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HIGH FREQUENCY LANDMINE DETECTION ROBOT

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Abstract - *This paper is designing a robot which is useful for military. This robot uses the motorized vehicle. There are various equipments connected to the motorized vehicle like GPS module, GSM Module, inductive proximity sensor, Arduino camera OV7670, accelerometer, RF Pair. The robot is controlled by hand gestures. The mine is detected through the Inductive Proximity sensor, then the image of the location is captured from the camera& the GPS and GSM module send the exact location of the mine detected using longitudes & latitudes. Camera module stores those images into mobile by using Arduino app. This helps to minimizing risk to a soldier's health.*

Key words - Arduino microcontroller, Inductive Proximity Sensor, GPS (Global Positioning System), GSM (Global System for Mobile communication), Camera OV7670, buzzer, DC motor.

1. INTRODUCTION

Nation's security is most significant thing today and so there's a necessity to think about safety of soldiers and military that fight for the nation's security one in all the most important concerns is that the mine that's laid by enemy on the way. So it becomes very important to detect this mine and diffuse them to avoid wasting the lives of soldiers and armies. This is often now made possible with our Landmine

Detection Robotic Vehicle with GPS positioning. System can scan the oblong area efficiently and scan it for landmines. For this, system uses detector for detecting these mines. Once the system detect the mines, it stops the robotic vehicle at the placement where the mine being hidden. After which system makes use of GPS to trace the position of mine so send SMS message indicating the position of mine that's hidden within the land. Here the Inductive Proximity Sensor is used to detect the mines and stop whenever it's detected. Here we've used Arduino Microcontroller that controls and drives the motorcar. So robotic vehicle scans the complete area. Thus, we making use of robotic vehicle and metal detection system, this project help to avoid wasting the lifetime of our soldiers and armies within the areas where landmine is hidden by enemies.

2. LITERATURE REVIEW

There is some literature which referred before starting the work to take a good idea and to check the possibilities of getting approximate output.

The first literature used Bluetooth to communicate over network. It has HC05 module of Bluetooth. It offers two-way communication method. It can act as either slave or master. But it is only needed for short distance communication and it doesn't allow to any kind of media. System takes more time to store and send videos.

In second literature Pi-GPS was used. It is for device tracking use in military. But it has some problems while detect the mine, it causes driving distraction. It also affected on signal or battery failure.

In third literature, used GPR to detect mine, it has high radio frequency waves which hits different objects. But drawback is that moisture content in the soil inhibits the effectiveness of GPR.

3. PROPOSED SYSTEM

A landmine detection robot is required to be designed to use in peace support, operations and within the clearance of contaminated areas. For the protection of the operator, the robot is controlled using hand gesture. The RF transmitter sends information to the robot and the RF receiver receives the information and accordingly the robot is moved. The mines are often located with the assistance of latitude and longitude from the GPS sensor. The robot also uses a GSM module that the is interfaced with the GPS sensor. The location of the mine detected is sent to the operator onto his mobile device via an SMS. The camera module helps and captures the images of the surroundings of the landmine detected and sends onto the mobile device.

4. HARDWARE REQUIREMENT

4.1 DC Motor

DC motors are used to physically drive the appliance as per the necessity provided in software. DC motor works on 9v.The robot is capable of driving 2 dc motors at a time. DC motor driver called L293D, it easy to use and follows H-bridge configuration for easily changing the direction of DC motor. It also allows easy motor speed control. It's capable of controlling stepper motor.

4.2 GSM Module

We used SIM800A cellular communication module that can make calls, send emails, and SMS texts, and even connect to internet. This module is operated like mobile phone, but it needs external peripherals to function properly. It transmits the information with low power consumption.

4.3 GPS Module

NEO-6M GPS is compatible with other microcontroller boards. To urge the raw GPS data just need to start serial communication with GPS module using software serial. It's accustomed determine position, time and speed. It measures the gap of robotic vehicle that what quantity it travels while detecting mine. It is highest level of sensitivity. This includes the pins required for communication with microcontroller.

4.4 Arduino Microcontrollers

Arduino Microcontroller

NEO-6M GPS is compatible with other microcontroller boards. To urge the raw GPS data just have to start serial communication with GPS module using software serial. It's accustomed determine position, time and speed. It measures the gap of robotic vehicle that what quantity it travels while detecting mine. It is highest level of sensitivity. This includes the pins required for communication with microcontroller.

4.6 Inductive Proximity Sensor

A inductive proximity sensor can detect metal targets approaching the sensor, without physical contact with the target. Inductive Proximity Sensors are roughly classified into the subsequent three types per the operating principle: the high-frequency oscillation type using electromagnetic induction, the magnetic type employing a magnet, and also the capacitance type using the change in capacitance.

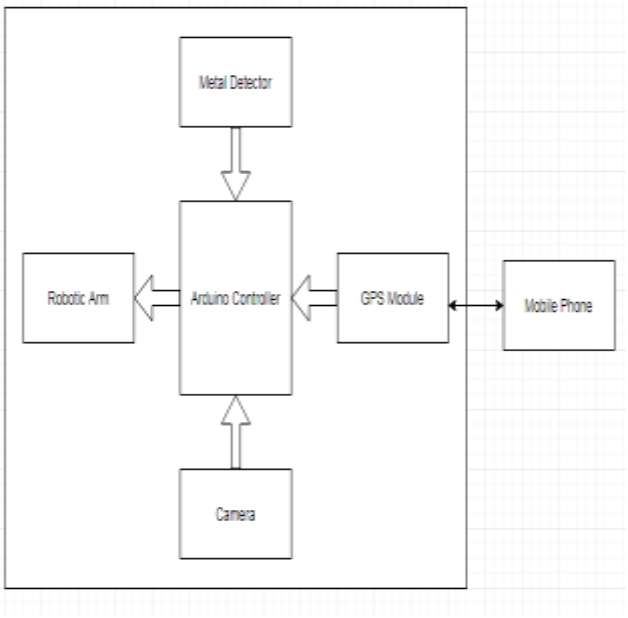
4.7 Camera

We have camera module for capturing images after detecting mine. We are using OV7670 camera for communication purpose in military. This can be an Arduino camera module use for image processing application. It is very convenient to attach with Arduino controller ready to read images and data through UART interface.

4.8 Accelerometer ADXL335

ADXL335Z could be a simple breakout board that permits quick evaluation of the performance of the ADXL335 accelerometer. The ADXL335 could be a 3-axis analog-output accelerometer with ±3 g measurement range. The tiny size (1" x 1") of the breakout board makes it easy to mount the accelerometer to an existing system without the requirement for added hardware and with minimal effect on performance of the system and of the accelerometer.

5. SYSTEM ARCHITECTURE



System Architecture

Here system goes to manage with the robot from remote location. Robot is embedded with sensing element capable of sensing the landmine and buzzer from producing a warning alarm to the nearby personnel therein area. Hand gesture is employed to manage mini robot including camera module to determine surrounding areas. Arduino UNO is utilized during this robot. Our system has two modes within which robot gets controlled manual mode and auto mode.

6. FUTURE SCOPE

1. In future, this proposed system can be used to find the actual condition of place where the robot is sent to detect the landmine.
2. It is automated mine detector that used to detect suspected area of land.
3. It wirelessly communicates with the server to transmit detected information such as location of object and capture images of land where does it exist.

7. CONCLUSION

This paper described the general design of wheeled robot for landmine detection and implementation. The wheeled robot is a smaller amount expensive and also helpful in military for surveying and monitoring purpose. This robot is developed for army operations and thus save the lifetime of soldiers during surprise attack or any dangerous mission. The movement of robot is controlled by smart phone and may move in any direction. It may be want to know the way many of us are hidden in a very room and supported that action may be taken by the defense force.

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