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LANDMINE DETECTION AND DISCRIMINATION OF GROUND SURFACE USING MULTISENSOR ROBOT

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ABSTRACT

The purpose of our project is to determine/monitor the landmine detection using variable sensors like pH sensor, temperature sensor, and ultrasonic sensor.

Here, ultrasonic sensor acts as an obstacle avoider; it finds the obstacle from a certain range and avoids collision between them. Generally Metal detectors, used for landmine identification can find only metal mines, to overcome this we using pH sensor as well as the temperature sensors to detect the composite landmines. The landmine soil will have chemical contents compare to other soil, pH sensor are used to determine that chemicals.

With the help of temperature sensor, we are measuring the temperature of landmine. The temperature shows the effectiveness and condition of the mine. Everything we feed in robot to measure the landmine and robot will monitor or controlled by server through zigbee. Embedded C program was used for the robot action. The data were fetched and can be seen simultaneously in the pc monitor.

***Keywords*— RADAR, WSN, Ultrasonic sensor, pH sensor, temperature sensors, chemicals, robot.**

I.INTRODUCTION

The landmines are the explosive one hence it creates threatening in large areas. The people cannot use the well fertilized land for any purpose due to the threatening available in a particular area. There is a survey about 50 million landmines are unexploded in around 60 countries.

Approximately 15000-2000 people die every year due to landmine as per the figure 1.1.hence, it created an urgent need for the development of efficient landmine detector. Now a days the mines can be also created using plastics as well as chemical composites, the low metal content in it made the traditional landmine detection technique inefficient.

The different strategies and the methods were used to detect the landmines. The ground penetrating radar(GPR) is one of the well known traditional technology used for the detection of metallic landmines but, it gives short standoff which means it can able to predict only to a limited ground sub-surface and produces false alarms since,

it greatly influenced by the soil property and heterogeneity. Here introduced a multistate management system which involves both short as well the large standoff to produce better experimental results. GPR for landmine detection commonly employs relatively high frequencies in order to detect and/or image small objects near the surface and also to reduce the size of the antennas for easier handling and higher mobility. [1-3]

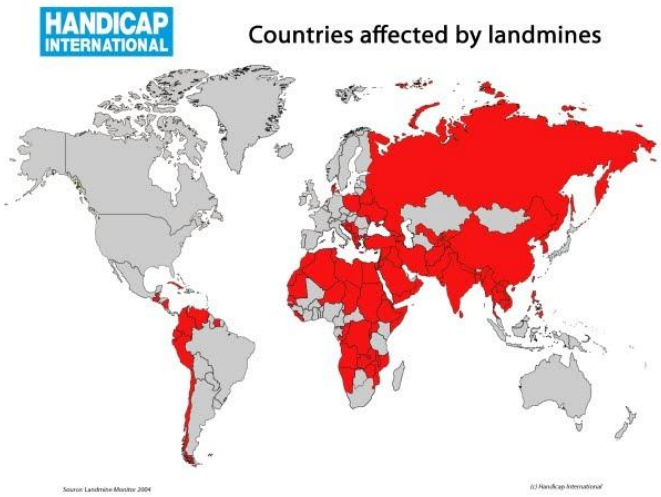

Fig.1.1 countries affected by landmines

The multi modality management system doesn't suitable for all types of landmines (fig 1.2) and the calculations become difficult.

Here we are using the sensors such as pH, temperature and the ultrasonic were associated with the random moving robot to find the landmines. The discrimination of soil content on the ground surface can be identified by using the chemical pH sensor. The sensor was attached in the moving legs of the robot it determines the actual change in the chemical content of the soil in varying places and monitored. The information was passed using the wireless sensor networks such as zigbee to the pc. The output actually indicates the alkalinity and the acidity of the soil content with varying pH values. The meter and probe must be handled properly to avoid wrong results. Thereby the difference in the soil chemical content in a place was identified useful in case of detecting other chemical landmines other than metal landmines.[4-6]

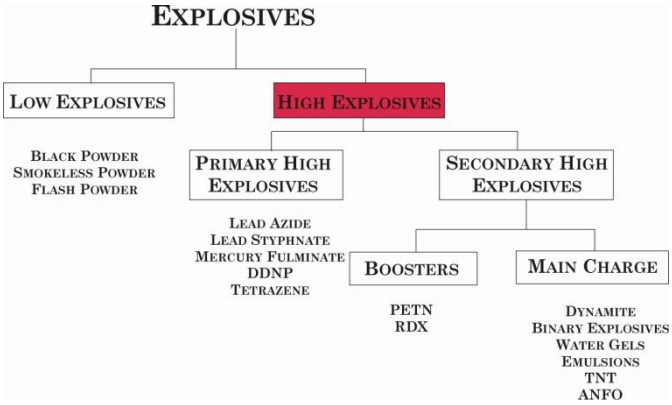

Fig 1.2 types of explosives

In addition the temperature sensor was used to know the thermal condition of the mines. The temperature was identified irrespective of the kind of mine and it is also attached at the legs of the robot. Temperature identification is important to know about the condition of the mine and to take necessary requirements as well as precautions.[7-8]

The ultrasonic which consist of tiny speaker like fronts send the sound waves and get reflected it back thereby finds the distance and the obstacle. When it moves around a random direction it should be known the obstacle beforehand. The ultrasonic perfectly does the job and makes the multisensory robot to give effective output.

If the robot which moves in the random direction happens to detect any drastic change in the chemical content as well as in the temperature change in it, it gives a buzzer sound to indicate the presence of landmines which makes the work simpler, easier and also considered as effective. The wireless sensor data monitor the surrounding physical conditions and record the data was used to store the information gathered in to the Pc.

II.SOIL DESCRIPTION

There are different chemical composition of soil and variety of sand in different parts of the countries.fig 1.3 For the effective results it is necessary to know about the soil content. Generally soil contains a mixture of degraded materials along with the fragmented had the eroded structures, amount of air, water and the bacteria. Soils have two kind of pores namely macro pores and micro pores. The macro pores are less than 60micrometer and micro pores less than 10 micro meter range.[9-10]

If the pores are filled with certain amount of water then it is considered a s clay and if it is dry known as sandy or sand. The texture and the soil and the soil chemical composition varies from one area to another depend on their nature. The detailed study about the soil pH values should be studied to analyse the various criteria associated along with it.[11]

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Even the soil fertility and their purpose of the soil can be found using the pH sensor. The output should not depend on the wellness of the soil it creates the challenging technology. The sensor we use is used to discriminate the ground surface soil and is continuously monitored through the wireless sensor networks.

The surface characteristics of the soil are best described by the amount of clutter and the other parameters mentioned above. The difference in the soil is monitored and when a drastic difference was found the buzzer should be alarmed to inform the change. The ability to find or to distinguish the difference in the chemical content of the soil must be high. Hence better results can be obtained and the nature of the soil surface can be studied for the further future work.

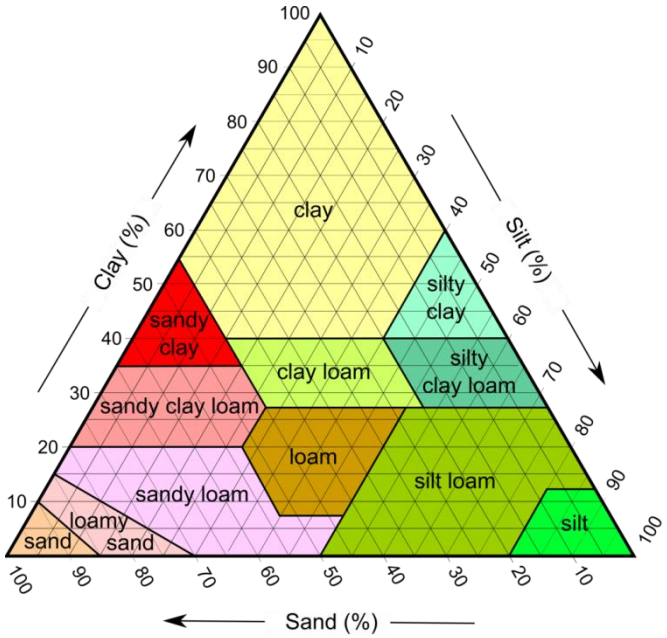

Fig 1.3 different types of sands

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III.THERMAL DETECTION

The temperature sensor here is used to find the temperature difference between the land surface sand to know the condition of the landmine. The landmine buried land will be generally having more heat radiation than the normal temperature.

The abnormal temperature change in the ground surface was continuously monitored by the WSN and noted. Any kind of mine can be found using the temperature sensor. It can be suitable for any kind of soil subsurface.

A. Ultrasonic sensor

The obstacles were large in some surfaces. The robot should be aware of it when going through it. Hence ultrasonic sensor has the ability to make it know about any kind of clutter along the path of it. It should know beforehand and change its direction.

It emits the sound wave and gets reflected it back. By the time it gets reflected it calculates the distance of the obstacle and avoids it.

: Distance = (Time x Speed of Sound) / 2.

B. Buzzer

The automatic buzzer is used to get the alert whenever the change was detected in the surface of the ground was detected.

C. Proximity sensor

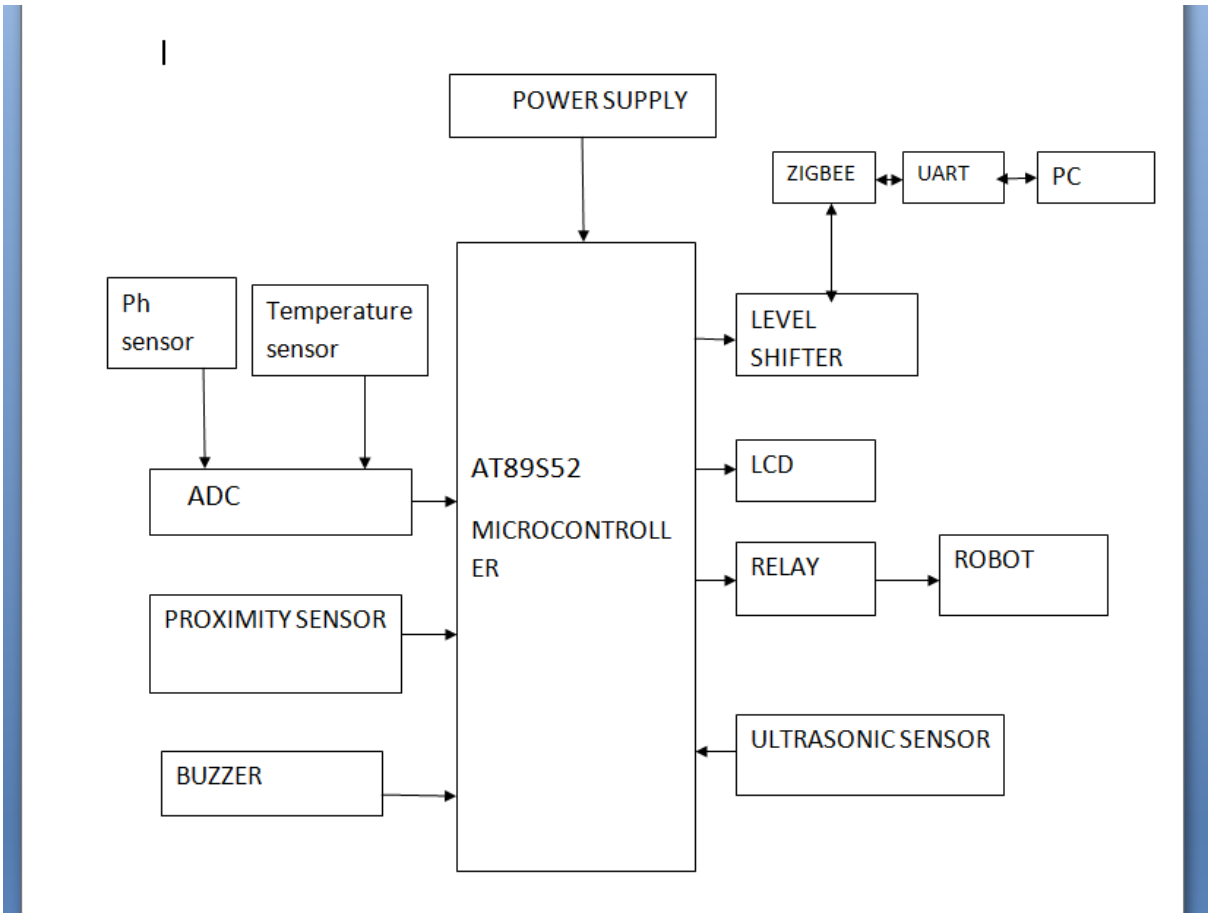
The proximity sensor is used to detect the landmines beforehand. It often emits the electromagnetic radiation and checks for the return field. The coil and the oscillator in it creates the radiation. It knows without being in contact with it. Hence it avoids unnecessary damage to the robot.

IV.BLOCK DIAGRAM

The proximity sensor data was fed into microprocessor and the ultrasonic sensor is used to find the obstacles in the range of 3cm to 3m. The pH sensor and the temperature sensor values are obtained from the robot and they are converted from the analog to digital value using the ADC converter. The digital form obtained is manipulated and stored.fig 1.4

- WSN ⟷ UART ⟷ PC

The level shifter converts the data accordingly to transmit through the WSN. The UART which is bidirectional takes the input and produces the output in the monitor of personal computer.



V. REVIEW AND CONCLUSION

The four wheeled robot is programmed. It is programmed to move in a random direction in a particular area. It can be reprogrammed according to the requirements. The sensors were fitted in the four wheels of the robot.

It has been considered as the feasible technology and the assessment tool for the fine detection and the monitoring of the landmines. The paper has featured the additional detailed information of the components and the methods to be implemented.

Our analysis has shown that the sensors along with the data collection have a great leap in the detection of landmines. There is no need for the extensive calculations incase of this since every data is directly fed as a value in the monitor and the detection was easier as there is no need for manual automation. It automatically grasps the surface particular area and gives the data about it. It is time efficient and output was probably considered as the efficient one.

B .Acknowledgement

The model is considered as the first time dependence of the thermal properties of the soil allows for the effective solution.

The valuable suggestions has improved the quality and communication of this work hence a extend gratitude for all the reviewers.

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