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Multi-Purpose Military Spying Robot

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Abstract: *Robotics has been a staple of advanced manufacturing for over half a century. As robots and their peripheral equipment become more sophisticated, reliable and miniaturized, these systems are increasingly being utilized for military and law enforcement purposes Mobile robotics play an increasingly important role in military matters, from patrol to dealing with potential explosives. "With suitable sensors and cameras to perform different missions, mobile robots are operated remotely for reconnaissance patrol and relay back video images to an operator. Now-a-days android smart phones are the most popular gadget. There are multiple applications on the internet that exploit inbuilt hardware in these mobile phones, such as Bluetooth, Wi-Fi and ZigBee technology to control other devices. With the development of modern technology and Android Smartphone, Bluetooth technology aims to exchange data wirelessly at a short distance using radio wave transmission comprising features to create ease, perception and controllability. In this paper we have designed a robot that can be controlled using an application running on an android phone. It sends control command via Bluetooth which is interfaced to the controller. The controller can be interfaced to the Bluetooth module though UART protocol. According to commands received from android the robot motion can be controlled*

Keywords: Bluetooth module, Control, Metal Detector, Gas Detector, Object Detector.

I. INTRODUCTION

Overview

Visually Impaired Persons faces many problem in general life in navigation and locating the objects.
For Better understanding we have to built some type of Realtime object detection technology where we can detect the object. Also the disease prediction functionality also gives the more functionality to this project.

Motivation

In this system mine disposal technicians and mission controllers with a number of challenges including high risks in it. A typical mine disposal mission will initially involve investigating the site using a remote controlled robot and disposing the mine. The system also includes night vision camera which will not only allow viewing whatever will be recorded in day time but also during night. The whole system is controlled via android application.

Problem Statement

To develop their technical limitations, redundancy and related issues that, when combined with a technical-moral skills degradation problem also detailed within, system to help them overcome the obstacles on war field.

Objective

While the entire aim of this project is identify the objects and identifying the diseases using symptoms.Following are the objectives:

- Identifying distance of object from detecter sencer.
- Identifying the Gas using Gas detecter sencer.
- Identifying metal using metal detecter sencer.
- Project Scope and Limitations

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The bot should capture the current situations and transmit it to server and its range is 20cm to 200m.Wi-fi module is used for transmitting information and range is generally from 20cm to 200m.It will detect metal using metal detector from range of 8-16 inches.After detection of mines it will diffuse the mines in the range of 8-16 inches by using arm.

II. LITERATURE SURVEY

2.1 Study of Research Paper

Paper No.1
Title. Arduino Controlled War Field Spy Robot using Night Vision Wireless Android Application.
Author: Priyanka Yadav, LeenaChaudhari, Swati GawhaleBharatiVidyapeeth College of Engineering, Lavale, India
Year Of Publication: 2017
Keywords- Object Detection, Arduino, Gas Detection,
Method of Algorithms Used: Using night vision camera and monitoring using RFID. Currently Wireless controlled Omni-directional monitoring robot with video support that can monitor using webcam. As per the present scenario, human dependencies on technology and future trends robots are going to be used as a perfect replacement for human being in all aspects of life.

Paper No.2
Title :- Arduino Controlled War Field Spy Robot using Night Vision Wireless Camera and Android
Application Author : Jignesh Patoliya1, Haard Mehta2, Hitesh Patel,V.T. Patel Charotar University of Science and Technology, Changa,Anand, Gujarat,India
Year Of Publication: 2015
Keyword: Architecture of Bluetooth module HC-05 along with L293D motor driver IC.
Method of Algorithms Used: The model of robot can be described to build a robot using night vision wireless camera run by android application and the people can learn about developing android application in order to control the robot through wireless application using the platform of MIT app inventor.

Paper No.3
Title:- Military Spying and Bomb Disposal Robot Using IOT
Author:- ChaitraliJadhav, ShamliGibile, Snehal Gaikwad, Neelum Dave DIT, Pimpri
Year Of Publication: 2018
Keyword: Android phone will connect to the server using TCP/IP link.
Method of Algorithms Used: Due to the less and rare technology available for bomb disposal operation the demand for wireless technology used for military spying and bomb disposal purpose is very beneficial.

III. SOFTWARE REQUIREMENTS SPECIFICATIONS

Introduction

Project Scope

In order to detect objects, this research combines real-time object identification with appropriate deep learning techniques. In our study, we describe the creation of a real-time system for item recognition, classification, and position estimation in the open environment.

User Classes and characteristics

After start the robot then user can access the Bluetooth application. When bluetooth application is open then user handlethe robot.

Dependencies

Dependencies:
Used Python Language Arduino

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The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, amessage area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.
Simulation software: Proteus
The Proteus Design Suite is a Proprietary software tool suite used primarily for electronic. Design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronics prints for manufacturing printed circuit boards. The Proteus Design Suite is a Windows application for schematic capture, simulation, and PCB layout design.
Features:
Real-time data across an organization or enterprise from underlying sources.
Extremely secure with full user and database security layers.
One source for editing, analysis and verification of data from multiple sources.
Extends functionality of underlying application.
PCB designing software: Express PCB

Functional Requirements
System Feature 1 (Functional Requirement)
Proposed system consists of 4 modules:

- Feature point extraction: Feature points of each Dataset parameters gets detected.
- Feature correspondence matching: Matching of selected feature points across various parameters.
- Point estimation: Position estimation and vision system orientation during navigation.
- Position refinement: Location estimate based, accurate location derivation

System Feature 2 (Functional Requirement)
In system we have used Arduino Mega 2560 R3 Board sensor with module, Gas Sensor, Ultrasonic sensor, DC motor, Bluetooth Module, GSM module, Metal sensor.

External Interface Requirements
User Interfaces
User can start our system and then run App
Hardware Interfaces and Software Interfaces
Ultrasonic SensorBuzzer
Smoke SensorGSM
Aurduino megaBluetooth
Metal Detector SesnorLCD 16X2
DC Motor Language: Python

Non Functional Requirements
Performance Requirements
The performance of the functions and every module must be well. The overall performance of the software will enable the users to work decently. Performance of encryption of data should be fast. Performance of the providing virtual environment should be fast Safety Requirement.
Safety Requirement
The application is designed in modules where errors can be detected and fixed easily. This makes it easier to install and update new functionality if required.

Software Quality Attributes

- Our software has many quality attribute that are given below:

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- Adaptability: This software is adaptable by all users.
- Availability: This software is freely available to all users. The availability of the software is easy for everyone.
- Maintainability: After the deployment of the project if any error occurs then it can be easily maintained by the software developer.
- Reliability: The performance of the software is better which will increase the reliability of the Software.

System Requirements

Software Requirements

IDE: Arduino 1.8.19 Coding Language: PythonOperating System: OS

Hardware Requirements

Speed: 1.1 GHz Hard Disk: 256 GBRAM: 8 GB

Processor: intel

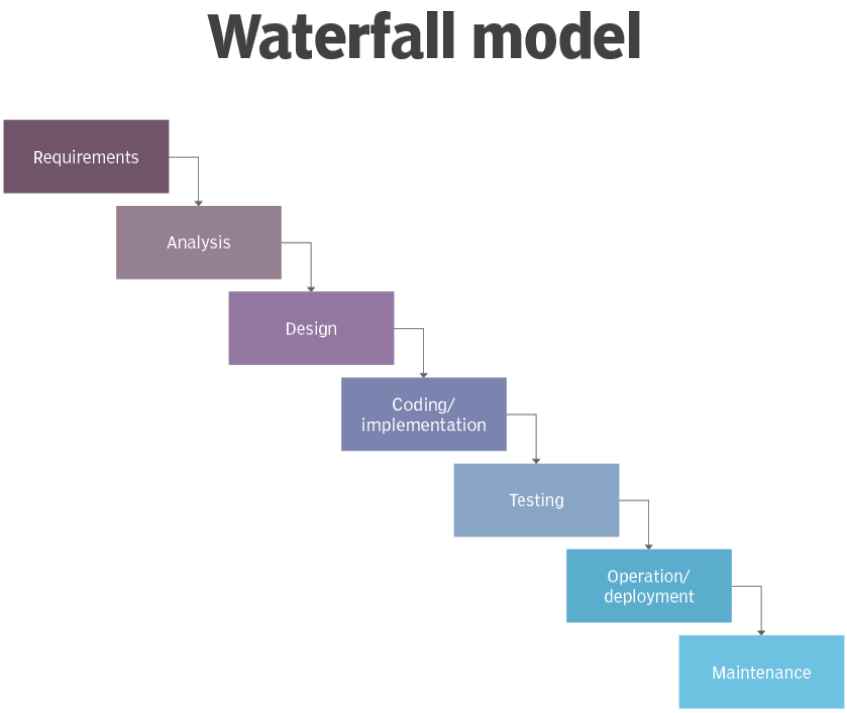

Figure: Waterfall Model

III. SYSTEM IMPLEMENTATION PLAN

The System Implementation plan table, shows the overall schedule of tasks compilation and time duration required for each task.

Sr. No.	Name/Title	Start Date	End Date
1	Preliminary Survey	2-9-22	16-9-22
2	Introduction and Problem Statement	17-9-22	22-9-22
3	Literature Survey	24-9-22	3-10-22
4	Project Statement	4-10-22	6-10-22
5	Software Requirement And Specification	7-10-22	10-10-22
6	System Design	11-10-22	6-11-22
7	Partial Report Submission	20-11-22	28-11-22
8	Architecture Design	1-1-23	15-1-23

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9	Implementation	20-1-23	15-2-23
10	Deployment	1-3-23	15-3-23
11	Testing	20-3-23	1-4-23
12	Paper Publish	5-5-23	25-5-23
13	Report Submission		

IV. SYSTEM DESIGN

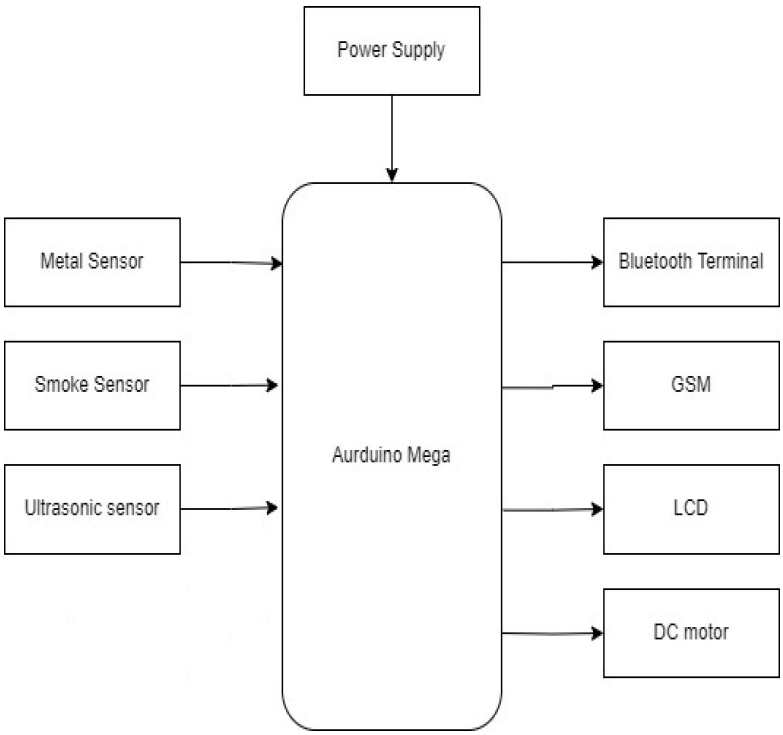

Figure: System Architecture

Data Flow Diagrams

In Data Flow Diagram, We Show that flow of data in our system in DFD0 we show that base DFD in which rectangle present input as well as output and circle show our system, In DFD 1 we show actual input and actual output of system input of our system is text or image and output is rumor detected likewise in DFD 2 we present operation of user as well as admin.

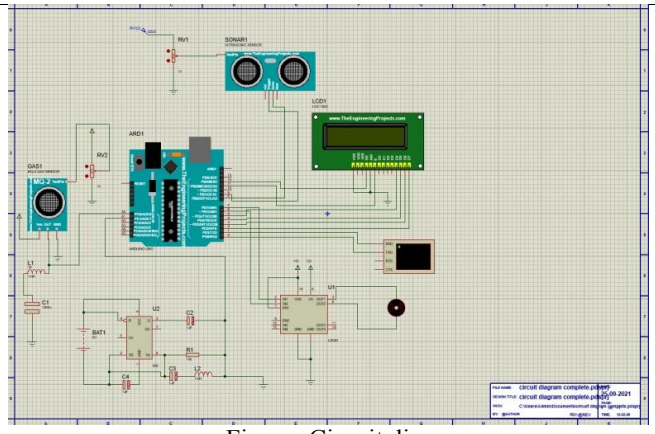

Figure: Circuit diagram

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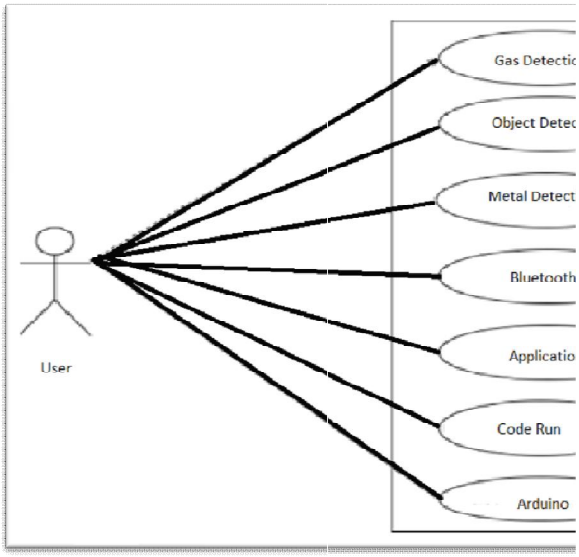
UML Diagrams

Unified Modeling Language is a standard language for writing software blueprints. The UML may be used to visualize, specify, construct and document the artifacts of a soft- ware intensive system.UML is process independent, although optimally it should be used in process that is use case driven, architecture-centric, iterative, and incremental.

The number of UML Diagrams are available:



V. ALGORITHM USED

5.1 Implementation Module

```
#include <SoftwareSerial.h>          //add the soft serial libray SoftwareSerial Bluetooth(50, 52);
int motorPin1 = 4;            // pin 2 on L293D ICz int motorPin2 = 5;     // pin 3 on L293D IC int motorPin3 = 6;       //
pin 4 on L293D IC int motorPin4 = 7;          // pin 5 o7n L293D IC char BT_input;
int sensorpin = 10;
float sensorValue; //Gas 8 no. pin int val;     //metal
int Buzzer = 9;     //Buzzer int triggerPin = 12;
int echoPin = 11; void setup() { Serial.begin(9600);
Bluetooth.begin(9600);
pinMode(triggerPin, OUTPUT);                // Sets the trigPin as an OUTPUT pinMode(echoPin, INPUT); //  Sets  the
echoPin as an INPUT pinMode(motorPin1, OUTPUT);
pinMode(motorPin2,     OUTPUT);     pinMode(motorPin3,     OUTPUT);     pinMode(motorPin4,     OUTPUT);
digitalWrite(motorPin1,   LOW)   ;   digitalWrite(motorPin2,   LOW)   ;   digitalWrite(motorPin3,   LOW)   ;
digitalWrite(motorPin4, LOW) ; pinMode(Buzzer, OUTPUT);//Buzzer digitalWrite(Buzzer, LOW);
pinMode (sensorpin, INPUT); // Metal Sensor
}
void loop() {
// Gas Sensor
sensorValue   =   digitalRead(8);   //   read   analog   input   pin   0   Serial.print("MQ3   Sensor   Value:   ");
Serial.println(sensorValue);
if (sensorValue == 0)
{
Serial.println("Gas Detected"); tone(Buzzer, 200);
delay(500); noTone(Buzzer); delay(500);
Bluetooth.println("Gas Detected");
}
```

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```
// Metal Sensor
val = digitalRead(sensorpin); Serial.print("Metal Detector "); Serial.println(val);
if (val == 1)
{
Serial.println("Metal Detected"); tone(Buzzer, 200);
 delay(500); noTone(Buzzer); delay(500);
Bluetooth.print("Metal Detected"); Bluetooth.print(sensorpin); // Bluetooth.println();
}
//Ultrasonic
long highPulseDuration; int calculatedDistanceCm;
//Set the trigPin to low, before setting it to high for the pulse digitalWrite(triggerPin, LOW);
delayMicroseconds(5);
// Create the 10 seconds pulse on the trig pin digitalWrite(triggerPin, HIGH); delayMicroseconds(10);

// Set the pin to low to end the pulse digitalWrite(triggerPin, LOW);

// Read the duration of the high pulse on the echo pin highPulseDuration = pulseIn(echoPin, HIGH);

// Calculating the distance
calculatedDistanceCm = highPulseDuration * 0.034 / 2; // Speed of sound wave divided by 2 (go and back)

// Displays the distance on the Serial Monitor Serial.print("Calculated Distance: "); Serial.print(calculatedDistanceCm);
Serial.println(" cm"); Bluetooth.print("Calculated Distance: "); Bluetooth.print(calculatedDistanceCm);
Bluetooth.println(" cm");
delay(1000);
if ( calculatedDistanceCm < 30)
{
digitalWrite(12, HIGH); delay(1);//wait for 1ms digitalWrite(12, LOW); delay(1);//wait for 1ms
digitalWrite(motorPin1, LOW); digitalWrite(motorPin2, LOW); digitalWrite(motorPin3, LOW);
digitalWrite(motorPin4, LOW); Serial.println("Stop"); Bluetooth.println("Stop"); delay(1000);
}
// MOTOR CODE
if (Bluetooth.available())
{
BT_input = Bluetooth.read();

Serial.print("BT_input:"); Serial.println(BT_input); if (BT_input == '1')
{
digitalWrite(motorPin1, HIGH); digitalWrite(motorPin2, LOW); digitalWrite(motorPin3, LOW);
digitalWrite(motorPin4, HIGH); Serial.println("Motors are rotating BACKWARD");
Bluetooth.println("Motors are rotating BACKWARD");
}
if (BT_input == '2')
{
digitalWrite(motorPin1, HIGH); digitalWrite(motorPin2, LOW); digitalWrite(motorPin3, HIGH);
digitalWrite(motorPin4, LOW); Serial.println("Motors are rotating FORWORD"); Bluetooth.println("Motors are
rotating FORWORD");

}
```

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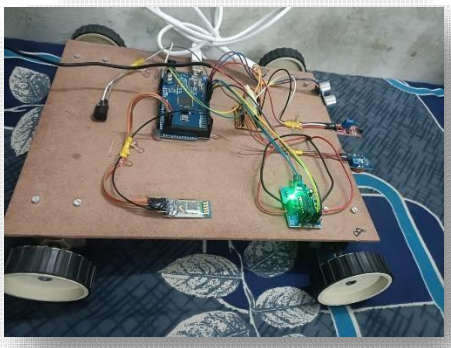
```
if (BT_input == '3')
{
digitalWrite(motorPin1, HIGH); digitalWrite(motorPin2, LOW); digitalWrite(motorPin3, LOW);
digitalWrite(motorPin4, LOW); Serial.println("RIGHT"); Bluetooth.println("RIGHT");
}
if (BT_input == '4')
{
digitalWrite(motorPin1, LOW); digitalWrite(motorPin2, LOW); digitalWrite(motorPin3, HIGH);
digitalWrite(motorPin4, LOW); Serial.println("left"); Bluetooth.println("left");
}
if (BT_input == '5')
{
digitalWrite(motorPin1, LOW); digitalWrite(motorPin2, LOW); digitalWrite(motorPin3, LOW);
digitalWrite(motorPin4, LOW); Serial.println("Stop"); Bluetooth.println("Stop");
}
}
}
```

VI. CONCLUSION AND FUTURE WORK

Conclusion

Smart phone is android which can develop effective remote control program. At the same time, this program uses Bluetooth connection to communicate with robot. It has proven to allow for meaningful two-way communication between the Android phone and the robot The Multi-Purpose Military Service Robot will be designing in such a way that it can fulfill the needs of the military, the police and armed forces. It has countless applications and can be used in different environments and scenarios. For instance, at one place it can be used by the armed forces, military purposes, while at another instance it can be used for spy purposes. It will also be able to diffuse the mines after detecting it.

VII. EXPERIMENTAL RESULTS



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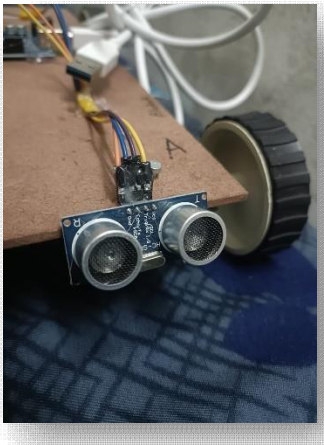

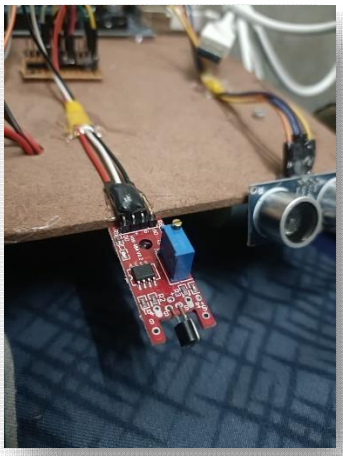

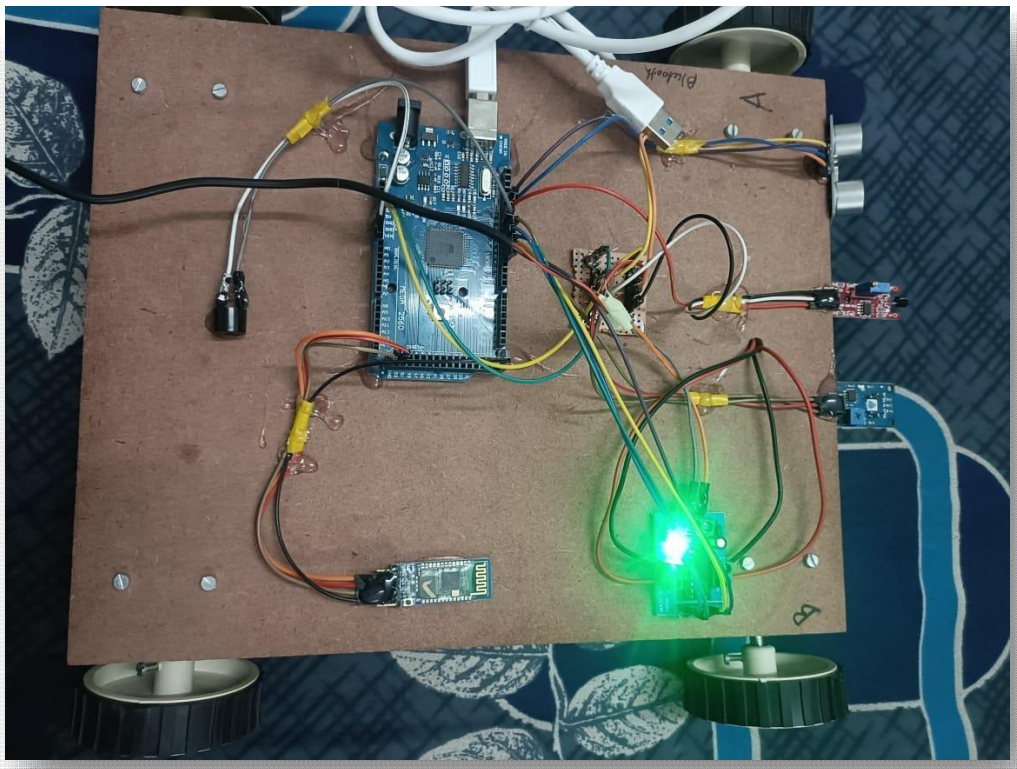

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