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# *DTMF BASED MINE DETECTION ROVER*

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***Abstract*- Nation's security is one of the most important thing today and therefore there is a need to consider safety of the soldiers and army who fight for the nation's security. One of the major concern is the mine that is laid by enemy on the way . While diplomats work to restrict the manufacture, sale, and use of land mines worldwide, a massive cleanup effort is required to find and destroy the estimated 100 million land mines still buried in 65 countries. Our project focuses on the problems and effects of land mines in defence fields. A rover that can help avoid human casualties in mine fields is proposed. The rover is controlled by DTMF i.e. Dual-tone multi-frequency which enables the control over rover from anywhere there is network. A wireless camera is added to the robot, which captures and broadcasts the present location of the robot. Microcontroller commands the robot because of which the robot can be controlled efficiently and the position of the obstacle can be robustly determined. Once it detects the mine, it gives out an indication. It also has an GPS feature which logs the latitude, longitude and time of the detection and sends it to IOT. From the cloud the data can be viewed and necessary steps can be taken to diffuse or to avoid the circumstances.**

**Keywords**: **DTMF, GPS, IOT, Arduino.**

## I. INTRODUCTION

The landmine crisis is globally alarming since there are presently 500 million unexploded, buried mines in about 50 countries. Governments are looking into this situation seriously since landmines are claiming the lives of civilians every day [1]. Landmines are easy-to-make, cheap and effective weapons that can be deployed easily over large areas to prevent enemy movements. They are usually buried 10mm to 40mm beneath the soil and it requires about 9 kg minimum pressures to detonate them. The face diameter of most the anti-personal mines ranges from 5.6cm to 13.3 cm [3]. The countries use different methods to deal with buried landmines which possess potential danger to the lives of its own civilians. The most commonly used methods are as followed [1,2].

(A) Probing the ground : For many years, the most sophisticated technology used for locating landmines was probing the ground with a stick or bayonet. Soldiers are trained to poke the ground lightly with a bayonet and search for buried mines.

(B) Metal Detectors : The detectors try to discover a buried mine by sensing the metal components inside the mines.

(C) Ground Penetrating Radar : This equipment detects the inconsistencies in the soil and tries to identify the differences in the densities of the soil and a buried mine.

Different combinations of mine detecting unit and carrying vehicle are employed with the aim of detecting all the mines in the desired direction and precisely pin-pointing their locations, with efficiency. The reliability on a landmine searching robot is highly dependent upon the performance of the detector with respect to the landmines, whereas, the purpose of the carrying vehicle is to provide the require pattern of movement in such a way that the detector can do its job. A data processing unit is needed on board, to process the input data from the operator and to send out output data to the specific mechanism to perform the necessary function.

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The purpose of this project is to design a robot which is capable of detecting buried land mines and marking their locations, while enabling the operator to control the robot wirelessly from a distance. A land mine detection robot can be employed in peace support operations and in the clearance of contaminated areas. Also the robot shall be able to detect 50-90% of landmines (Anti-personnel mines) and mark the locations of the mines within a tolerance of 5cm. For the safety of the operator, the designed robot must be able to operate remotely, moreover, must be equipped with wireless data transmitting capabilities [2,3].

## II. MODULE DESCRIPITION

### a. ARDUINO UNO

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. Its more interactive since it has an USB port. Also it can be easily programmed using C/C++ language. In this project, it acts as the controller for all the activities carried out by the robot.

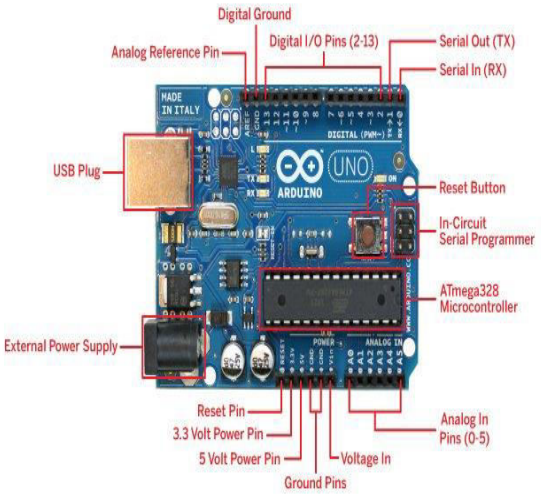


Fig 1: Arduino Uno

### b. METAL DETECTION CIRCUIT

When any metal comes near to the coil then inductance of the coil changes. This change in inductance depends upon the metal type. It decreases for non-magnetic metal and increases for ferromagnetic materials like iron. Depending on the core of the coil, inductance value changes drastically.

### c. DTMF DECODER – MT8870

This circuit detects the dial tone from a telephone line and decodes the keypad pressed on the remote telephone. Dual Tone Multi-Frequency, (DTMF) tone is a form of one way communication between the dialer and the telephone exchange. When a key is being pressed on the matrix keypad, it generate a unique tone consisting of two audible tone frequency. A complete communication consist of the tone generator and the tone decoder. The IC MT8870DE is used as the main component to decode the input dial tone to 4 digital output. These digital bits can be interface to a computer or microcontroller for further application.

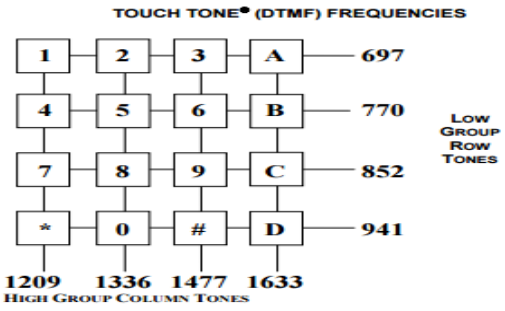


Fig 2: Arduino Uno

### d. DRIVER MODULE – L293D

The L293D is a 16-pin Motor Driver IC which can control a set of two DC motors simultaneously in any direction. The L293D is designed to provide bidirectional drive currents of up to 600 mA (per channel) at voltages from 4.5 V to 36 V .

## III. SYSTEM ARCHITECTURE

The proposed System design is shown in fig. 3. The rover consist of a onboard arduino, dtmf decoder, driver module, a basic smartphone and a metal detector circuit. The arduino is used to generate a square wave which is given to the metal detector circuit. The metal detector sets up an electromagnetic field in the coil. Whenever a metal

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comes near it, there is variation in the field which is sensed by the microcontroller which in turn gives a signal to the smartphone via Bluetooth. The signal sent is detected by an App created using MIT App inventor.

The app has buttons for connecting and disconnecting the Bluetooth. It has labels for displaying the latitude and longitude. Once a signal is detected, the app makes use of the location sensor of the mobile, and logs the GPS value in the respective fields to IOT.

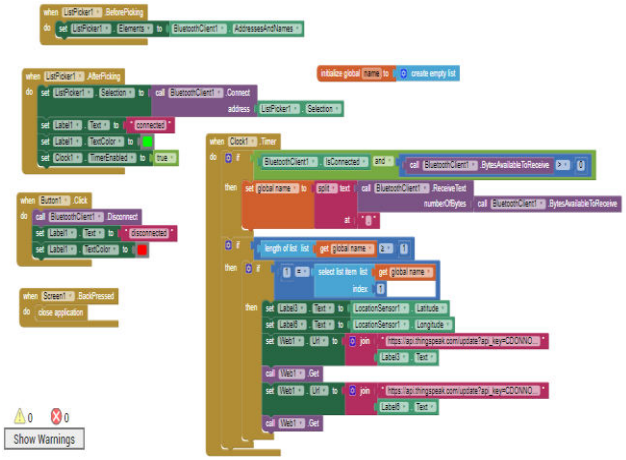


Fig 4:App Inventor for Bluetooth connection

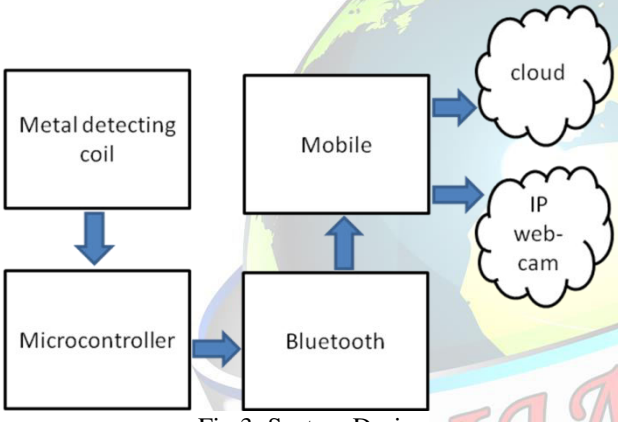


Fig 3: System Design

**a. Design**

App Inventor makes Android app development highly visual. The android APP has been developed using the MIT App inventor. The block diagram of the App is shown in Fig.4

The app has two buttons for connecting and disconnecting the Bluetooth module. The App also searches for the nearby Bluetooth devices along with MAC addresses. It is implemented through list picker. The user has to just select the required MAC address displayed in the list picker for establishing connection with that device. Once the connection is established, it's shown as connected in the App. For viewing the video, IP Webcam App is used. This App provides authentication. Once authentication is done, an IP address will be generated. Using the generated IP address recorded video can be viewed at any point of time.

Apart from these button, the app also provides two buttons for longitude and latitude using which the position values can be loaded to the IoT. The fig.5 and 6 shows the application layout with latitude and longitude buttons and the values displayed. Also the call is also connected through phone to DTMF decoder, which provides a 4 bit binary output for the corresponding key pressed in the sender side phone. The DTMF decoder output is fed to the motor driver which is used to control the movement of the rover through the two dc motors.

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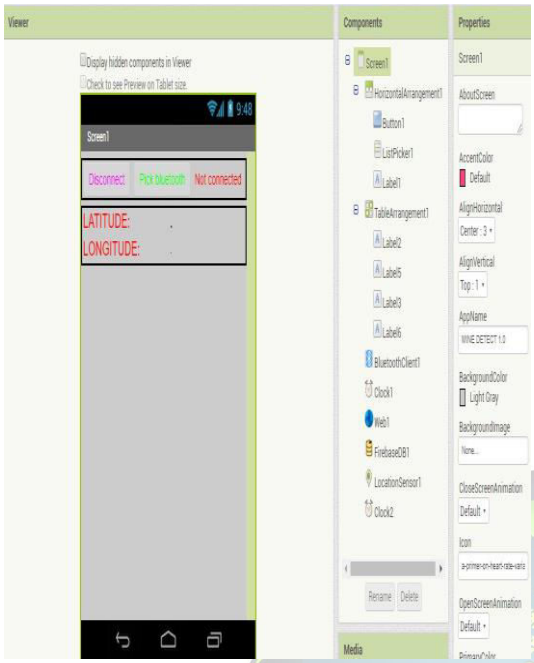

Fig 5: Application Layout

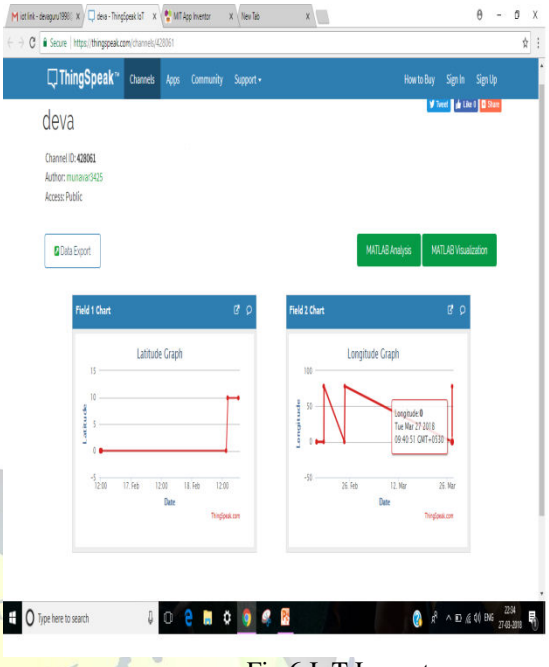

Fig 6:IoT Layout

## IV.CONCLUSION

Landmine contamination remains a major problem worldwide. Thousands of injuries and death result from landmines worldwide, despite the fact that landmines have been banned in warfare for 20 years. Landmines are not a problem that will disappear anytime soon, and current methods of clearing minefields are too expensive, or unacceptably risky. Mine clearance is exhausting, dangerous, repetitive work, poorly suited for humans, but perfect for a robotic solution.

The proposed technique focuses on land mine detection without the hazard of explosion. The proposed rover can be controlled and viewed wirelessly by any non expert persons using mobile alone. The rover finds and mark the landmine location and report it to base for detonation.

## FUTURE ENHANCEMENT

Future works include addition of a method for detonating the landmine without the need for expert authorities.

## REFERENCES:

[1] Kenzo Nonami, Seiji Masunaga and Daniel Waterman‖ Mine Detection Robot and Related Technologies for Humanitarian Demining", Japan, 2008.

[2] Nyein Chann, "Landmine detection and marking robot", NUS, 2007.

[3] M. Sonka, V. Hlavac and R. Boyle, Image Processing, Analysis and Machine Vision, 2nd ed., Pacific Grove, CA: Brooks/Cole Publishing, 1999.

[4] J. A. Stuller, S. J. Qiu, and K. Das, ―Signal processing for landmine detection using a water jet,‖ in Detection and Remediation Technologies for Mines and Mine like Targets IV, vol. 3710 of Proceedings of SPIE, pp. 1330–1342, Orlando, Fla, USA, 1999.

[5] Kishan Malaviya, Mihir Vyas, Ashish Vara-Autonomous Landmine Detecting and Mapping Robot, International Journal of Innovative Research in Computer and Communication EngineeringVol. 3, Issue 2, February 2015.

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ISSN2394-3785 (Online)
Available online atwww.ijartet.com

rnational Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
5, Special Issue 13, March 2018

[6] Seiji M.; Kenzo N., "Controlled Metal Detector Mounted on Mine Detection Robot", International Journal of Advanced Robotic Systems, Vol. 4, No. 2 (2007),pp. 237-245.

[7] Jaradat, M.A. "Autonomous navigation robot for landmine detection applications",IEEE Transactions on Mechatronics and its Applications (ISMA),pp.1-5, 10-12 April 2012

[8] Armada, M.A. et al. (2005), Configuration of a legged robot for humanitarian de-mining activities, Proceedings of the IARP International Workshop on Robotics and Mechanical Assistance in Humanitarian Demining (HUDEM2005), Tokyo, Japan, (2005-6), pp. 131-135

[9] Baudoin, Y. et al. (2000), Humanitarian Demining and Robotics State-of-the art, Specifications, and Ongoing Research Activities, Proceedings of the Third International Conference on Climbing and Walking Robots (CLAWAR2000), Mdrid, Spain, (2000-10), pp. 869-877, ISBN: 1860582680

[10] Clark, F. et al. (2007), Visual terrain mapping for Mars exploration, Computer Vision and Image Understanding, Vol. 105, No.1, (2007-1), pp. 73-85, ISSN: 10773142