ROVER'S IN HAZARDOUS SITUATIONS– A SURVEY

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ABSTRACT

In recent times, technology is growing apace with increasing human wants and expectations. Technological growth is achieved with the assistance of machines that square measure designed and integrated into a very thanks to meet current necessities. However, their square measure varied analysis fields for this however the AI field particularly robotic arms and Rovers have very caught our attention. Robotic arms work with the desired predefined command by the developer with a specific degree of freedom that makes it one of the vital tools for engineering applications. On the opposite 0.5 Rovers too has their own significance in movableness operation. This paper exclusively focuses on the event of a tool by desegregation the higher than technology, a Robotic arm on the prime of a Rover for choosing and putting operations in venturesome environments. NodeMCU act because the brain of the system and therefore the whole system is controlled by employing a smartphone.

Keywords: IoT, Blynk, NodeMCU, Rover, Robotic Arm.

I.   INTRODUCTION

Over the last decade, technology has improved drastically everywhere around the globe which tends to rise in the golem, automation, and unmanned vehicle. The robotic arm and robotic vehicle are currently operating in situ for humans to perform repetitive tasks. In general, artificial intelligence will be divided into 2 areas, industrial and repair artificial intelligence [1]. Several tiny and transportable golems, robotic vehicles and robotic arms that are semi or absolutely autonomously add numerous fields of application like applications together with the workplace, military tasks, hospital operations, dangerous surroundings, and agriculture [2]. In the event of varied technologies like frequency transmission and AI these golems are controlled by distance and tasks controlled or ordered by the controller (human).Space agencies are victimization Rovers with a robotic arm for planet and house exploration. Rover's square measure designed vehicle that travels on the lowest or different paves. A robotic arm may be a mechanical structure that may perform similarly human-like performance [3]. The prime example of this technology is Mars Rovers which are ordered for Mars exploration [4]. In the Gregorian calendar month of 2004.NASA landed twin Rovers named Spirit and chance in the vicinity of their Mars Exploration Rovers Mission (MER), the Rovers use robotic quality and manipulator arm for an assortment of information on the surface of Mars these are controlled by either frequency or AI [5]

OVERVIEW

The system includes a Wi-Fi module Node MCU that acts as a brain. It's an ASCII text file code and development kit that plays an important role in planning a correct IoT product employing a few script lines. The module may be a chip incorporating each a full TCP/IP stack and microcontroller capability primarily supported by ESP8266 that's a cheap Wi-Fi. Motor different to regulate the motion of motor in Rover for quality and rotation of the robotic arm. Rover and also the robotic arm is automatically designed and capable to raise the load of 250-350 grams and may choose and place tasks for a sure distance.This paper has been organized into 5 sessions one describes the introduction and also the main purpose of this project. Session two includes previous connected work and a literature review. Session three includes methodology, and system design. Working rules and parts employed in the project. Session four includes the result and conclusion and session five includes the future scope.

II.   LITERATURE REVIEW

From ancient times, a human was curious about building a machine that performs similarly perform as humans. Around the fifth century BC, the primary trace of such machines as automatic puppets was found in Greek and Indus natural depression civilizations, but it gets the correct form during when historic period as the mechanical boom provided sufficient development of robotic arms. In 1954, the first programmable mechanical arm was introduced by martyr Pevol Associate in nursing in 1959 planet corporation conjointly developed an arm, afterward, it was difficult to increase the quality and potency of the arm thus in 1973 German artificial intelligence company KUKA developed six electro automatically driven axis arm. Any arm with additional load capabilities like Motorman and higher microcontroller like seawards introduced in around the 70s. The main challenge afterward is to provide application based mostly arms thus, in 1979 over-the-counter DAIHEN introduced an arm for arc fastening conjointly they introduced the mega ex series in 2003 as the advancement of this in 1981 the Takeo Kanad introduced an arm with a motor at every joint that increases the potency of the arm. Any over-the-counter DAIHEN & NACHI Technology used many changed arms for numerous purposes. On the opposite aspect, the little-sized vehicle has its own importance because of its straightforward movability. But humans have used vehicles from ancient times however Rover is one of the little-sized vehicles that have the utmost importance. Rover gets its main importance when it absolutely was used for house exploration purposes in one969 Lunokhod was 1st Rover sent to the house by land any in advancement Lunokhod 1,2 and three were launched Phoebus Apollo Greek deity} satellite roving. Rover gets its main importance once it fully was used for house exploration functions in one969 Lunokhod was first Rover sent to the house by land any in advancement Lunokhod one,2 and 3 were launched Phoebus {apollo|Greek deity} Greek deity} satellite roving vehicle as series Apollo fifteen,16 and seventeen from Gregorian calendar month. Afterward, worldwide nations concerned in competition to launch mars landing Rover parallel to those tiny vehicles also are employed by numerous trade to get new machines thus, we have a tendency to be on the verge to use such tools to make one thing advance. Our paper relies on one such combined tool Rover with an artificial intelligence vehicle that might be used for numerous functions and has a probability of advancement in the future.

III.   METHODOLOGY

A.   Project Overview

The project is split into 2 sections Rover and robotic arm. Half-dozen DC motors of Rover are connected to the motor pins of the L298N motor driver. Four input pins of the L298N motor driver area unit connected to Node MCU digital pins. Power is equipped employing a 12V metallic element compound battery to Node MCU and motor driver. The movement of Rover is controlled victimization of the Blynk app on a smartphone. The robotic arm is of three-degree freedom victimization 3 motors base, shoulder, and claw. Two motor drivers are employed to dominate the three motors. The Motors pin of the motor driver are connected to the three motors and therefore the input pins are connected to Node MCU. The arm is controlled victimization of the Blynk app on smartphones. Each Rover and arm are connected to Node MCU victimization the Wi-Fi hot spot of the smartphone.
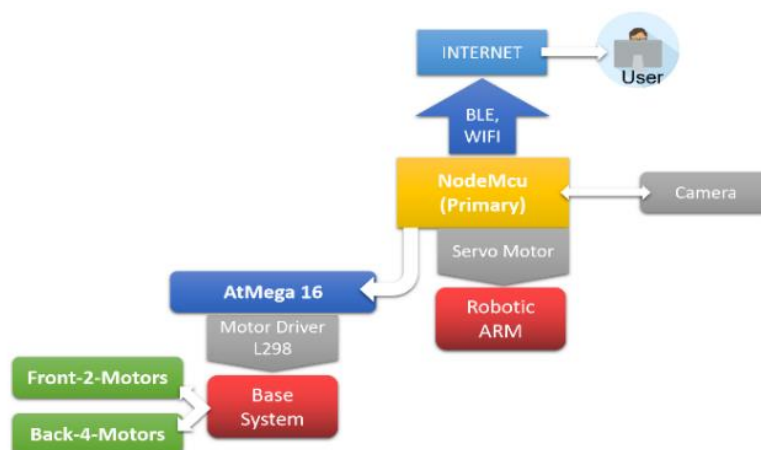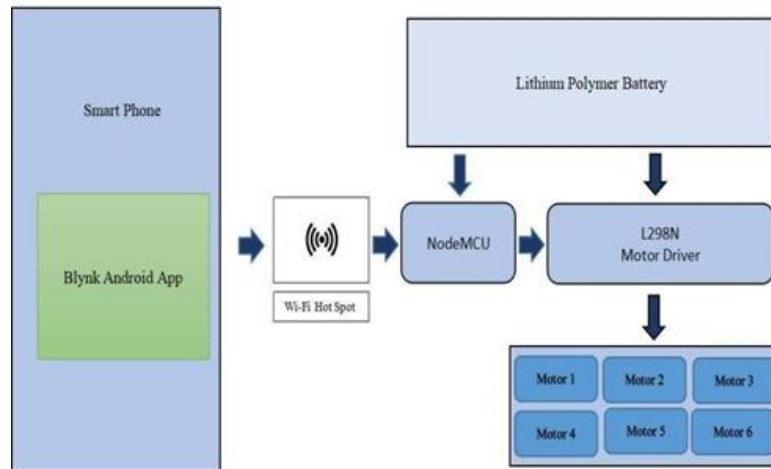

Figure 1:- Rover block diagram

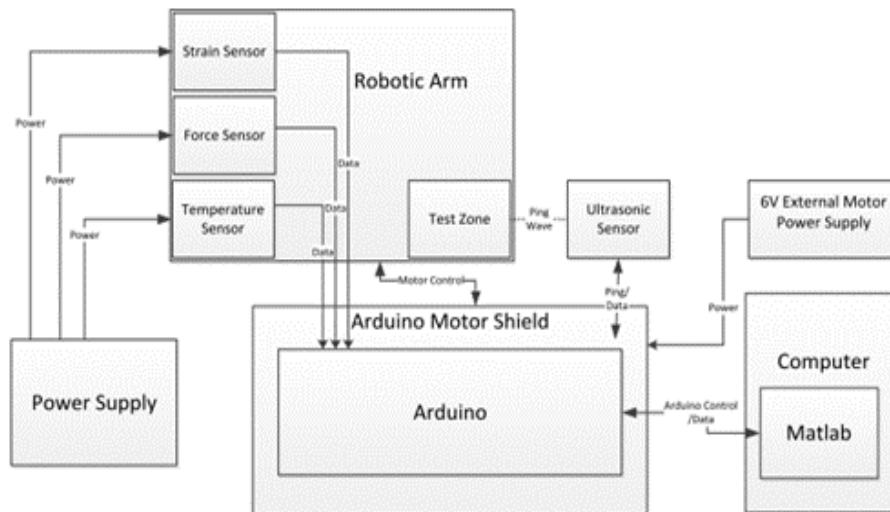**Figure 2:-** Connectivity of Wheels with controller

Figure 3:- Connectivity of robotic Arm with controller

B. Working Principle

The operation of the system is unbroken as straightforward as attainable. The facility supply is that the DC offer that runs the Node MCU and motors drivers. The Node MCU module receives the signal from the smartphone that acts as a distance. Smart-phone has the Blynk app that helps to regulate the motors of the Rover and therefore the motors of the arm. The smartphone is connected to Node MCU with the assistance of Wi-Fi employing a hotspot.

Our planned project is categorized into 3 sections:

a) Input section

b) Node MCU section

c) Output section

Remote consists of smartphones and therefore the Blynk app. The Rover consists of an L238N motor driver, Node MCU, and motors. Users will manage the Rover with the assistance of a distance at intervals of a variety of 100 m. Command or code is inserted into Node MCU with the assistance of a USB knowledge cable. This command or code helps Node MCU to interface or communicate with the smartphone and motor driver L298N.

NodeMCU act as a brain and also as a communicating device. It receives instruction from the remote which is our smartphone and the controls and commands the function of the motor driver and the whole system. Smart-phone using Blynk app operates the function of the given instruction. Users can control the functioning and movement of the DC motor. 9V 200 R.P.M DC motors are used and for power supply 12V DC batteries as the main power supply for NodeMCU and motor driver.

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C. Components

1. HARDWARE

Node MCU

NodeMCU is an associate degree ASCII text file IoT platform that has a microcode that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware that's supported the ESP-12 module. The microcode uses the Lua scripting language. The module is incorporating each a full TCP/IP stack and microcontroller capability primarily supported by ESP8266 which could be an inexpensive Wi-Fi microchip. it was launched by the manufacturer Espressif Systems. The ESP8266 NodeMCU could be a complicated device that mixes some options of the standard Arduino board with the likelihood of connecting to the web [6].

It consists of multiple GPIO pins which permit America to attach the board with alternative peripherals and is additionally capable of generating PWM, I2C, SPI, and UART serial communications. Its microcode is predicated on Lua- A scripting Language.
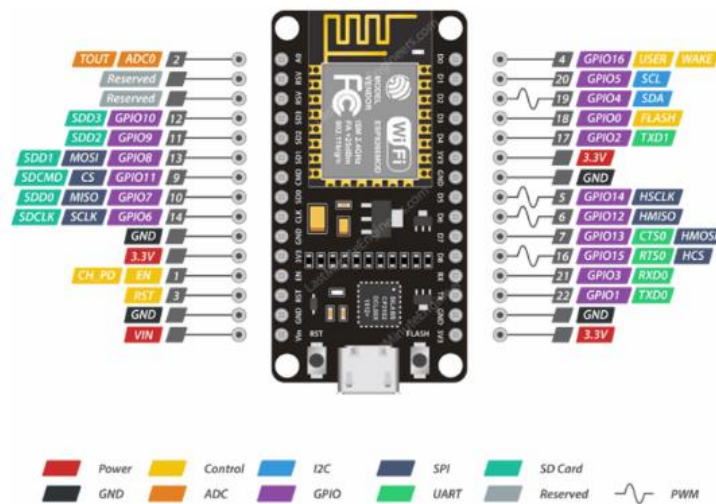

Figure 4:- NodeMCU

Arduino Nano

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P released in 2008. It offers the same connectivity and specs of the Arduino Uno board in a smaller form factor. The Arduino Nano is equipped with 30 male I/O headers, in a DIP-30-like configuration, which can be programmed using the Arduino Software integrated development environment (IDE), which is common to all Arduino boards and running both online and offline. The board can be powered through a type-B mini-USB cable or from a 9 V battery.
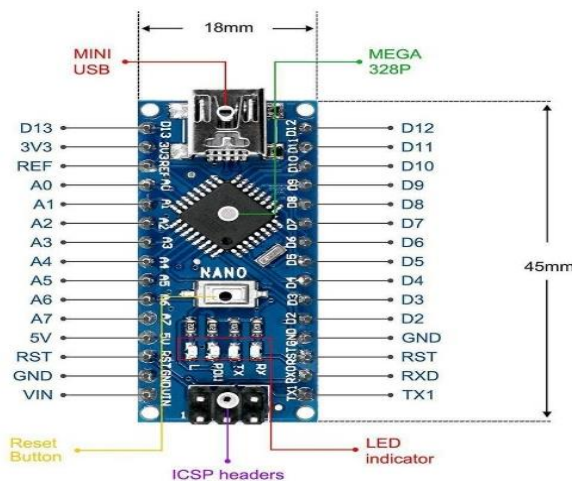

Figure 5:- Arduino Nano

Motor Driver (L298N)

L298N driver may be a high voltage, high current twin full-bridge driver. It's designed to simply accept customary TTL logic levels and drive inductive hundreds. It's like-minded to regulate dc motors in each direction. It's ideal for robotic applications and well-suited for the association with a microcontroller. It needed an Associate in nursing input voltage of three.2V~40V dc and a peak current of four amp.
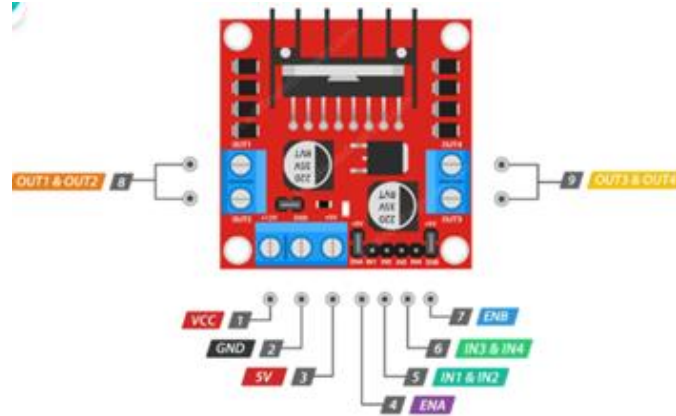

Figure 6:- Motor Driver

Servo Motor

A servomotor (or servo motor) is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servomotors are not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system.

Figure 7:- Servo Motor

DC Metal Geared MOTOR

DC Motor – 500RPM – 12Volts engaged motors ar typically an easy DC motor with a shell hooked up to that. This could be utilized in all-terrain robots and type of robotic applications. These motors have a three millimeter rib hole {in the ground} in the middle of the shaft so creating it easy to attach it to the wheels or the other mechanical assembly.

500 rev 12V DC engaged motors wide use for AI applications. Terribly simple to use and out there in customary size. Also, you ought not to pay tons of cash to regulate motors with AN Arduino or compatible board. the foremost fashionable L298N H-bridge module with aboard transformer motor driver are often used with this motor that includes a voltage of between five and 35V DC otherwise you will select the foremost precise motor diver module from the big selection out there in our Motor diverse class as per your specific necessities.
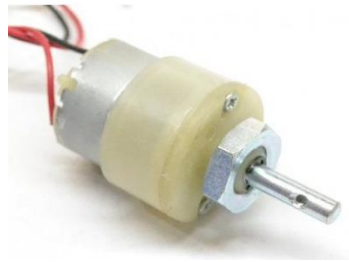
Figure 8:- DC Metal Geared Motor

2. SOFTWARES

Proteous 8 Professionals

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 electronic prints for manufacturing printed circuit boards.

Figure 9:- Proteous 8 Professionals

Arduino IDE

Arduino software package (Figure 9) its accustomed management whole system with the support of a small controller. C programming" language is utilized for the execution of this model. The complete program is burnt in small controller victimization Arduino Ide software package so the program holds on within the EEPROM of the small controller that is an element of Arduino board with facilitate of Arduino Ide software package we tend to execute the instruction for left, right, forward and backward of the complete system. To derive the conclusion for sensible implementation various sets of trials are performed. The accuracy of the system parameters has been evaluated and modifications are created in step with that. The initial section of takes look at includes the test of stable operation of each unit one by one. Since this Rover is employed for movableness therefore its motor operation analysis was enough. The dc motor with a 12V provides two hundred rates is employed which is enough to maneuver the Rover alongside the Robotic Arm on its prime of it. In the case of a Robotic Arm, a three degree of freedom of the arm is employed with a base rotation of 360 degrees, articulatio plana rotation of one hundred eighty degrees, and gripper movement in one plane (90 degrees) is employed. The whole system is controlled with NodeMCU and motor driver (L298N). Code is burned in NodeMCU victimization Arduino Ide that is written in C++ program language that allows NodeMCU to attach to a smartphone employing a Wi-Fihotspot.

Figure 10:- Arduino IDE
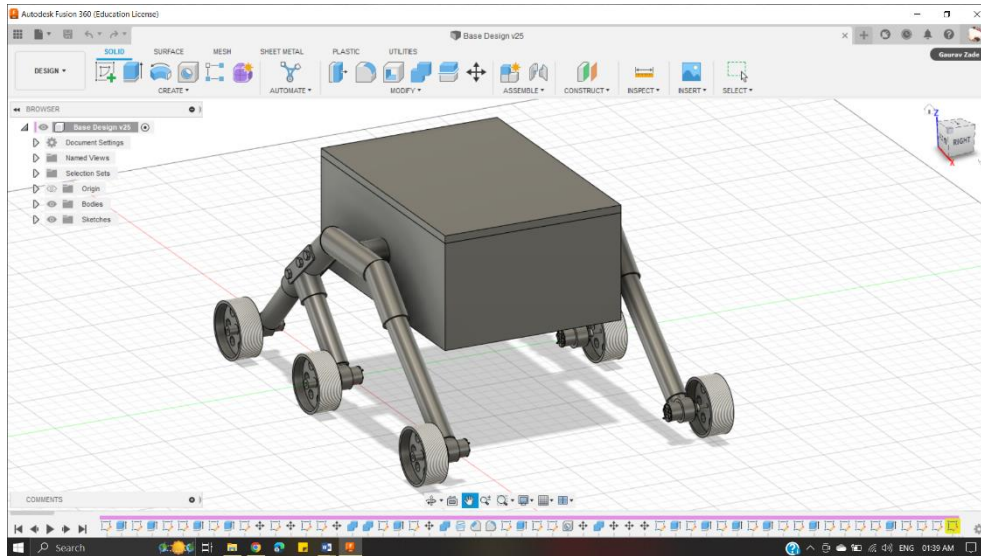
IV.　MODELING AND ANALYSIS
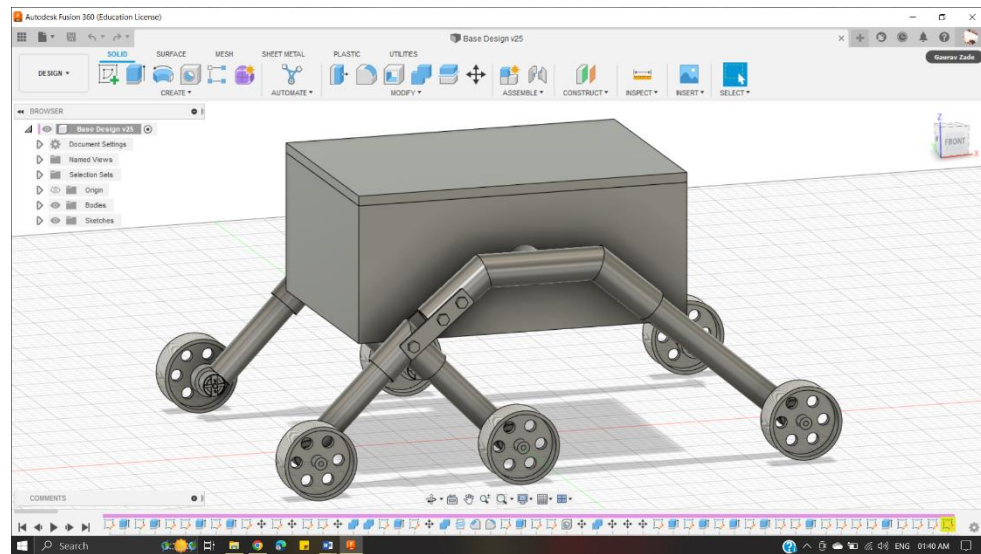

Figure 11: 3D view of Rover[1].

Figure 12: 3D view of Rover[2].

Sr no.	Material	Specification
1.	PVC pipes	White
2.	PVC joints	White
3.	Clamp	Metallic
4.	Wheels	Plastic
5.	Angle (Basic Metallic frame)	Iron
6.	Cardboard	Wood
7.	Screw	Black V-Shape
8.	Metallic Strip	Iron
9.	Joint Screw	Iron

V.   FUTURE SCOPE

The basic arm structure projected within the paper is to perform straightforward pick-and-place operations with a restricted degree of freedom. thus there's the scope for many advancements to diversify the applying of arm and increase the sector of application For this three dimensions square measure chiefly to emphasize:-

i. Increasing the degree of freedom of the arm in conjunction with gripper quality to perform the additional advanced operations.

ii. Rover automation feature for controlled and pattern-wise operation employing a machine learning formula. Increasing system integrity and employing a smaller model of the project for a slender space of application.

VI.   CONCLUSION

In this paper I explained about the rover, its details. How it will be beneficial for the different-different tasks, with the components which I used for the rover with its design and the flow chart. According to my survey, the situations which is hazardous or dangerous for all human beings should be restricted & at that place we can use rovers which is very helpful for all the researchers & workers for their own purpose so that the life of these people get secured. According to its, working machines can do any work with perfection without time wasting which is very important parameter for humans. Machines capability is very good compared to humans, the places where humans cannot able to go and survive at that place these rovers is very beneficial for all.

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