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BOMB DETECTING BOT

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Abstract- *The earlier method for detection, diffusion and disposal of bomb were very dangerous for human life. There have been numerous incidents in the news reporting deaths during dealing with such hazardous bombs. To overcome this problem our project proposed a wireless method for detecting as well as disposing bombs. This report discusses a Bomb Detecting Bot having a robotic arm. The bot is controlled by a Smartphone over Wi-Fi using NodeMCU. This report discusses the method in which we can deal with such hazardous bombs with minimum human contact. Also, How to build and control the bot and furthermore, how it would tackle the various obstacles and how it deals with it. As well as the benefits of using a robot and how it could save the precious lives*.

Key Words: Wireless, Bomb Detecting Bot, robotic arm, smartphone, Wi-Fi, NodeMCU.

1. INTRODUCTION

The growth in the robotic field has turned out to be true blessing to human life. From the past 49 years, robots have been used to defuse bombs. The main aim of our project is to develop a robot which is to be used as a replacement for humans to do tasks where human life is at higher risk. Especially for applications like bomb disposal is one of the most harmful where the risk of death lurks with every move. Our basic idea is to provide a bot that can be used for bomb detection, diffusion and disposal where it can be controlled from a specific distance by using a smartphone. As per instructions the bot will follow the path clearing the obstacles with the help of its arm, and the bomb is carried and disposed at out of danger zone, where human population is absent.

The main technology used here for serial communication with the bot is the Wi-Fi technology. Wi-Fi technology can be used to share data between two devices considering the range between two devices. The Wi-Fi module NodeMCU Esp8266 will be interfaced with the bot and the commands to the bot will be given through the android application Blynk. The two wheeled DC motors help to navigate the robot and proximity sensor to avoid obstacles. The camera which connected to the robot using a Wi-Fi link helps it to capture the environment or any object of concern. Experimental results have shown that even though the positions of obstacle are varied the robot shows the flexibility to avoid it which leads it to have better performance. The communication range of this bot is nearly 50m, which is acceptable for many surveillance applications. Based on visual feedback from the camera the robot is controlled from the smartphone application Blynk.

1.1 Literature survey

Paper [1] discusses use of robot for bomb detection and disposal for aid to risky military fields. The robot consists of robots arm, Arduino microcontroller, metal sensor, buzzer and other components. The robot is controlled through Personal Computer.

Paper [2], here they have used RF technology to control the robot wirelessly. Arm is used that detect bombs and tracking position of bomb by using GPS (Global Positioning System). The system consists of Arduino microcontroller and different sensors. Here wireless camera is used to make controlling easy and accurate.

Paper [3] illustrates how human hand movements could direct the robotic motor. Here for operation hand wave mode or gesture controlled mode are used.

Paper [4], Robots are referred as Unmanned ground vehicles or self-controlled robots as it finds application in Border patrol, surveillance and in active combat. The robot is controlled through human commands.

2. SYSTEM DESCRIPTION

2.1 BLOCK DIAGRAM

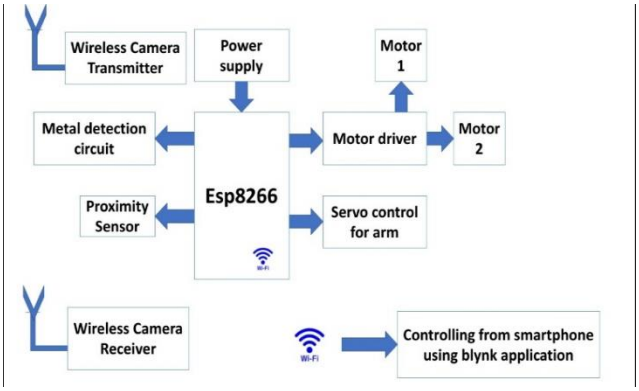

Fig .1. Block diagram

2.2 WORKING OF SYSTEM

This Project uses an embedded system which is designed for finding explosives by using a bot, controlled by user through an android application known as Blynk. We have used a wireless camera for better vision during the day as well as night. With the help of a wireless camera it becomes possible for the viewer to capture and record real time video from the robot. In this project NodeMCU is interfaced with different hardware like motor driver L298N, proximity sensor, metal sensor. When the sensor senses any metal body in its range it creates an analogue value by respect of the distance between the sensor and metal body. The movement of the bot and the robotic arm is controlled manually according to the input from the connected sensors. When the proximity sensor detects an object in its radius it is verified by the metal sensor; if it is not a metal then it is cleared from its path. If the detected object is metal, then the user examines whether it is a bomb or scrap with the help of a wireless camera.

2.3 PROCEDURE

While creating this project we had to deal with various aspects like the right positioning of the sensors, we had to consider other aspects like what terrain would it be suitable for, what could be the possible weather conditions it would have to work in, what other challenges it might have to face, etc. We here deal with a basic module consisting a motor driver, an arm with a gripper and the software part which consists of the Arduino IDE software with the controlling application Blynk. A brief discussion on this project would be as such:- Our bomb detecting bot is assembled on a Small Chassis of Length: 115 mm Width: 105 mm Height: 50 mm with One Castor Wheel Arrangement and Two Round Wheel Arrangements. On top of it we have our hardware, of motor driver connected to its respective components. The sensors used for this project are situated on the front side of this bot which will have clear access of its radius for its function. These connections are secured in a case on which the robotic arm is attached with its 4 controlling servo motors for the movement of the arm. The movement of the wheels is controlled by the user through the Blynk application installed in the android which is interfaced through a code between the NodeMCU and the application. Once it is interfaced we can easily control the movements of the bot.

3. PROJECT DESIGN

3.1 Hardware description :

a. NodeMCU Esp8266 wi-fi module

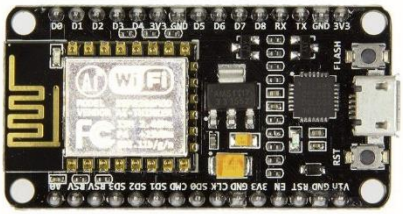

Fig.2. Nodemcu

The ESP8266 Wi-Fi Module which is a self-contained SOC is also integrated with TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The main motive to use this module is to make our operation wireless.

b. DC Motors

Direct Current motor which stands for DC motor is a commonly used actuator which produces continuous movement. A DC motor is a transducer that converts electrical energy into mechanical energy by the means of electromagnetic fields. 12V, 60 rpm DC motors will be used for controlling wheels of the robot. More rpm motors can be used to increase the speed of the robot.

Fig.3.DC motors

c. KY-036 Metal-touch sensor module

KY -036 Metal touch sensor is a simple and useful module for detecting the existence of metal inclusions concealed within objects. When you touch the mosfet in the module with a metal object, a low output voltage is generated. This small voltage is amplified by the LM386 and transferred to the analog output.

Fig.4. KY-036 Metal touch sensor

d. L298N Motor Driver

L298N is a Dual H-Bridge Motor Controller Module. An H-Bridge is a circuit which can be controlled by Pulse Width Modulation (PWM) which also drives current in either polarity. It achieves fast and accurate control of torque.

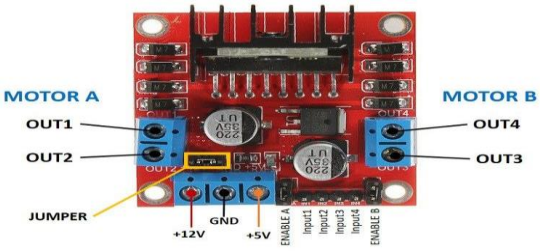

Fig.5. L298N Motor Driver

e. Proximity sensor

It is a sensor which can identify the presence of an object in its proximity. The function of proximity sensor is very simple. This sensor transmits electromagnetic radiation and the receiver receives and examines for changes in the returned signal and the obstacle is detected.

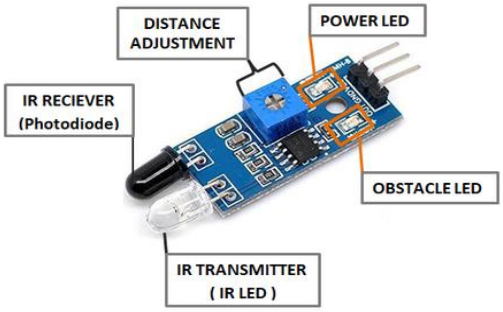

Fig.6. Proximity sensor

f. Robotic arm

A robotic arm is a mechanism which consists of two or more segments linked into a kinematic chain by means of joints. Each joint in the chain has a servo or another motor which provides either rotational or linear displacement of the segments. The number of linkages in the structure enables us to know how many freedom degrees (DOF) it has—typically, ranging from two to the human arm maximum of seven.

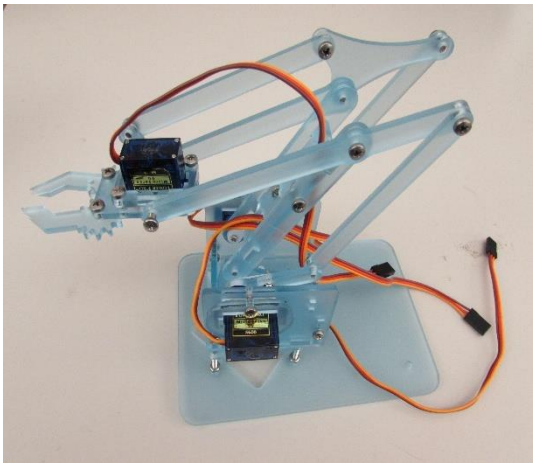

Fig.7. Robotic Arm

Wireless camera

Camera plays a crucial role in robotics. In this, we will use wireless camera. It will also provide video of night vision. It will be live streaming. Through the camera, we can see every action that will be performed by the robot. When robot searches for bomb, we can see live streaming with the help of wireless and internet camera. The wireless camera has its own transmitter and receivers.

Fig.8. Wireless Camera

g. Servo Motors

A servomotor is a called as a rotary actuator or can also be called as linear actuator which allows precise control of angular or linear position, velocity and acceleration. Servo motor is controlled by PWM (Pulse Width Modulation) which is provided by the control wires.

The movement of the robotic arm is controlled using servo motors. We have used 5 servo motors. The 2 servo motors

are used for the shoulder (base) movement which is used to control the front and backward arm movement, 1 motor aids the elbow movement, 1 motor is used for the gripper control for the picking up of the bomb and 1 is used at the base of arm for 360° rotation of arm.

Fig.9. Servo motor

h. Battery

A 12 V Lithium Acid battery is used to power the bot. It is also called SLI due to its function of Starting, Lighting and Ignition. It releases a high burst of current and gets quickly recharged.

Fig.10. Battery

3.2 Software description :

1. Arduino IDE

The Arduino Integrated Development Environment is a cross-platform application which is written in functions from C and C++ programming language. The code which is used for controlling our bot is developed using this application.

2. Blynk application

Blynk is a Platform with which IOS and Android users control Arduino, Raspberry Pi and that links it over the Internet. It's a digital dashboard enables us to build a graphic interface for our project by simply dragging and dropping widgets.

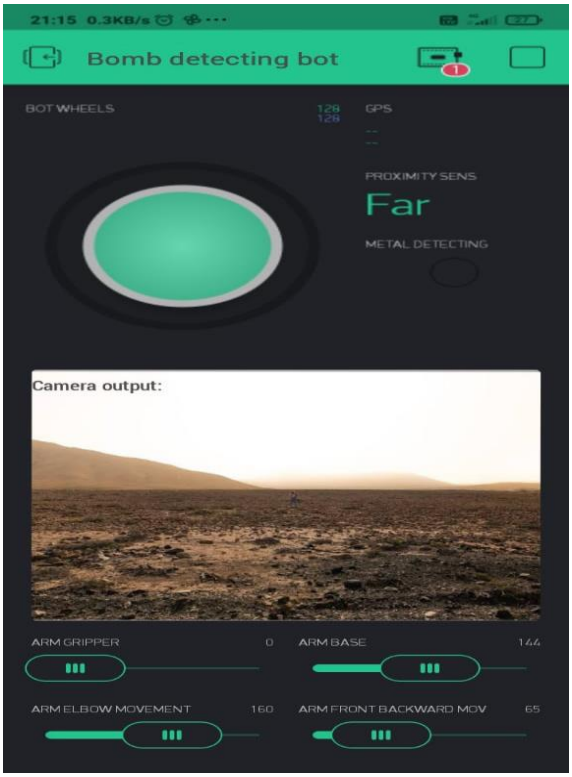

Fig.9. Blynk setup for controlling movement of BOT

2. FLOWCHART

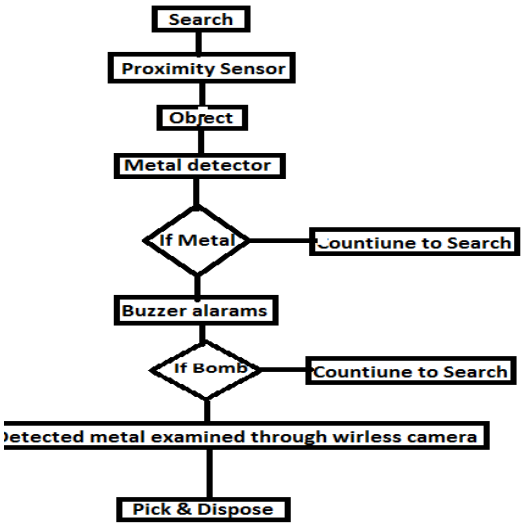

Fig.11. Flowchart

4. CONCLUSION

Thus, the proposed system affords exposure to design of simple bot for bomb detection. Manual control is applied to the robot from a certain distance. The buzzer alarms when it detects a metal. If the detected metal is a bomb, the robotic arm is manually controlled to dispose the bomb safely. The building cost for the robot is greatly

reduced because of the use of smartphone which makes this system very efficient and its manufacturing cost low. Therefore designed bot could assist bomb disposal squads in military and police applications.

5. REFERENCES

1. S.Keerthana, AR.Vellaiyan, M.Rajamohan,"Bomb detection and disposal robot: Aid for risky
2. Military Fields" , International Journal of Engineering and Advanced Technology (IJEAT)
3. ISSN: 2249 – 8958, Volume-8 Issue-6, August 2019.
4. Nitika Bansa, "BOMB DETECTION ROBOTICS USING GPS, GSM AND INTERNET" , International Journal of Latest Trends in Engineering and Technology, Vol.(15)Issue(3), pp.016-025.
5. Mithileysh Sathiyanarayanan, Syed Azharuddin, Santhosh Kumar, Gibran Khan, “Gesture Controlled robot for military purpose”, International journal of technological research in Engineering, , Vol.1, 2014,pp.1300-1303.
6. Mithileysh Sathiyanarayanan, Syed Azharuddin, Santhosh Kumar, Gibran Khan, “Self-controlled robot for military purpose”, International journal of technological research in Engineering, Vol.1, 2014, pp.1075-1077.
7. https://www.google.com/amp/s/www.instructables.com/Interface-L298N-Using-NodeMCU/%3famp_page=true
8. https://www.google.com/amp/s/pinouts.net/ky-036-metal-touch-sensor-module/%3famp
9. https://components101.com/misc/buzzer-pinout-working-datasheet

6. BIOGRAPHIES

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