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ABSTRACT

The aim of this project is to reduce human casualties in terrorist assault, for example, 26/11 attack at Taj hotel in Mumbai. So, this issue can be overcome by structuring the RF based government agent robot which includes remote camera, bomb detection, camouflage technology and motion sensor. So that from this it will be anything but difficult to inspect enemy at the point when it required. This robot can discreetly go into a war zone and sends us the data by means of remote camera. It can detect bomb with the help of metal detector and camouflage in the environment. The development of this robot is remotely constrained by ahandheld RF transmitter to send orders to the RF beneficiary mounted on the moving robot. Since human life is consistently important, these robots are the replacement of troopers in war zones. This government agent robot can likewise be utilized in star lodgings, shopping centers and so on where there can be danger from gatecrashers or fear-based oppressors. At the hour of war where it tends to be utilized to gather data from the enemy landscape and screen that data at afar secure zone, and securely devise an arrangement for the counter assault, Tracking areas of psychological militant associations and afterward plan assault at appropriate time. Making a reconnaissance of any debacle influenced zone where people can't go into.

CHAPTER-1

1.0 INTRODUCTION

1.1 Statistical Analysis

The number of countries with military drones has skyrocketed over the past decade, a new report revealed, showing that nearly 100 countries have this kind of technology in their armed frames every minute there will be growth in robotics and at the same time there will be many deaths ofsoldiers in our country. So, if we design robot like this it will really helpful to save their lives, there are many robots already severing our country and helping army and this be next generation of robot that can handle very easily by everyone. Earlier the robots were controlled through wired network but now to make robots more user friendly, they are framed wirelessly. Robots is the branch of mechanical engineering, electrical engineering and computer science that deals with the design, construction, operation, and application of robots.

The RF transmitter acts as a RF remote control that has a advantage of certain range (up to 200meters) with proper antenna and the wireless camera is mounted on the robot body for spying purpose even in the complete darkness by using infrared lighting. At the transmitting end usingjoysticks, commands are sent the receiver to control every movement of the robot either to forward, backward, left, right likewise ARM up and down also is controlled. At the receiving endtwo motors are attached to microcontroller where they help in the movement of the vehicle. After receiving the commands robot will stop. So, for all this we have programmed it in embedded C.

1.2 Background and Motivation

In war field, ventilation systems are critical to supply adequate oxygen, keeping up non-dangerous and non-lethal environments and an effective working mine. To monitor an underground mine, can help killing high hazard environments. Primitive procedures of monitoring a mine's air can be followed back to the utilization of canaries and different creatures to ready diggers when the climate gets to be lethal. Incorporating ventilation monitoring systems empowers a mine to insightfully roll out ventilation improvements in view of the far-reaching information given by the monitoring systems. Sudden changes in the ventilation system are identified by the monitoring system, permitting quick move to be made.

New and creating correspondence and following systems can be used to monitor mines more proficiently and transfer the information to the surface.

The progression of technology has allowed mine monitoring techniques to become more sophisticated, yet explosions in underground coal mines still occur. The safety issues of war fields have gradually turned into a major concern for the society and nation. The occurrence of disasters in war fields is mainly due to the harsh environment and variability of working conditions. So, it makes the implementation of field monitoring systems essential for the safety purpose. Wired network systems used to be a trend for traditional survey lines, it is essential to have a wireless sensor network mine monitoring system, which can be disposed in such mines in order to have a safe production within.

Wireless sensor networks (WSNs) have earned a significant worldwide attention in current scenario. A WSN is a special ad-hoc, multi-hop and self-organizing network that consists of a large number of nodes arranged in a wide area in order to monitor the phenomena of interest. It can be useful for medical, environmental, scientific and military applications. Wireless sensor networks mainly consist of sensor nodes or motes responsible for sensing a

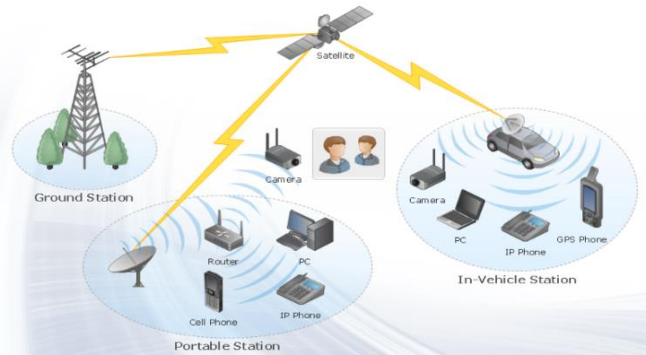


Figure 1.1 Wireless Sensor Network

Phenomenon and base nodes, which are responsible for managing the network and collecting data from remote nodes. The design of the sensor network is influenced by many factors, including scalability, operation system, fault tolerance, sensor network topology, hardware constraints, transmission media and power consumption.

These small sized sensors are quite inexpensive compared to traditional sensors and also require limited computing and processing resources. These sensor nodes can detect, measure and collect information from the environment and based on some local statistical decision process, they can convey the collected data to the control room.

It has three major advantages over wired monitoring network systems:

- There is no need of cables to lay and easy installation in blind areas, reducing cost of the monitoring system. The number of nodes can be increased to eliminate blind areas. Also, it offers a general communication and allocation of the goal.
- The dense nodes ensure the data acquisition with high accuracy and optimum data transmission, and further realization of real-time monitoring system for my environment.
- A little computing ability, storage capacity with data fusion of sensor nodes makes them suitable for the remote monitoring system.
- The above-mentioned advantages make wireless sensor network ideal for monitoring of safely production of coal mines.

CHAPTER-2

2.0 LITERATURE SURVEY

Several papers have been referred to for the development of the model described in this project. Papers on Robotic arm, Wireless control, Metal detection and Camouflage robots were referred.This section provides the description of the work done and the papers which were presented byseveral authors, that we have used in this project. Although several references have been made,we have described the important work that has helped us to develop this project.

2.1 Wireless Control & Monitoring

This paper discusses about wireless control of robots and their uses. The authors of this paper R.A. Kadu, Prof. V.A. More, P.P. Chitte, J.G. Rana, M.R. Binder describes the use of such robots for military operations and how it can be useful to reduce the risk taken by soldiers.

This papers sheds light on two main area of interest. The first is the “wireless camera” which allows the soldiers to see the enemy in an area remotely with having to be present there physically. The second contribution of the papers is “bomb diffusion” which gives us information about how to use the robot to diffuse bomb and therefore would not put a soldier’s life at risk.

2.2 Camouflage Technology

This conference paper has been presented by Akash Ravindran and Akshay Premkumar in The International Journal of rising Technology in engineering & physics (IJETCSE) ISSN: 0976-1353 Volume eight Issue one –APRIL 2014. This work describes how we tend to square gauge comingto consider concerning military machine. A large portion of the military association as of now takes the help of robots to hold out a few hazardous assignments that can't be done the help ofthe officer.

These robots used in military application square measure commonly used with the incorporated framework, just as video screens, sensors and cameras. A robot is basically an electro-mechanical machine that is target-chasing by PC and electronic programming. a few robots are intended for creating application and might be found in processing plants round theworld. In the majority of the ongoing up-set machine which may be prevailing using by An APP for robot adaptable

2.3 Evolution of HUMAN-ROBOT Interaction awareness in search & Rescue

This paper has been published by Jean Schultz, Jill L. Drury, Holly A. Yanco in the IEEE, 2004, PP. 2327-2332. This paper tends to provide details regarding the examination of basic occurrences all through a robot urban inquiry and salvage rivalry any place fundamental episodes square measure plot as a situation any place the machine may most likely reason damage to itself, the person in question, or the environmental factors. we look at the alternatives blessing inside the human-robot interface that added to achievement in various assignments required in search and salvage and blessing pointers for human-robot association style.

The use of robots in urban search and rescue (USAR) is a challenging area for researchers in robotics and human-robot interaction (HRI). Robots used in search and rescue need mobility and robustness. The environments in which they will be used are harsh with many unknowns. These robots must be able to serve as members of the USAR teams, sending back information to rescue workers about victims, the extent of damages, and structural integrity [1]. Operators of USAR robots will be working long shifts in stressful conditions. Fortunately, most USAR teams are infrequently called to service. This, however, means that human-robot interaction must support infrequent use. The user interactions in USAR robots need to be designed with these requirements in mind.

Robotics research is making progress in producing autonomous robots. A key to autonomy is perception capabilities. Robots must be able to recognize objects and to make decisions based on what an object is. For example, an off-road driving vehicle can recognize trees and plan a route to navigate around those trees. Current autonomous off-road driving performance is quite reasonable [2]. The objects that must be perceived are static and relatively few in nature. This is not true in the USAR domain. After fires or explosions, objects are difficult even for humans to recognize. Planning paths for navigation is not just locating trees or rocks but picking a path through or over a rubble-strewn area. This work is funded in part by the DARPA MARS program, NIST 70NANB3H1116, and NSF IIS-0308186. Completely autonomous robots for USAR are definitely not feasible in the near future. Operators must work as teammates with the USAR robots, with all parties contributing according to their skills and capabilities. It is difficult to study actual USAR events. Casper and Murphy [3] documented efforts to use robots during 9/11 rescue efforts. Burke et al. [1] have conduced field studies during search and rescue training.

Few robotics and HRI researchers are able to participate in such events. Moreover, given the nature of these events, data collection is difficult, if not impossible. The National Institute of Standards and Technology has developed a physical test arena [4,5] that researchers can use to test the capabilities of their USAR robots. A number of international USAR competitions have used the NIST arena. We used these competitions to study a number of human-robot interfaces to determine what information helps the operator successfully navigate the course and locate victims. Although we have no control over the user interfaces, these competitions allow us to see a wide variety of designs and to determine how effective different features are in supporting USAR work. The competition simulates the stressful environment of a real disaster site by limiting the time periods that robots can be in the arena. Since it is a competition, additional pressure is added by the desire to do well. However, the safety issues that would be present in a real disaster are not present in the competition setting.

The primary focal point of this exploration is the use of robots in wars and in harmony and their effect on the general public. This paper examines about advances utilized for spying and observation in various situations and condition. The creators examine the need and motivation behind building up the cutting-edge robots for various, unforgiving and unpredicted condition of the war zones. They intend to present progressed controlling, self-ruling and rapid robots to serve for harmony in countries, as effectively as human controlled machines. Alongside these variables, they centre on growing innovative weapons and hardware to be utilized. This government operative robot is easy to use. It can undoubtedly move, catch pictures and transmit them remotely on the checking screen where the warriors can see the present circumstance of the war field.

The powers can design their guards as indicated by the risks been appeared through the robot. This robot is utilized for short separation reconnaissance for the security of that locale. The structure comprises of a vehicle having a camera for checking with a RF innovation for remote activities. The transmitter sends the directions to the recipient for controlling the development of robot. The collector gathers and disentangles the gotten flags previously intensify the micro-controller which drives the motors through drivers. Remote of the camera can sends live sound and visual recording to a PC or a TV through a tuner card to the station of remote controller. Current military forces are using different kinds of robots for different applications going from mine distinguishing proof to spare exercises.

In future, they will be used for perception and surveillance, coordination and support, correspondences establishment, forward-passed on antagonistic exercises and as strategic fakes to cover move by keeping an eye on resources [5]. The task is to build a mechanical vehicle which will be controlled through the android application which will be linked or connected to the remote of the camera for observation purposes. The camera which is attached on the robot it will continuously sends or transmits the data by special feature of CCD camera which is night vision competencies. This robot has a very useful application in the battle ground or war fields in form of spying purposes as an agent. As in this research paper, existing system is discussed where global system for mobile (GSM) – built mobile robot and Dual tone multi frequency build robot (DTMF) was used, these robots have realistic drawbacks for example, more vitality or energy is acquired to the system, the robot and the controlling unit must be in viewable pathway, for various Mobile phones, the control unit must be reassembled so that thusly the movement of the system is subordinate to cell phone. To end this requisite with a final goal, this research paper presents a voice over android application via Bluetooth connection. In this exam control on both remote correspondence between the versatile robots Android GUI application has been achieved.

This framework can also be created by upgrading the execution and adding highlights. The improvement of this framework depends on the application used there. The frame may include highlights such as gas sensor, thermal image recognition, automated arm connection, and may be used in pick-and-place and so on should be possible. The improvement of this framework has been achieved by wide application zones, for example in army and legal authorization and industrialized and mischance organization criteria correspondence between the versatile robot Android GUI applications has been achieved [6]. This innovative robot system is constructed to perform various special tasks which is dangerous for human's life, which have his risk factor of human loss. On the whole we can say it can be used to perform task in cases where some crime happened and can be very important for military or army for keeping an eye on opposite entities or we can say purpose of spying. Some of the time it is important for a human which is bomb transfer master to incapacitate the gadget. For this reason, the master who uncovered the bomb will put on a defensive suit and protective cap, get a tool compartment of gear, and walk the 100 or so meters to the site.

To achieve the bomb's area, it might be important to climb stairs, creep through entry way or even rests to satisfy the mission. This framework spares the profitable existence of our officers. This robot can also be used as robotic arms and mobile robots to go into armed force territory. The entire framework is controlled through android application. In this paper, usage of IOT information arranges in military condition has been demonstrated utilizing Wi-Fi framework accessible on mechanical vehicle and android telephones.

CHAPTER-3

3.0 SYSTEM ANALYSIS

3.1 Existing Systems

An Army robot is capable of performing arts tasks like locomotion, sensing the harmful gas, sensing the humans to a lower place the surface, metal detection. An Army robot is an autonomous robot comprising of wireless camera which might be used as a spy and Bluetooth accustomed management to make wireless.

The prevailing systems suffered several issues like high price to line up communication between robot and rescue management unit, screaming wireless communication link between robot and management unit that ultimately stopped robot to operate. In these systems, distance could be a limiting issue as a result of the Bluetooth features a mere vary that can't be exaggerated.

3.2 Proposed Systems

The idea of the military robot relies on the camouflage techniques. The aim of the project is to manufacture and operate via a sensible phone, used as remote device will reproduce the color consequently with the bottom surface wherever it'll be moving on, thus will not be detectable to the surface world. On the one hand, so as to realize these goals, we have used diodes (RGB) which might diffuse uniform colors, coupled to sensors which will exactly determine ground colors. This robot is meant in such the way that it will reproduce the color severally at numerousspaces every area having the ability to breed color with specific spots of the bottom surface which permit the robot to model as a gameboard of multiple colors – the assorted colors it drivesover.

On the opposite hand, we have a tendency to additionally created a system which might receive and decipher data received from the sensible phone victimization IOT to any pilot motorsthat successively drive the robot in any needed direction.

- **Dexterity**

Dexterity refers to the functionality of limbs, appendages and extremities, as well as the general range of motor skill and physical capability of a body. In robotics, dexterity is maximized where there is a balance between sophisticated hardware and high-level programming that incorporates environmental sensing capability.

The United States Department of Dence is host to the Defence Advanced Research Projects Agency (DARPA), which sponsors a great deal of innovation in the development of prosthetic limbs. This technology lends a great deal of insight into the future of robot dexterity, but not all robots imitate the human physical form (those that do are often referred to as “androids,” whose Greek etymological origin basically translates as “likeness to man”

Organizations like Boston Dynamics explore a variety of both bipedal and quadrupedal configurations while expanding on the idea of extrinsic dexterity in grasping mechanisms.

Anthro apomorphic robotic hands that can perform delicate tasks such as opening jars or writing can be used in many circumstances where it is too dangerous for a human to use their own limbs, such as in extreme environments or when handling harmful substances and materials. Reinforcement learning (a relatively new form of machine learning), has driven forward robot dexterity. The algorithms help the machine understand which techniques are more effective in manipulating a certain object or achieving a specific task, similarly to what happens with muscle memory in animals. The results are outstandingly dexterous robots that are nearly able to emulate the level of precision of true human hands.

- **Power**

Robots require an energy source, and there are many factors that go into deciding which form of power provides the most freedom and capability for a robotic body. There are many different ways to generate, transmit and store power. Generators, batteries and fuel cells give power that is locally stored but also temporary, while tethering to a power source naturally limits the device’s freedom and range of functions.

One very notable exception would be the simple machine-based bipedal walking system that relies only on gravity to propel its walk cycle (developed at Japan’s Nagoya Institute of Technology). While this may not qualify as a stand-alone (no pun intended) robot, it could lead to innovations on how robot power could potentially be optimized, or possibly even generated.

A fantastically ingenuous example of how advanced robotics power can be arranged by for soft and flexible intelligent robots is using soft smart materials such as dielectric elastomers which can be used as transducers to design intelligent wearable robotics.

A wearable actuator-generator such as robotic clothing could, for example, accumulate energy from the body movements while the robot walks down a flight of stairs, only to return this stored energy to provide added power when they must climb up again those same stairs. The strain-responsive properties of these soft materials are employed to create advanced assisting robots that are nearly self-sufficient in terms of power consumption.

- **Independence**

Intelligence, sense, dexterity and power all converge to enable independence, which in turn could theoretically lead to a nearly personified individualization of robotic bodies. From its origin within a work of speculative fiction, the word “robot” has almost universally referred to artificially intelligent machinery with a certain degree of humanity to its design and concept (however distant).

This automatically imbues robots with a sense of personhood. It also raises many potential questions as to whether or not a machine can ever really “awaken” and become conscious (sentient), and by extension treated as an individual subject, or "person."

CHAPTER-4

4.0 SYSTEM REQUIREMENTS

4.1 Hardware Requirements

- Node MCU
- Arduino uno
- RGB Color sensor
- PIR sensor
- Metal sensor
- Motor driver
- GAS sensor
- Motion detector
- WI-FI module
- Power supply
- DC motor

4.1.1 Software Requirements

- IDE Compiler
- Robot controller software

4.2 System Description, Construction & Operation

4.2.1 System Overview

The war field spying robot consists of two major blocks – First, the Transmitter Block and the Second, Receiver Block.

The Transmitter block consists of a Microcontroller –AT89C2051 which performs the following task:

1. The robot is controlled by the transmitter block which consists of a microcontroller (NodeMCU), this moves the robot in various direction Various sensors like Gas sensor, Color sensor, Motion sensor are controlled by the microcontroller. They information from these sensors is also given to the microcontroller.
2. The transmitter block also consists of an Encoder which converts parallel data into serialdata and can be transmitted through the antenna, an encoder is a low power and high noise immunity device. The Receiver block consists of Microcontroller which controls the operation of other components, it performs

the following task:

1. The Receiver block consist of an antenna which receives information from theTransmitter, the information is received in the form of serial data.
2. The Decoder is used at the Receiving end to receive the serial data and it is converted toparallel data.
3. The microcontroller sends information to the motor diver to move the robot in thedesired direction. The Motor driver controls the operation of the DC-motors. The receiver block also consists of a Gas sensor, Color sensor, Motion sensor and Camera.

4.3 Component Specification

The components used in the project are described below

4.3.1 Microcontroller Node MCU

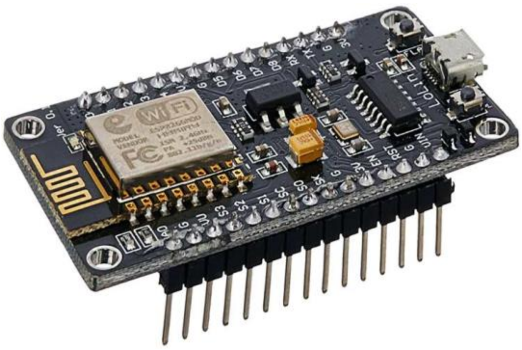


Figure 4.1 Microcontroller – Node MCU

The NodeMCU ***(Node Micro Controller Unit)*** is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (Wi-Fi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds.

However, as a chip, the ESP8266 is also hard to access and use. You must solder wires, with the appropriate analogy voltage, to its pins for the simplest tasks such as powering it on or sending a keystroke to the "computer" on the chip. You also have to program it in low-level machine instructions that can be interpreted by the chip hardware. This level of integration is not a problem using the ESP8266 as an embedded controller chip in mass-produced electronics. It is a huge burden for hobbyists, hackers, or students who want to experiment with it in their own IoT projects. But, what about Arduino? The Arduino project created an open-source hardware design and software SDK for their versatile IoT controller. Similar to NodeMCU, the Arduino hardware is a microcontroller board with a USB Connector, LED lights, and standard data pins. It also defines standard interfaces to interact with sensors or other boards. But unlike NodeMCU, the Arduino board can have different types of CPU chips (typically an ARM or Intel x86 chip) with memory chips, and a variety of programming environments.

There is an Arduino reference design for the ESP8266 chip as well. However, the flexibility of Arduino also means significant variations across different vendors. For example, most Arduino boards do not have Wi-Fi capabilities, and some even have a serial data port instead of a USB port.

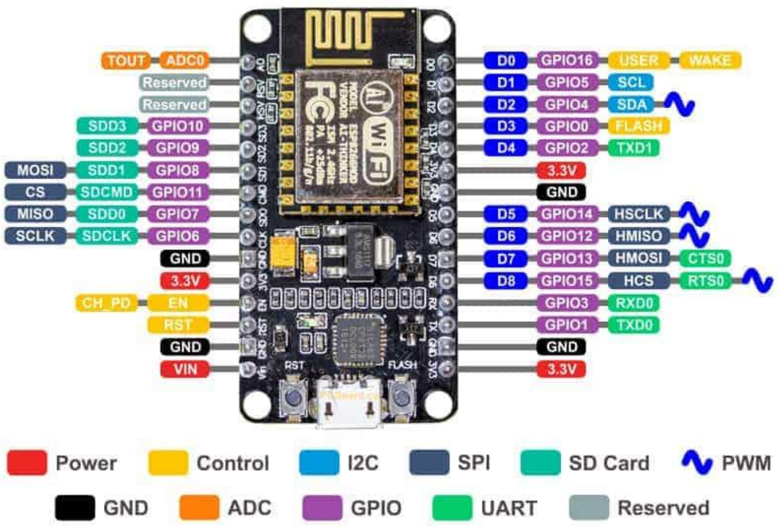


Figure 4.2 Pin description

Power pins There are four power pins. **VIN** pin and three **3.3V** pins.

VIN can be used to directly supply the NodeMCU/ESP8266 and its peripherals. Power delivered on **VIN** is regulated through the onboard regulator on the NodeMCU module – you can also supply 5V regulated to the **VIN** pin

3.3V pins are the output of the onboard voltage regulator and can be used to supply power to external components.

GND are the ground pins of NodeMCU/ESP8266

I2C pins are used to connect I2C sensors and peripherals. Both I2C Master and I2C Slave are supported. I2C interface functionality can be realized programmatically, and the clock frequency is 100 kHz at a maximum. It should be noted that I2C clock frequency should be higher than the slowest clock frequency of the slave device.

GPIO Pins NodeMCU/ESP8266 has 17 GPIO pins which can be assigned to functions such as I2C, I2S, UART, PWM, IR Remote Control, LED Light and Button programmatically. Each digital enabled GPIO can be configured to internal pull-up or pull-down, or set to high impedance. When configured as an input, it can also be set to edge-trigger or level-trigger to generate CPU interrupts.

ADC Channel implemented using ADC. Testing power supply voltage of VDD3P3 pin and testing input voltage of TOUT pin. However, they cannot be implemented at the same time.

UART PINS NodeMCU/ESP8266 has 2 UART interfaces (UART0 and UART1) which provide asynchronous communication (RS232 and RS485), and can communicate at up to 4.5 Mbps. UART0 (TXD0, RXD0, RST0 & CTS0 pins) can be used for communication. However, UART1 (TXD1 pin) features only data transmit signal so, it is usually used for printing log.

SPI PINS NodeMCU/ESP8266 features two SPIs (SPI and HSPI) in slave and master modes. These SPIs also support the following general-purpose SPI features:

- 4 timing modes of the SPI format transfer
- Up to 80 MHz and the divided clocks of 80 MHz
- Up to 64-Byte FIFO

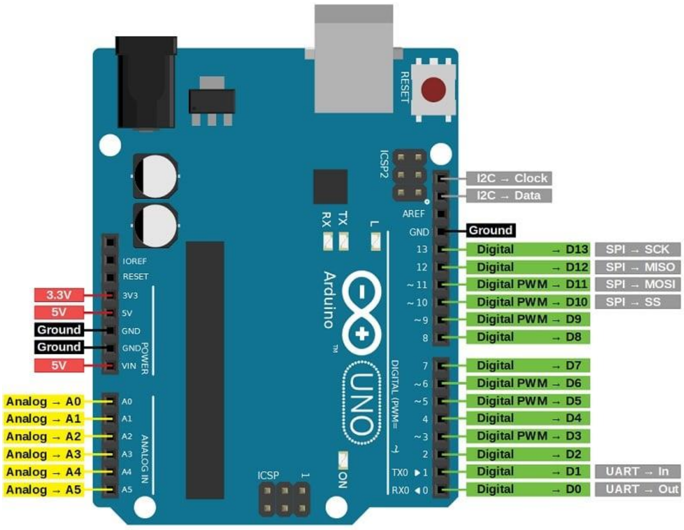
SDIO Pins NodeMCU/ESP8266 features Secure Digital Input/Output Interface (SDIO) which is used to directly interface SD cards. 4-bit 25 MHz SDIO v1.1 and 4-bit 50 MHz SDIO v2.0 are supported.

PWM Pins The board has 4 channels of Pulse Width Modulation (PWM). The PWM output can be implemented programmatically and used for driving digital motors and LEDs. PWM frequency range is adjustable from 1000 is to 10000 is (100 Hz and 1 kHz).

Control pins are used to control the NodeMCU/ESP8266. These pins include Chip Enable pin (EN), Reset pin (RST) and WAKE pin.

- **EN:** The ESP8266 chip is enabled when EN pin is pulled HIGH. When pulled LOW the chip works at minimum power.
- **RST:** RST pin is used to reset the ESP8266 chip.
- **WAKE:** Wake pin is used to wake the chip from deep-sleep.

4.3.2 Arduino UNO



4.3 Figure: Arduino uno pin description

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analogy inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst-case scenario you can replace the chip for a few dollars and start over again.

Vin: This is the input voltage pin of the Arduino board used to provide input supply from an external power source.

5V: This pin of the Arduino board is used as a regulated power supply voltage and it is used to give supply to the board as well as onboard components.

3.3V: This pin of the board is used to provide a supply of 3.3V which is generated from a voltage regulator on the board

GND: This pin of the board is used to ground the Arduino board.

Reset: This pin of the board is used to reset the microcontroller. It is used to Resets the microcontroller.

Analog Pins: The pins A0 to A5 are used as an analogy input and it is in the range of 0-5V.

Digital Pins: The pins 0 to 13 are used as a digital input or output for the Arduino board.

Serial Pins: These pins are also known as a UART pin. It is used for communication between the Arduino board and a computer or other devices. The transmitter pin number 1 and receiver pin number 0 is used to transmit and receive the data resp.

External Interrupt Pins: This pin of the Arduino board is used to produce the External interrupt and it is done by pin numbers 2 and 3.

PWM Pins: This pin of the board is used to convert the digital signal into an analogy by varying the width of the Pulse. The pin numbers 3,5,6,9,10 and 11 are used as a PWM pin.

SPI Pins: This is the Serial Peripheral Interface pin; it is used to maintain SPI communication with the help of the SPI library. SPI pins include:

1. SS: Pin number 10 is used as a Slave Select
2. MOSI: Pin number 11 is used as a Master Out Slave In
3. MISO: Pin number 12 is used as a Master in Slave Out
4. SCK: Pin number 13 is used as a Serial Clock

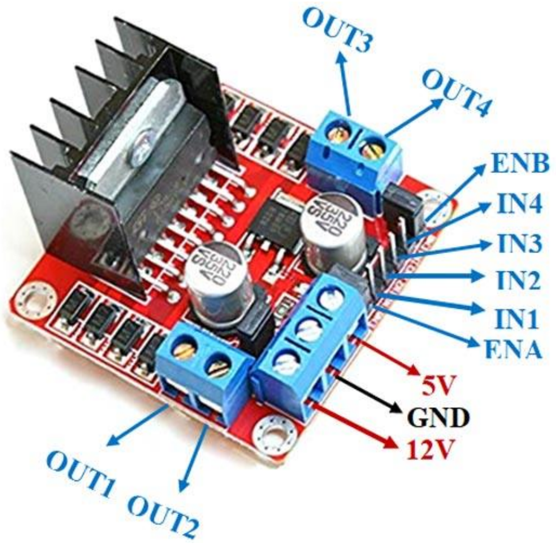
LED Pin: The board has an inbuilt LED using digital pin-13. The LED glows only when the digital pin becomes high.

AREF Pin: This is an analogy reference pin of the Arduino board. It is used to provide a reference voltage from an external power supply.

Configurability &. Replaceable chip

- The ATmega328P can easily be replaced, as it is not soldered to the board.
- The ATmega328P also features 1kb of EEPROM, a memory which is not erased when powered off.
- The Arduino UNO features a barrel plug connector, that works great with a standard 9V battery.

4.3.3 Motor Driver Module



4.4 Figure: Motor driver Module

This **L298N Motor Driver Module** is a high-power motor driver module for driving DC and Stepper Motors. This module consists of an L298 motor driver IC and a 78M05 5V regulator. **L298N Module** can control up to 4 DC motors, or 2 DC motors with directional and speed control. The L298N Motor Driver module consists of an L298 Motor Driver IC, 78M05 Voltage Regulator, resistors, capacitor, Power LED, 5V jumper in an integrated circuit. 78M05 Voltage regulator will be enabled only when the jumper is placed. When the power supply is less than or equal to 12V, then the internal circuitry will be powered by the voltage regulator and the 5V pin can be used as an output pin to power the microcontroller.

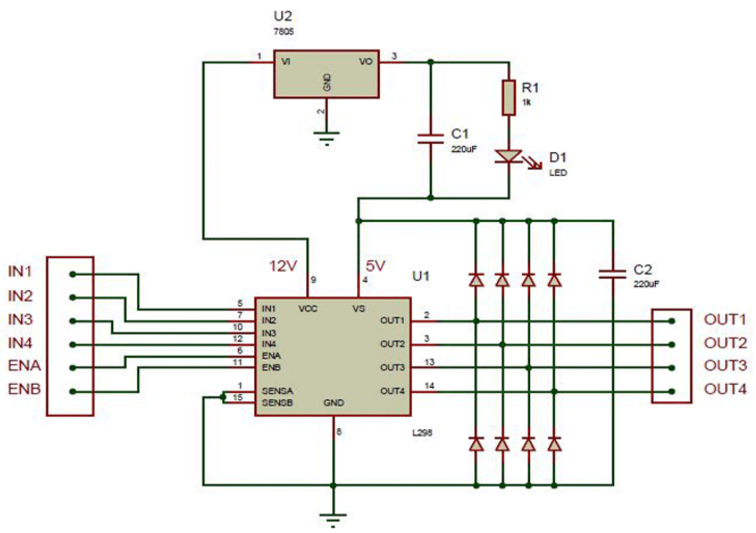


Figure 4.5: Internal circuit diagram of L298N Motor Driver module

The jumper should not be placed when the power supply is greater than 12V and separate 5V should be given through 5V terminal to power the internal circuitry. ENA & ENB pins are speed control pins for Motor A and Motor B while IN1& IN2 and IN3 & IN4 are direction control pins for Motor A and Motor B.

4.3.4 DC MOTOR

Figure 4.6: DC MOTOR

The 300 RPM L-Shape BO Motor Plastic Gear Motor – BO series straight motor gives good torque and rpm at lower operating voltages, which is the biggest advantage of these motors.

Small shaft with matching wheels gives an optimized design for your application or robot. Mounting holes on the body & light weight makes it suitable for in-circuit placement. This motor can be used with 69mm Diameter wheel for Plastic Gear Motors and 87mm Diameter Multipurpose wheel for Plastic Gear Motors.

Low-cost geared DC Motor. It is an alternative to our metal gear DC Motors *It* comes with an operating voltage of 3-12V and is perfect for building small and medium robots. Available with 60 and 150 RPM.

The motor is ideal for DIY enthusiasts. This motor set is inexpensive, small, easy to install, and ideally suited for use in a mobile robot car. They are commonly used in our 2WD platforms.

This is a motor which has steel gears and pinions setup which would have a longer life and havebetter wear and tear properties. The gears in this motor are fixed on hard steel spindles. The gears work using the principle of conservation of angular momentum. The shaft would rotate ina plastic bushing. This DC motor can run smoothly from 4 to 12V which would give a wide rangeof RPM and Torque.

The motor weighs about 100 grams. Total length of the motor is 46mm and the motor diameteris 36mm. The gear assembly inside the motor is of Spur type and the gear head diameter and length is of 37mm and 21mm respectively. The shaft length is of 22mm and shaft diameter is of6mm.

4.3.5 PIR Sensor

Figure 4.7 PIR SENSOR

The PIR sensor used to recognize the movement of person inside a specific scope of the sensor is called as PIR sensor or passive infrared sensor (roughly have a normal estimation of 10m, however 5m to 12m is the genuine identification scope of the sensor). In a general sense, pyroelectric sensors that distinguish the degrees of infrared radiation are utilized to make PIR sensors.

There are various sorts of the PIR sensor circuit is utilized in various gadgets ventures which are utilized to find an individual entering or leaving the specific area or room. These passive infrared sensors are level control, comprises of a wide scope of focal point, and PIR sensors can be effectively interfaced with hardware circuits. sensor and he re let us talk about PIR sensor with arch molded Fresnel lens. The PIR sensor circuit comprises of three pins, power pin, output signal pin, and ground pin. The PIR sensor circuit has a substrate and channel window. When an individual (even a warm body or article with some temperature) goes through the field of perspective on PIR sensor, at that point it identifies the infrared radiation produced by a hot body movement. In this manner, the infrared radiation recognized by the sensor creates an electrical sign that can be utilized to initiate a alert system or buzzer or alarm sound.

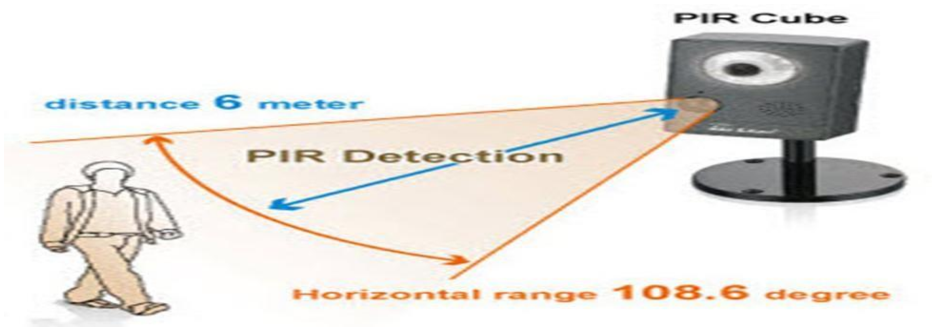


Figure 4.8 PIR Sensor range

4.3.6 IR Sensor

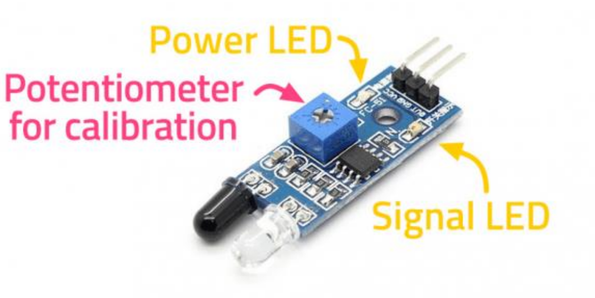


Figure 4.9 IR Sensor

IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An **IR sensor** can measure the heat of an object as well as detects the motion. Usually, in the **infrared spectrum**, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations.

The emitter is simply an IR LED **(Light Emitting Diode**) and the detector is simply an IR photodiode. Photodiode is sensitive to IR light of the same wavelength which is emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.

There are five basic elements used in a typical infrared detection system: an infrared source, a transmission medium, optical component, infrared detectors or receivers and signal processing. Infrared lasers and Infrared LEDs of specific wavelength used as infrared sources.

The three main types of media used for infrared transmission are vacuum, atmosphere and optical fibres. Optical components are used to focus the infrared radiation or to limit the spectral response.

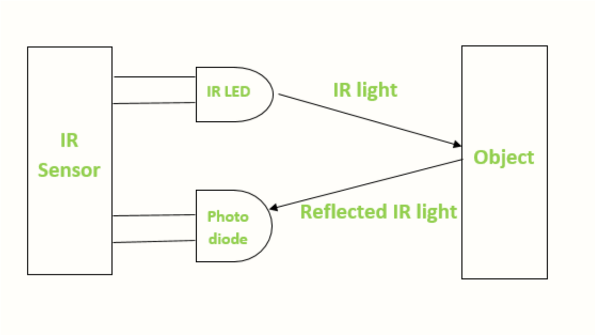


Figure 4.10 Underlying working principle of the IR sensor.

4.3.7 Gas Sensor

Figure 4.11 Gas Sensor

This is a device that detects presence of amount of concentration of gases. The gas sensor operates at voltage of 5V. Due to the concentration of gas, the sensor produces a potential difference by changing the resistance and it can be measured as the output voltage. In view of the centralization of the gas the sensor delivers a relating potential contrast by changing the opposition of the material inside the sensor, which can be estimated as yield voltage. In light of

This voltage esteems the sort and grouping of the gas can be evaluated. The sort of gas the sensor could recognize depending upon the detecting material present inside the sensor

Generally, these sensors are accessible as modules with comparators as appeared previously. These comparators can be set for a specific limit estimation of gas focus. At the pointwhen the convergence of the gas surpasses this edge the computerized pin goes high. When a SnO_2 semiconductor layer is heated to a high temperature, oxygen is adsorbed on the surface. When the air is clean, electrons from the conduction band of tin dioxide are attracted to oxygen molecules. This creates an electron depletion layer just beneath the surface of the SnO_2 particles, forming a potential barrier. As a result, the SnO_2 film becomes highly resistive and prevents electric current flow.

In the presence of reducing gasses, however, the surface density of adsorbed oxygen decreases as it reacts with the reducing gasses, lowering the potential barrier. As a result, electrons are released into the tin dioxide, allowing current to freely flow through the sensor.

Figure 4.12 Gas Sensor Working

The pins of the gas sensor are:

1. VCC – Input Power Supply
2. GND – Supply Ground
3. DO – Digital Output
4. AO – Analog Output

4.3.8 Metal detector

Figure 4.13 Metal detector sensor

A metal detector is an instrument that detects the nearby presence of metal. Metal detectors are useful for finding metal objects on the surface, underground, and under water. The unit itself, consists of a control box, and an adjustable shaft, which holds a pickup coil, which can vary in shape and size. If the pickup coil comes near a piece of metal, the control box will register its presence by a changing tone, a flashing light, and or by a needle moving on an indicator. Usually, the device gives some indication of distance; the closer the metal is, the higher the tone in the earphone or the higher the needle goes. Another common type is stationary "walk through" metal detectors used at access points in prisons, courthouses, airports and psychiatric hospitals to detect concealed metal weapons on a person's body.

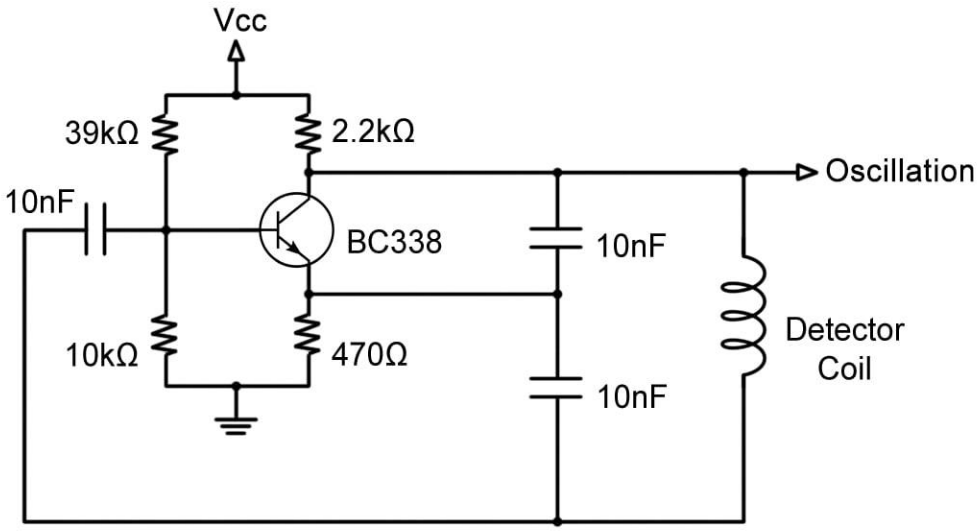
Metal detector sensor is used to identify the presence of a metal body in the nearby surrounding,these sensors can sense the object even if its buried underground. The presence of a metal makesthe LED glow or it sends signals to the buzzer. Such sensors are used for detection of mines and bomb in our project, So, as to avoid that path or to diffuse the bomb.

the series capacitor and inductor form a tank circuit. In a tank circuit, energy is transferred repeatedly between a capacitor and an inductor, resulting in oscillation. Current discharged from the capacitor flows through the inductor; when the capacitor is completely discharged, the inductor's decreasing magnetic field maintains the current flow. The capacitor will then charge with the opposite polarity, and when the magnetic field has completely collapsed, the capacitor will discharge, resulting in current flow in the direction opposite to that of the original current. This cycle continues.

The inductor of the above tank circuit forms the detector of the metal detector (a large coil of wire). When metallic material approaches the centre of the inductor (the detector coil), it enters the magnetic field created by the inductor. This changes the magnetic permeability of the inductor’s core, causing the inductance to change. The change in inductance, in turn, changes the oscillating frequency of the tank circuit.

If the components were ideal, the tank circuit would oscillate indefinitely without an external power source. But, in practice, the components are non-ideal. The unwanted resistance of the components will introduce energy loss, causing the oscillating current to taper to a stop. To counter this, a single stage BJT inverting amplifier is used to continuously add gain into the tank circuit

Figure 4.14 The Colpitts oscillator



Since the oscillation at the nodes before and after the inductor are 180° out of phase of with each other, one of the nodes will supply the oscillation to the transistor base, amplify and invert the signal at the collector, then return it in phase to the other node of the tank circuit. This entire circuit is called the Colpitts oscillator.

The Colpitts oscillator above provides a steady oscillation with a frequency in the 100kHz range. Metals from household items changing the permeability of the inductor core will fluctuate this frequency around 10kHz. Since this frequency range is outside of the human audio spectrum (20Hz to 20kHz), we will need to translate the oscillation into an audible tone.

Traditional BFO (beat-frequency oscillator) metal detectors overcome this problem by incorporating another tank circuit with a fixed frequency equal to the frequency of the detector tank circuit without the influence of any metals. Then, taking the difference between the two frequencies will isolate the fluctuating frequencies of the detector circuit and bring it down to an audible range. For this metal detector project, we will be using an Arduino to process the oscillation signal instead of offsetting the oscillation with a second tank circuit.

The Arduino will store the fixed frequency and continuously compare the incoming frequency of the detector circuit with the stored frequency.

4.3.9 COLOR SENSOR TCS 230/2300

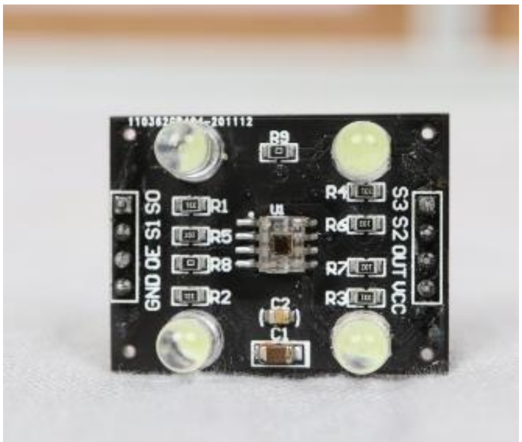


Figure 4.15 TCS COLOUR SENSOR

where 16 photodiodes have blue filters, 16 photodiodes have green filters, 16 photodiodes have red filters, and 16 photodiodes are clear with no filters.

Besides the typical VCC and GND pins for the power supply, the colour sensor breakout boards have many special pins. The colour sensor has two pins (S2 and S3) that are used to select a type out of the photodiode types (blue,

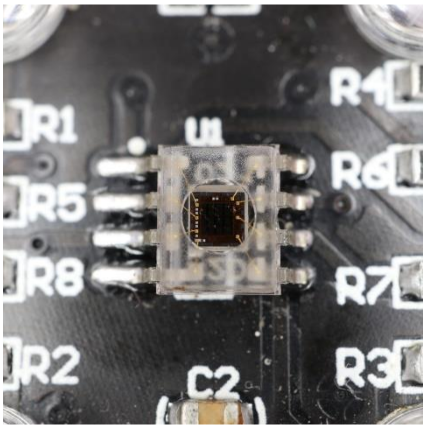


Figure 4.16 TCS230 and TCS3200 modules consists of an 8×8 photodiodes array with different filters.

green, red and clear). TCS230- and TCS3200-based colour sensors have two more pins to control the scaling of the output frequency. In particular, the frequency can be adjusted to three different presents: 2%, 20% and 100%. The adjustment of the frequency scaling is used to optimize the output of the sensor for different frequency counters or microcontrollers. Furthermore, the output enable pin (OE) places the output in the high-impedance state for multiple-unit sharing of a microcontroller input line (not used in this tutorial). The OUT pin is used to read the current sensor value.

The TCS3200 has an array of photodiodes with 4 different filters. A photodiode is simply a semiconductor device that converts light into current. The sensor has:

- 16 photodiodes with red filter – sensitive to red wavelength
- 16 photodiodes with green filter – sensitive to green wavelength
- 16 photodiodes with blue filter – sensitive to blue wavelength
- 16 photodiodes without filter

If you take a closer look at the TCS3200 chip you can see the different filters.

By selectively choosing the photodiode filter's readings, you're able to detect the intensity of the different colours. The sensor has a current-to-frequency converter that converts the photodiodes' readings into a square wave with a frequency that is proportional to the light intensity of the chosen colour. This frequency is then, read by the Arduino – this is shown in the figure below.

4.3.10 Connecting wires

Connecting wires are used to allow electrical current which is used to travel from one point of circuit to other as electricity needs a medium to travel. Most connecting wires are made up of Copper or Aluminum.

4.3.11 Double screw mount tire

Figure 4.17 Mount tire

This tire is made of rubber but the rim of the wheel is made up of hard plastic. The width of the tire is 4.5 cm and its diameter is 10 cm. The diameter of the hole through which the shaft of themotor is inserted is of 6mm.

4.3.12 Software (ARDUINO IDE)

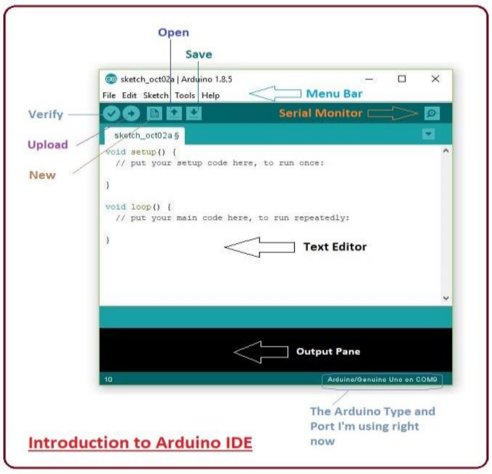


Figure 4.18 ARDUINO IDE COMPILER

Introduction to Arduino IDE, where IDE stands for Integrated Development Environment - An official software introduced by Arduino.cc, that is mainly used for writing, compiling and uploading the code in almost all Arduino modules/boards. Arduino IDE is open-source software and is easily available to download & install from Arduino's Official Site.

In this post, I'll take you through the brief Introduction of the Software, how you can install it, and make it ready for your required Arduino module. Let's dive in and get down to the nitty-gritty of this Software.

Arduino IDE is an open-source software, designed by Arduino.cc and mainly used for writing, compiling & uploading code to almost all Arduino Modules.

It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process.

It is available for all operating systems i.e., MAC, Windows, Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role in debugging, editing and compiling the code.

A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and many more.

Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code.

The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board.

The IDE environment mainly contains two basic parts: Editor and Compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module.
This environment supports both C and C++ languages.

4.3.13 Node MCU car software

Figure 4.19 Node MCU Car Software

When the NodeMCU boot up, it would create a Wi-Fi AP called "NodeMCU_Car". Enter the password 12345678 (you can change both the AP name and password) to connect the server. Then open your browser and enter 192.168.4.1. You should see the web page created by NodeMCU appear.

The code itself should be pretty clear: setup the Wi-Fi server and define what actions to do when the user send specific HTTP GET requests from their browser. You can adapt the basis of the code to do other Internet of Things (IoT) applications.

One line in the code

```
html += "<meta name=\"viewport\" content=\"width=device-width, initial-scale=1\">\n";
```

is to make the web page viewed as mobile version, so that the buttons won't be too small on phone screens.

The web page uses JavaScript to HTTP GET a new URL. It's possible to do it by POST, but for now GET is enough. If you know enough about HTML, CSS and JavaScript, you can also modify the web page anyway you like.

CHAPTER-5

5.0 SYSTEM DESIGN

The process of defining the architecture, components, data and interfaces for a system to satisfythe given requirements is known as system design.

5.1 Architectural design

System design may be a abstract model that defines the structure and behavior of the system. It contains of the system elements and therefore the relationships describing however they workalong to implement the system.

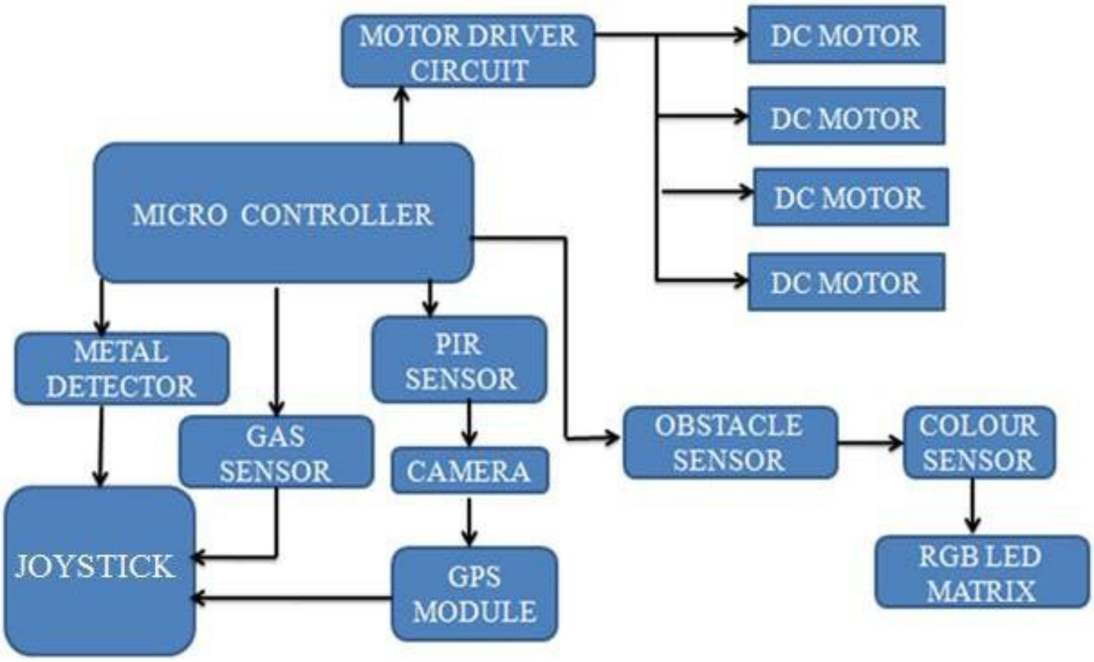


Figure 5.1 Architectural diagram of War Field Spying Robot

5.2 Data Flow Diagram

A data multidimensional language could be a graphical illustration of the "flow" of information through associate degree data system, modelling its method aspects. A DFD is commonly used as a preliminary step to make an outline of the system while not going into nice detail, which might later be detailed. DFDs also can be used for the image of information process.

A DFD shows what quite data are going to be input to and output from the system, however theinfo can advance through the system, and wherever the info is going to be hold on. It doesn't show data regarding the temporal order of method or data regarding whether or not processescan operate in sequence

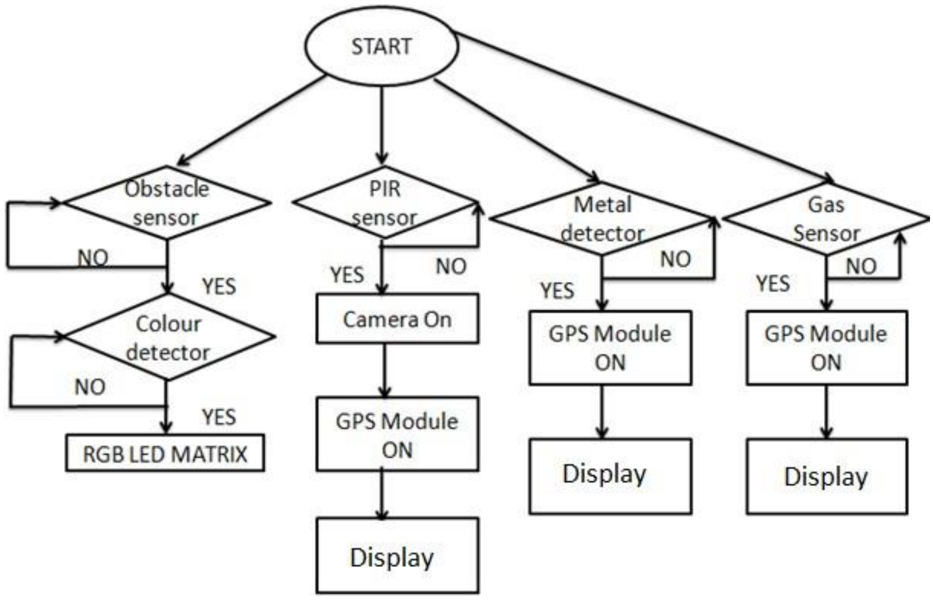


Figure 5.2 Data flow diagram

or in parallel in contrast to a multidimensional language that conjointlyshows this data

5.3 Use Case Diagram

A use case diagram at its simplest is a representation of a user's interaction with the system that shows that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accomplished by others types of diagrams as well.

Figure given below

A **UML** use case diagram is the primary form of system/software requirements for a new software program underdeveloped. Use cases specify the expected behaviour (what), and not the exact method of making it happen (how). Use cases once specified can be denoted both textual and visual representation (i.e., use case diagram). A key concept of use case modelling is that it helps us design a system from the end user's perspective. It is an effective technique for communicating system behaviour in the user's terms by specifying all externally visible system behaviour.

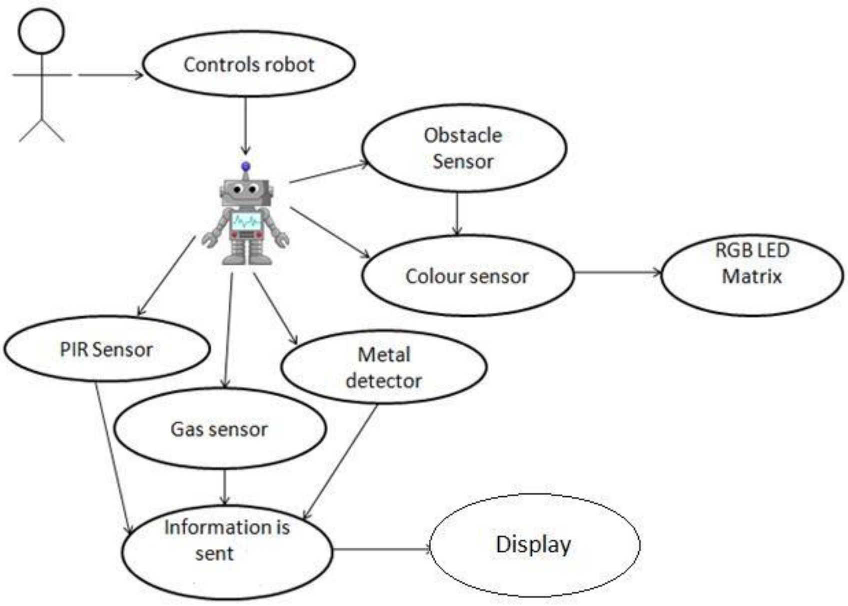


Figure 5.3 Case Diagram

A use case diagram is usually simple. It does not show the detail of the use cases:

- It only summarizes **some of the relationships** between use cases, actors, and systems.
- It does **not show the order** in which steps are performed to achieve the goals of each use case.

As said, a use case diagram should be simple and contains only a few shapes. If yours contain more than 20 use cases, you are probably misusing use case diagram.

This GSM home security system is based on Arduino; hence the connections are simple. The components are connected as –

The PIR sensor has a digital output pin and the pin is connected to any of the digital I/O pins of the Arduino board.

5.4 Circuit Design

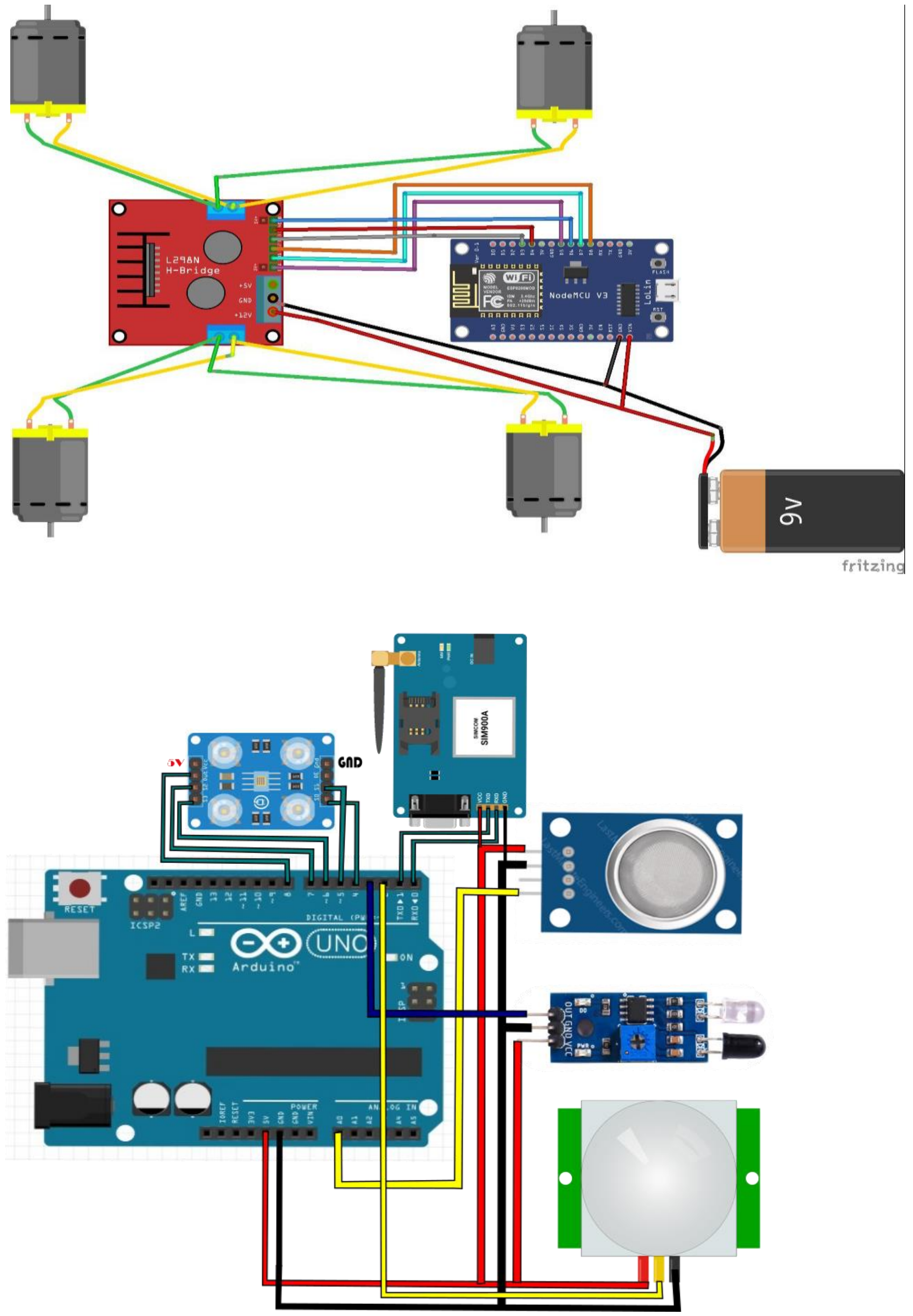


Figure 5.4 Circuit diagram for robot

The GSM 900A module has two pins Rx & Tx that communicates with the microcontroller in a serial manner. And, these pins of the GSM Module are connected to the Tx & Rx pins of the Arduino Uno.

It is important to disconnect the GSM module while uploading the program code (sketch) to Arduino, as it might cause interference with the serial communication with the Arduino IDE.

Arduino GSM Working

The PIR, MQ2, TCS230 sensor detects the motion by sensing the difference in infrared levels emitted by surrounding objects. When there is any motion the output of the PIR sensor goes high.

The range of this sensor is around 6 meters. The PIR sensor requires a warm-up time of 20 to 60 seconds for proper operation because the sensor calibrates its sensor according to the environment in this settling time and stabilizes the infrared detector.

The output of the sensor is high when it detects any motion. This is detected by Arduino, then Arduino communicates with the GSM module via serial communication to connect a call to the mobile number pre-programmed in the code.

The output of PIR sensor goes low from time to time, so it may mislead the Arduino even when there is motion & considers that there is no motion.

This issue can be solved during the Arduino programming by ignoring the low output signals that have a short time duration than a predefined time.

5.5 Sequence diagram

A sequence diagram shows object interactions organized in time sequence. It depicts the objectsand categories concerned within the state of affairs and therefore the sequence of messages changed between the objects required to hold out the practicality of the state of affairs. Sequence diagrams square measure generally related to use case realizations within the Logical read of the system beneath development. Sequence diagrams square measure typically known as event diagrams or event situations.

A sequence diagram shows, as parallel vertical lines (lifelines), totally different processes or objects that live at the same time, and, as horizontal arrows, the messages changed between them, within the order within which they occur. this permits the specification of easy runtime situations in an exceedingly graphical manner.

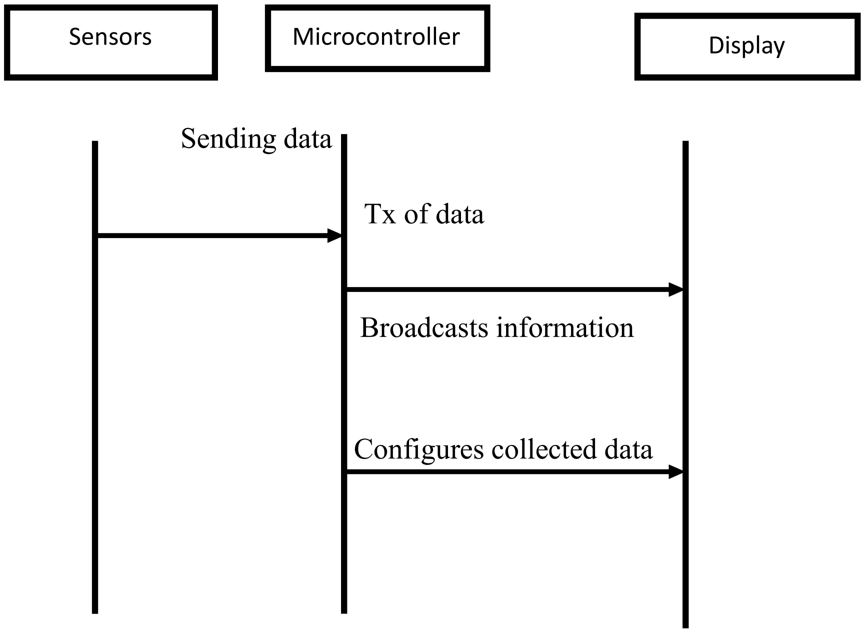


Figure 5.5 Sequence Diagram

CHAPTER-6

6.0 DESIGN PROCEDURE

The robot is a physically structured, which hard, rigid and strong which is really helpful in defense space which is really required and essential and acts as a life savior. So, this is our main goal ofproject.

The wireless night vision camera embedded on the robot consists of wireless transmitter. The main thing is wireless night vision camera, night vision camera is a device which will allow us tosee in dark also which is the main advantage of this project. With human eyes we will be not able see very small part of the electromagnetic spectrum. The part which helps us to see is called as "Visible Spectrum".

Basically, this concept is simple –A wireless night vision camera is a device which emits infrared"light" and it is also capable of detecting it in camera. The main and only difference between a night vision camera and normal camera that is used for film is that is being lighted by a normal lamp which we cannot see in infrared light with human eyes but we can see that in infrared camera. This helps us to see in dark.

All we need to have been the following components to design a war field spying robot apart from a base with wheels and motors.

Sensor Unit: Apart from what a basic camera consists of, it consists of a transmitter unit. It captures images and transmits these images through the transmitter in the form of digital signals, which are received by the receiver unit connected to the TV or computer. The camera can be as far as 30 miles away from the receiver. A night vision camera can receive illumination either by amplifying the visible light using image intensifiers or using infrared light directly by objects – thermal imaging or infrared light reflected by objects-near infrared illumination.

A Receiver Unit: The robot also consists of a receiver unit that receives the command signals for controlling the motors and thus the robot unit.

Actuators: It consists of two DC motors as actuators that provide reverse and forward motion to the robot.

Control Unit: It consists of a remote transmitter unit consisting of a microcontroller, encoder, and an RF module and a receiver unit embedded on the circuit consisting of an RF receiver module, a microcontroller, and a decoder.

6.1 Control & Mechanism of Movement

The robot is controlled by joystick, which allows the robot to move in desirable direction The goal of the joystick is to communicate motion in 2 axes to an Arduino. They act as a dual voltage divider providing two-axis analog input in a control stick form. It completely helps in the movement of robot in forward, backward, right and left, clockwise and counter clockwise direction using six buttons. All the movement is based on the truth table 6x4 encoder circuit.

6.2 Safety Measurements Fail Safes

The robot is equipped with RGB colour detection unit it detects colour accordingly and it will activate itself using the sensors and it helps in camouflage. We have used hazardous gas detection sensors too with RGB sensors, it helps in detecting hazardous equipment's and gases too. And another safety feature used and main goal of our project is night vision wireless camerawhich helps in night vision as well as it helps in vision in light vision too, which we can never seein human eyes so this is really helpful in war field.

No two robots are used the same way, even for the same type of job. That means the safety risks and procedures are different in every application. An experienced integrator can help you anticipate safety problems and what will change when moving from manual to automated or robotic assisted work.

A formal risk assessment should be based on your application in your facility, not just generalities. Many of the dangers of manual manufacturing work persist in automated systems (e.g. fumes and burns in welding, cuts and abrasions from grinding/deburring). In addition, equipment like conveyors, turntables, gantries, and even safety gates or doors present hazards.

Also, not all potential risks are assigned the same priority. The severity and likelihood of potential injuries and the frequency of worker exposure to specific risks should guide prevention strategies.

The American National Standards Institute and the Robotic Industries Association standard ANSI/RIA R15.06-2012 illustrates the range of situations where risks occur

Actions of the robot under normal operating conditions and during teaching/programming, maintenance, setting, and cleaning

- Unexpected startup, power surge, or loss

- Access from all directions around machine/cell
- Accidental or intentional misuse of robot or tooling
- Computerized controls failure

  Within the above situations are these factors
- Robot payload, reach, operating speed, and path of motion
- End-of-arm tooling (e.g., sharp edges, pinch points, fumes, hot surfaces)
- Collision points where an operator's path crosses with that of the robot
- Location of the work area relative to other hazardous areas and a workers' ability to exit quickly if necessary
- Any continued movement due to inertia after powering off, and movement/lowering of overhead equipment when de-energized or de-pressurized

6.3 Source code

Source code for Arduino uno

```
#include <SoftwareSerial.h>
SoftwareSerial gsmSerial(7, 8);   // RX, TX to GSM module  const
int pirPin = 2;     // Connect PIR output to this pin const
int irPin = 3;      // Connect IR sensor output to this pin const
int mq2Pin = A0;    // Connect MQ2 sensor output to this pin const
int s0Pin = 4;      // Connect S0 pin to this pin const
int s1Pin = 5;      // Connect S1 pin to this pin const
int s2Pin = 6;      // Connect S2 pin to this pin const
int s3Pin = 7;      // Connect S3 pin to this pin const
int sensorOutPin = 8; // Connect OUT pin to this pin
void setup()
{
pinMode(pirPin, INPUT);
pinMode(irPin, INPUT);
pinMode(mq2Pin, INPUT);
pinMode(s0Pin, OUTPUT);
pinMode(s1Pin, OUTPUT);
pinMode(s2Pin, OUTPUT);
pinMode(s3Pin, OUTPUT);
```

```
 pinMode(sensorOutPin, INPUT);
  Serial.begin(9600);
 gsmSerial.begin(9600);
  while (!gsmSerial.available())
  {
 Serial.println("Initializing GSM module...");
   delay(1000);
  }
gsmSerial.println("AT+CMGF=1");
 delay(1000);
 Serial.println("GSM module ready!");
 }   void loop(){   int pirValue = 3
,gitalRead(pirPin);     // Read PIR sensor output
int irValue = digitalRead(irPin);       // Read IR obstacle sensor output
int mq2Value = analogRead(mq2Pin);      // Read MQ2 gas sensor output
 digitalWrite(s0Pin, HIGH);  // Choose red LED
digitalWrite(s1Pin, LOW);
  int redFrequency = pulseIn(sensorOutPin, LOW);
 digitalWrite(s2Pin, LOW);   // Choose blue LED
digitalWrite(s3Pin, LOW);
int blueFrequency = pulseIn(sensorOutPin, LOW);      // Check PIR sensor for
activity
 if (pirValue == HIGH)
 {
sendSMS("Activity detected by PIR sensor!");
delay(4000);  // Delay to avoid sending multiple messages
 }      // Check IR sensor for obstacle
 if (irValue == HIGH)
{
  sendSMS("Obstacle detected by IR sensor!");
  delay(4000);
// Delay to avoid sending multiple messages
  }
```

```
   // Check MQ2 gas sensor for gas
if (mq2Value > 500)
{
 sendSMS("Gas detected by MQ2 sensor!");
delay(4000); // Delay to avoid sending multiple messages
 }      // Check TCS3200 sensor for blue color
 if (blueFrequency > redFrequency)
 {     sendSMS("Blue color detected by TCS3200 sensor!");
   delay(4000); // Delay to avoid sending multiple messages
    } }   void sendSMS(String message)
 {
gsmSerial.println("AT+CMGS=\"+919490576265\"");
  // Replace "+91xxxxxxxxxx" with receiver's mobile number
  delay(1000);
gsmSerial.println(message);
delay(100);
gsmSerial.println((char)26);
delay(1000);   Serial.println(message);
 }
```

Code For Car Control

```
#define ENA   14          // Enable/speed motors Right        GPIO14(D5)
#define ENB   12          // Enable/speed motors Left         GPIO12(D6)
#define IN_1  15          // L298N in1 motors Right           GPIO15(D8)
#define IN_2  13          // L298N in2 motors Right           GPIO13(D7)
#define IN_3  2           // L298N in3 motors Left            GPIO2(D4)
#define IN_4  0           // L298N in4 motors Left            GPIO0(D3)

#include <ESP8266WiFi.h>
#include <WiFiClient.h>
#include <ESP8266WebServer.h>
String command;             //String to store app command state.
int speedCar = 800;         // 400 - 1023.
int speed_Coeff = 3;
```

```
const char* ssid = "Indian Lifehacker wifi car";
ESP8266WebServer server(80);
void setup() {
 pinMode(ENA, OUTPUT);
 pinMode(ENB, OUTPUT);
 pinMode(IN_1, OUTPUT);
 pinMode(IN_2, OUTPUT);
 pinMode(IN_3, OUTPUT);
 pinMode(IN_4, OUTPUT);
  Serial.begin(115200);
// Connecting WiFi
  WiFi.mode(WIFI_AP);
  WiFi.softAP(ssid);
  IPAddress myIP = WiFi.softAPIP();
  Serial.print("AP IP address: ");
  Serial.println(myIP);
 // Starting WEB-server
     server.on ( "/", HTTP_handleRoot );
     server.onNotFound ( HTTP_handleRoot );
     server.begin();
}
void goAhead(){

      digitalWrite(IN_1, LOW);
      digitalWrite(IN_2, HIGH);
      analogWrite(ENA, speedCar);

      digitalWrite(IN_3, LOW);
      digitalWrite(IN_4, HIGH);
      analogWrite(ENB, speedCar);
  }
void goBack(){
      digitalWrite(IN_1, HIGH);
```

```
    digitalWrite(IN_2, LOW);
    analogWrite(ENA, speedCar);
    digitalWrite(IN_3, HIGH);
    digitalWrite(IN_4, LOW);
    analogWrite(ENB, speedCar);
  }
void goRight(){
    digitalWrite(IN_1, HIGH);
    digitalWrite(IN_2, LOW);
    analogWrite(ENA, speedCar);
    digitalWrite(IN_3, LOW);
    digitalWrite(IN_4, HIGH);
    analogWrite(ENB, speedCar);
  }
void goLeft(){
    digitalWrite(IN_1, LOW);
    digitalWrite(IN_2, HIGH);
    analogWrite(ENA, speedCar);

    digitalWrite(IN_3, HIGH);
    digitalWrite(IN_4, LOW);
    analogWrite(ENB, speedCar);
  }

void goAheadRight()
{
    digitalWrite(IN_1, LOW);
    digitalWrite(IN_2, HIGH);
    analogWrite(ENA, speedCar/speed_Coeff);
    digitalWrite(IN_3, LOW);
    digitalWrite(IN_4, HIGH);
    analogWrite(ENB, speedCar);
  }
```

```
void goAheadLeft()
{
    digitalWrite(IN_1, LOW);
    digitalWrite(IN_2, HIGH);
    analogWrite(ENA, speedCar);
    digitalWrite(IN_3, LOW);
    digitalWrite(IN_4, HIGH);
    analogWrite(ENB, speedCar/speed_Coeff);
 }
void goBackRight(){

    digitalWrite(IN_1, HIGH);
    digitalWrite(IN_2, LOW);
    analogWrite(ENA, speedCar/speed_Coeff);

    digitalWrite(IN_3, HIGH);
    digitalWrite(IN_4, LOW);
    analogWrite(ENB, speedCar);
 }

void goBackLeft(){

    digitalWrite(IN_1, HIGH);
    digitalWrite(IN_2, LOW);
    analogWrite(ENA, speedCar);

    digitalWrite(IN_3, HIGH);
    digitalWrite(IN_4, LOW);
    analogWrite(ENB, speedCar/speed_Coeff);
 }

void stopRobot(){
```

```
    digitalWrite(IN_1, LOW);
    digitalWrite(IN_2, LOW);
    analogWrite(ENA, speedCar);

    digitalWrite(IN_3, LOW);
    digitalWrite(IN_4, LOW);
    analogWrite(ENB, speedCar);
 }

void loop () {
   server.handleClient();

    command = server.arg("State");
    if (command == "F") goAhead();
    else if (command == "B") goBack();
    else if (command == "L") goLeft();
    else if (command == "R") goRight();
    else if (command == "I") goAheadRight();
    else if (command == "G") goAheadLeft();
    else if (command == "J") goBackRight();
    else if (command == "H") goBackLeft();
    else if (command == "0") speedCar = 400;
    else if (command == "1") speedCar = 470;
    else if (command == "2") speedCar = 540;
    else if (command == "3") speedCar = 610;
    else if (command == "4") speedCar = 680;
    else if (command == "5") speedCar = 750;
    else if (command == "6") speedCar = 820;
    else if (command == "7") speedCar = 890;
    else if (command == "8") speedCar = 960;
    else if (command == "9") speedCar = 1023;
    else if (command == "S") stopRobot();
```

```
}

void HTTP_handleRoot(void) {

if( server.hasArg("State") ){
      Serial.println(server.arg("State"));
  }
  server.send ( 200, "text/html", "" );
  delay(1);
}
```

CHAPTER-7

7.0 RESULTS

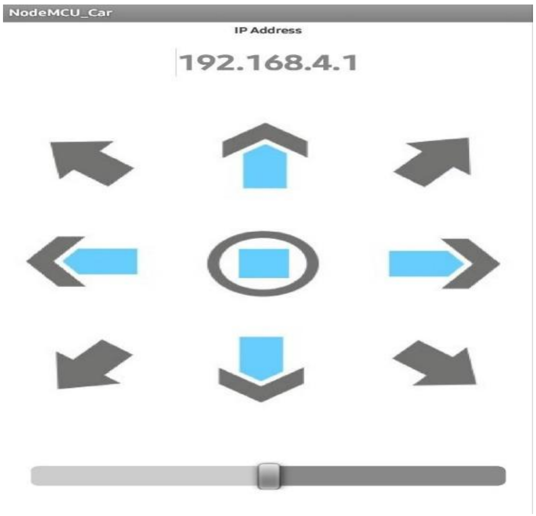


Figure 7.1 Car Controlling Screen

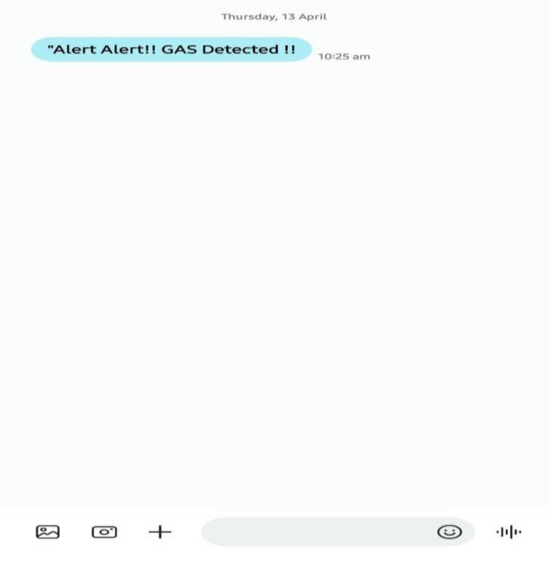


Figure 7.2 MQ2 is detected smoke Gsm send message to phone

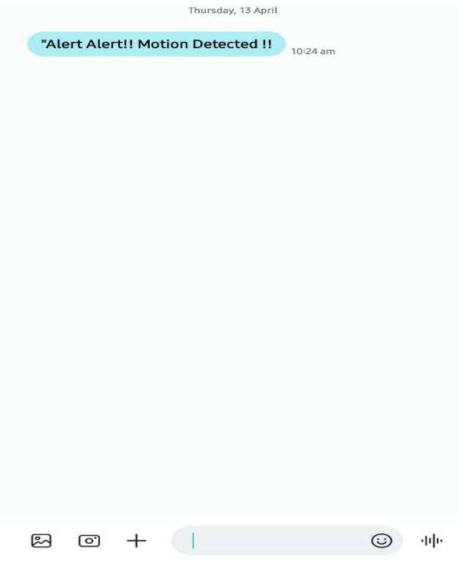


Figure 7.3 PIR sensor detected motion Gsm send message to phone

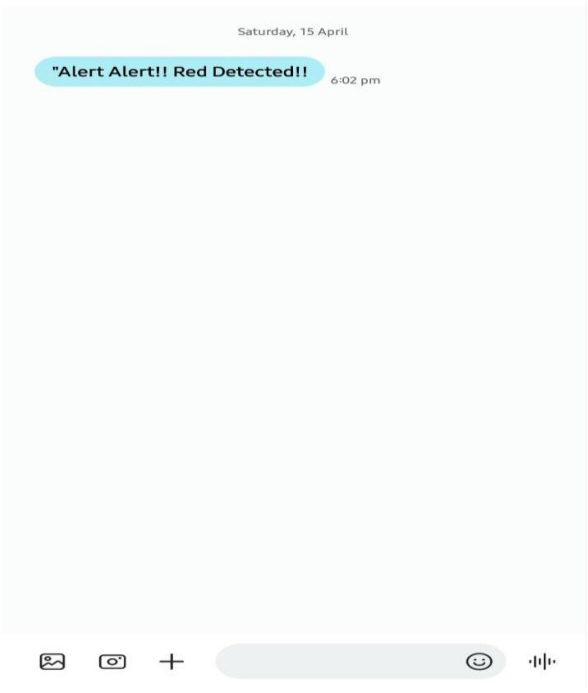


Figure 7.4 TCS 230 detected colour Gsm send message to phone

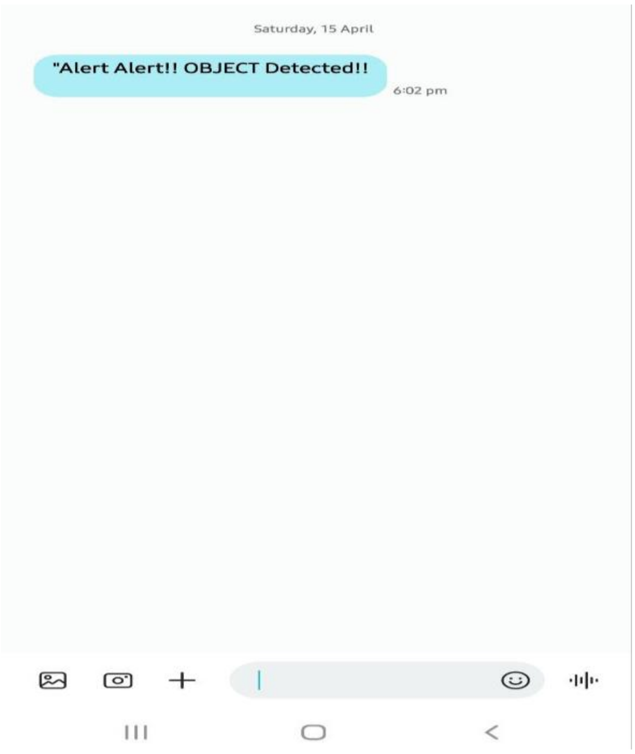


Figure 7.5 IR object detected Gsm send message to phone

CHAPTER-8

8.0 FUTURE SCOPE

With the facilitate of this we tend to aimed toward getting the accuracy. it's been tested to better of our ability. we tend to were ready to read the things accurately that were happening. In our read. Our style has not caused any type of disturbances. This mechanism can move supported the motor direction relying upon the input we tend to offer through command via remote section unit. With the facilitate of camera we tend to are in a position to read the thingsthat are happening within the war field wherever the mechanism is hidden

The amount of risk can be reduced in war fields. Robot can be controlled from any place using GUI Based on the information we can take up the action automatically It can be controlled through mobile app also We can also control it through voice control with any disturbances. This spying robot can be modified and made it for prolonged ranged and can be make it more useful by consuming more operational procedures and modules like Wi-Fi module, raspberry pi. Future scope of this robot is very efficient it may have gas sensors to detect the harmful or hazardous gases in the surroundings. It can also be used as bomb diffuser and bomb disposal team can also use this type of robot in many ways and reduces the risk factor of human loss. Further, a terminating framework can be set on the robot, to fire any foe when he is spotted. The innovation can be enhanced further by offering directions to accepting circuit and control it by utilizing satellites correspondence. It will be utilized in shopping centers for pickup, drop trolleys and car vehicle painting. Likewise, the framework can be made android based, where all controlling should be possible through an advanced mobile phone. There is a light called halogen light which is useful for the camera’s vision which is attached on the robot. This robot can also be controllable by giving commands through voice it will response to the voice commands also.

8.1 Conclusion

Every day our soldiers will walk into the death, they will keep their life at risk to save our lives. It's more important for us (upcoming generation) to concentrate on this part and take this as responsibility to reduce the risk they take up, which can actually help them in analysing all the status of enemies before they the field.

So, we wanted to give that would really help them and reduce their work and the amount of risk. That something is our interesting project that is WAR FIELD SPYING ROBOT. so, this robot will give them complete support as in this can even climb the steps, trees, detects the bomb and hazardous equipment's and also harmful gases too. It also contains laser that will guide the missile by locking the coordinates of striking area and we have inserted RGB colour detection unit which helps the robot to camouflage.

Our main aim of the project is to help our soldiers and reduce their works. This project completely will reduce the risk of the soldiers walking into the death and helps their job. Hence the work we are presented here, WAR FIELD SPYING ROBOT can play a wide role in helping our soldiers from walking into deaths.

The technology that empowers robot senses has fostered our ability to communicate electronically for many years. Electronic communication mechanisms, such as microphones and cameras, help transmit sensory data to computers within simulated nervous systems. Sense is useful, if not fundamental to robots' interaction with live, natural environments.

The human sensory system is broken down into vision, hearing, touch, smell and taste – all of which have been or are being implemented into robotic technology somehow. Vision and hearing are simulated by transmitting media to databases that compare the information to existing definitions and specifications. When a sound is heard by a robot, for example, the sound is transmitted to a database (or "lexicon") where it is compared among similar sound waves.

Self-driving vehicles are a great example of how robotic senses work. The car is stacked with sensors such as LIDAR, RADAR, video cameras, GPS, and wheel encoders that allow it to collect data from its surroundings in real time. Advanced perception algorithms will then elaborate this raw data to allow the AI to compare it against a set of pre-defined items. This way the vehicle will be able to identify and, thus, "sense" other cars, road signs, highways, pedestrians, etc. Much still needs to be done before engineers will truly be able to make human-robot interactions more genuine. A particularly coveted frontier of machine perceptivity for which modern robotics is focusing all its endeavours is the ability to recognize human emotions from facial expressions. Although not yet fully employed in robotics, early emotion recognition systems are currently tested by several tech companies, including Google, Amazon and Microsoft.

These not-particularly-intelligent AI-powered systems are being used for a variety of purposes, such as empowering surveillance cameras with the ability to identify suspicious people or gauge how customers respond to advertisements. Whether these techs will be used for teaching machines how to better understand humans, or just demolish our right to privacy even more, only time will tell.

8.2 Advantages

1. Reduces human casualties – The WAR FIELD SPYING ROBOT will serve the appropriate machine for defense sector to reduce the amount of risk and loss of human life in army and it also helps soldiers to know information about enemy before the enter their field.

2. Makes all kind of work easier in war field- The WAR FIELD SPYING ROBOT has a capability to reduce the amount of risk taken by soldiers every day. Robot especially helps them in detectingthe hazardous equipment's and it can detect hazardous gases too which will be really helpful tothem. It can run through any surface so this is one more plus point of this project.
3. Helps the disabled soldiers too- In war field suppose if any solders get injured and they can'twalk or run anymore that time also they can make use of this and they can make sure the statusof the opponents.
4. Makes all activities faster and easier
5. Lifesaving and safety.
6. Robots can make quick decisions in fast-paced combat situations.
7. Human lives can be saved if robots are sent into frontline combat.
8. They can be mass-produced and upgraded instead of being trained.
9. Military robots can traverse hazardous environments that are otherwise fatal to humans
10. military robots are often lifesaving, they can perform duties similar to human duties without the actual danger to human lives.

11. They can be easily replaceable.

8.3 Disadvantages

1. Requires expertise- The main disadvantage is that they should know how to handle it and theyshould know how to operate the robot else whole the effort put in is waste.
2. Investment- Even though robot is very helpful and life saver but it is bit costlier, this makethem step back to take up this robot because providing it every section may be difficult.
3. Network- Network is also the main concern for robot to work accordingly, if the network isnot proper then the robot may not work.

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