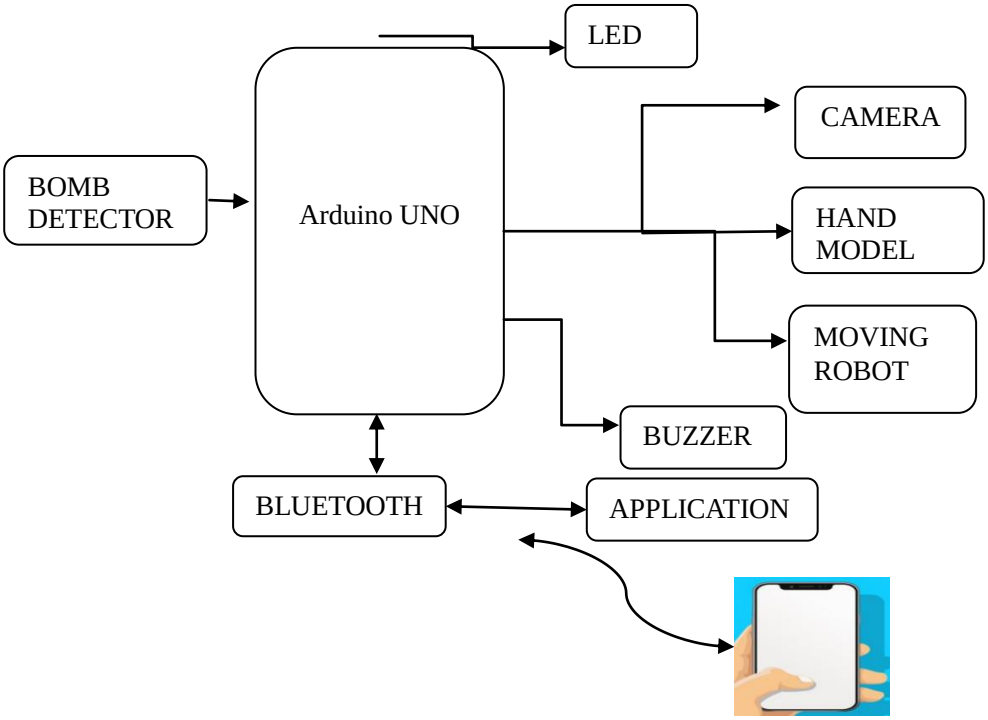

Figure 1: Proposed block diagram of Intelligent Robot

MODULE DESCRIPTION

Arduino UNO:

It contains everything needed to support the microcontroller along with14 digital input/output pins; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to

get started. It differs from all preceding boards because in that it does not use the FTDI USB-to-serial driver chip. It contains everything needed to support the micro controller. We either need to connect it to a computer using a USB cable or power it with an AC-to-DC (7-12v) adapter. Arduino had used the Atmel Atmega AVR series of chips, specifically the ATmega8, ATmega168, ATmega328, ATmega1280, and ATmega 2560[4].

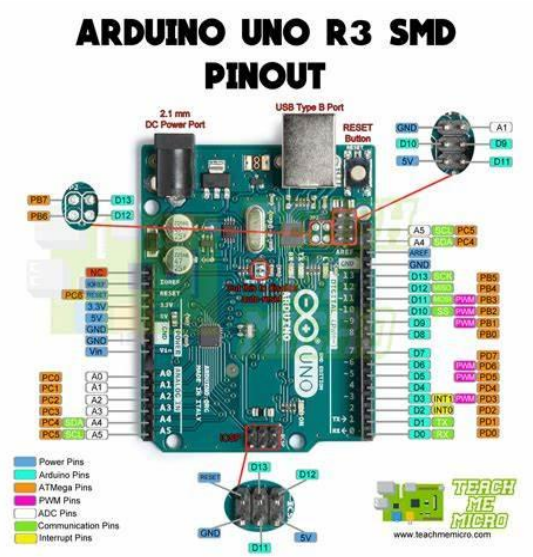

Figure 2: Arduino Uno pinout

DC MOTOR

A DC motor is an electrical machine that converts electrical energy into mechanical energy. In a DC motor, the input electrical energy is the direct current which is transformed into the mechanical rotation.A DC motor is defined as a class of electrical motors that convert direct current electrical energy into mechanical energy.We will understand the DC motor construction and how a DC motor converts the supplied DC electrical energy into mechanical energy in the next few sections. We will be discussing the construction of DC motors. When kept in a magnetic field, a current-carrying conductor gains torque and develops a tendency to move. In short, when electric fields and magnetic fields interact, a mechanical force arises.

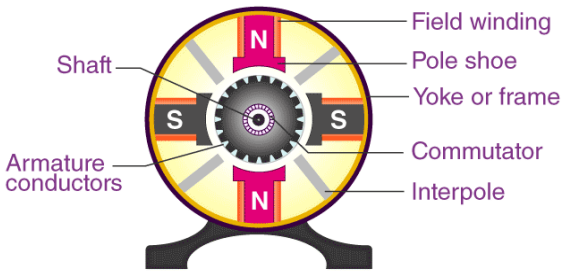

Figure 3: DC MOTOR

BLUETOOTH MODULE

HC-05 Bluetooth Module is a low-cost, easy-to-operate & small-sized module used for wireless communication in the Bluetooth spectrum.It supports Serial Port Protocol (SPP), which helps in sending/receiving data to/from a microcontroller (i.e. Arduino UNO).Its default baud rate is 9600 for data communication and 38400 for command mode communication.HC05 can operate in master/slave mode and thus multiple slave nodes can be controlled using a single master node (called

mesh networking).HC-05 Pinouts are used for powering up the module and sending/receiving data via Serial Port.

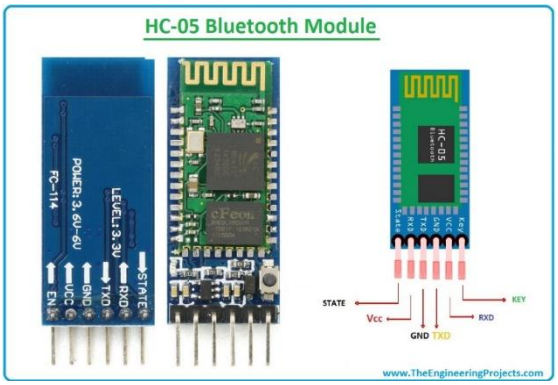

Figure 4: BLUETOOTH MODULE

Buzzer

A buzzer or beeper audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. Figure 5 shows the pin configuration of buzzer. t includes two pins namely positive and negative. The positive terminal of this is represented with the „+" symbol or a longer terminal. This terminal is powered through 6V whereas the negative terminal is represented with the „-" symbol or short terminal, and it is connected to the GND terminal.

Figure 5: BUZZER

ESP32CAM

ESP32-CAM is a low-cost ESP32-based development board with onboard camera, small in size. It is an ideal solution for IoT application, prototypes constructions and DIY projects. The board integrates WiFi, traditional Bluetooth and low power BLE , with 2 high performance 32-bit LX6 CPUs. It adopts 7-stage pipeline architecture, on-chip sensor, Hall sensor, temperature sensor and so on, and its main frequency adjustment ranges from 80MHz to 240MHz. Fully compliant with WiFi 802.11b/g/n/e/i and Bluetooth 4.2 standards, it can be used as a master mode to build an independent network controller, or as a slave to other host MCUs to add networking capabilities to existing devices ESP32-CAM can be widely used in various IoT applications. It is suitable for home smart devices, industrial wireless control, wireless monitoring, QR wireless identification, wireless positioning system signals and other IoT applications. It is an ideal solution for IoT applications.

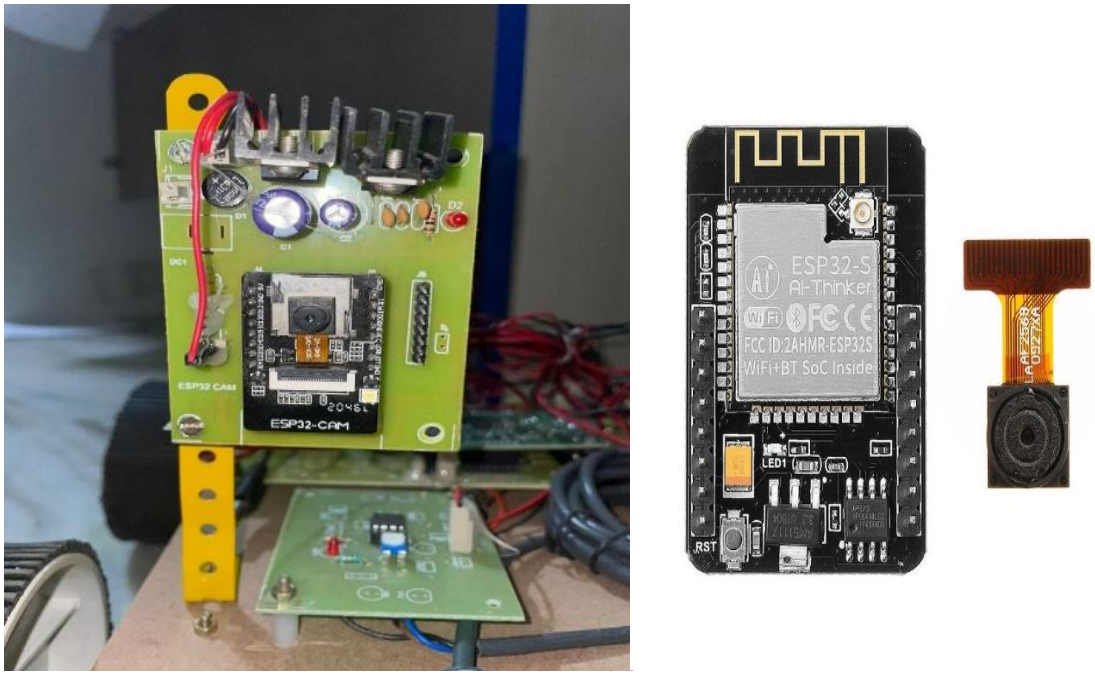

Figure 6: ESP32CAM

RESULTS AND DISCUSSION

Figure 7: Hardware implementation of proposed intelligent robot for blast analysis prototype

Figure 7: Bluetooth module page for controlling the robot and checking the metal detection.

CONCLUSION

There can be various sensor variants and bombs of all kinds. However, it is necessary to select accurate sensors and remove bombs earlier through easy analysis. We are primarily concerned about preventing chaos and protecting mankind from fatal damage through strong intellect. The path range may be vary depending upon the distance, which the bomb can be placed.ESP32CAM after receiving detection from metal detector sends image to Mail**.**

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