A PROJECT REPORT ON

OBSERVATORY ROVER

Submitted in fulfillment of the requirements for

The Award of the Degree of

Industrial training

In

Diploma in Electronics & Communication engineering

Submitted By

G.Gurunadham (20028-EC-043)

K.Uday (20028-EC-074)

D.Naveen (20028-EC-029)

K.Sriram (20028-EC-061)

K.Rohith (20028-EC-062)

G.Lakshman (20028-EC-047)

K.Varun Adithya (20028-EC-064)

V.Revathi (20030-EC-257)

G.Krishna Sai (20028-EC-048)

K.Hemanth Kumar (20028-EC-075)

B.Tarun (20028-EC-012)

G.Sai Kiran (20028-EC-040)

Ch.Nithin (20028-EC-025)

B.Likith Babu (20028-EC-019)

B.Pavan Kumar (20028-EC-011)

L.Jagadaditya (20028-EC-055)

J.Gopichand (20028-EC-057)

S.Balaji (20030-EC-229)

G.Venkata Sai srinu (20028-EC-053)

Ch.Prashanth (20028-EC-021)

K.Harshavardhan (20028-EC-073)

B.Ramji Amedkar (20028-EC-010)

G.Vardhan (20028-EC-042)

K.Balakrishna (20028-EC-069)

G.Sampath Kumar (20028-EC-038)

J.Govardhan (20028-EC-059)

G.Eswar Sai (20028-EC-050)

G.Vamsi (20028-EC-049)

Under the guidance of

K. SUNIL KUMAR. M.Tech

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERINGDEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Session (August-January)

2022-2023

ANDRAPRADESH STATE SKILL DEVELOPMENT CARPORATION

SIR C R REDDY COLLEGE OF ENGINEERING ELURU

CERTIFICATE

This is to certify that this project work entitled **observatory Rover** has beensuccessfully completed by the following students

G.Gurunadham (20028-EC-043)

K.Uday (20028-EC-074)

D.Naveen (20028-EC-029)

K.Sriram (20028-EC-061)

K.Rohith (20028-EC-062)

G.Lakshman (20028-EC-047)

K.Varun Adithya (20028-EC-064)

V.Revathi (20030-EC-257)

G.Krishna Sai (20028-EC-048)

K.Hemanth Kumar (20028-EC-075)

B.Tarun (20028-EC-012)

G.Sai Kiran (20028-EC-040)

Ch.Nithin (20028-EC-025)

B.Likith Babu (20028-EC-019)

B.Pavan Kumar (20028-EC-011)

L.Jagadaditya (20028-EC-055)

J.Gopichand (20028-EC-057)

S.Balaji (20030-EC-229)

G.Venkata Sai srinu (20028-EC-053)

Ch.Prashanth (20028-EC-021)

K.Harshavardhan (20028-EC-073)

B.Ramji Amedkar (20028-EC-010)

G.Vardhan (20028-EC-042)

K.Balakrishna (20028-EC-069)

G.Sampath Kumar (20028-EC-038)

J.Govardhan (20028-EC-059)

G.Eswar Sai (20028-EC-050)

G.Vamsi (20028-EC-049)

Project Guide

K. SUNIL KUMAR. M Tech

ECH LAB,Dept of ECE

ACKNOWLEDGEMENT

Our most sincere and grateful acknowledgement is due to this sanctum **(ANDRAPRADESH STSTE SKILL DEVELOPMENT CORPORATION) (APSSDC)** for Giving us the opportunity to full fill our aspiration and become engineers

We express our profound gratitude and acknowledgement our deep indebtedness to our project guide **K.Sunil Kumar** MTech **,**whose valuable suggestions and guidance helped us a lot in completing and presenting our project work on **OBSERVATORY ROVER**

Lastly, we thanked one and all who helped us directly and indirectly in completing the project successfully

Project Associates…..

G.Gurunadham (20028-EC-043)

K.Uday (20028-EC-074)

D.Naveen (20028-EC-029)

K.Sriram (20028-EC-061)

K.Rohith (20028-EC-062)

G.Lakshman (20028-EC-047)

K.Varun Adithya (20028-EC-064)

V.Revathi (20030-EC-257)

G.Krishna Sai (20028-EC-048)

K.Hemanth Kumar (20028-EC-075)

B.Tarun (20028-EC-012)

G.Sai Kiran (20028-EC-040)

Ch.Nithin (20028-EC-025)

B.Likith Babu (20028-EC-019)

B.Pavan Kumar (20028-EC-011)

L.Jagadaditya (20028-EC-055)

J.Gopichand (20028-EC-057)

S.Balaji (20030-EC-229)

G.Venkata Sai srinu (20028-EC-053

Ch.Prashanth (20028-EC-021)

K.Harshavardhan (20028-EC-073)

B.Ramji Amedkar (20028-EC-010)

G.Vardhan (20028-EC-042)

K.Balakrishna (20028-EC-069)

G.Sampath Kumar (20028-EC-038)

J.Govardhan (20028-EC-059)

G.Eswar Sai (20028-EC-050)

G.Vamsi (20028-EC-049)

DECLARATION

We hereby declare that results of study presented in his dissertation entitled **OBSERVATORY ROVER** Is original and carried out by our team

Under the supervision of K.SUNIL KUMAR MTech Electronic Home trainer, APSSDC (SIR CR R COLLEGE)during the session (August -December)in partial fulfillment of the award of industrial training. This work has not been submitted for the award of any degree in part of full prior to this date as per our knowledge

G.Gurunadham (20028-EC-043)

K.Uday (20028-EC-074)

D.Naveen (20028-EC-029)

K.Sriram (20028-EC-061)

K.Rohith (20028-EC-062)

G.Lakshman (20028-EC-047)

K.Varun Adithya (20028-EC-064)

V.Revathi (20030-EC-257)

G.Krishna Sai (20028-EC-048)

K.Hemanth Kumar (20028-EC-075)

B.Tarun (20028-EC-012)

G.Sai Kiran (20028-EC-040)

Ch.Nithin (20028-EC-025)

B.Likith Babu (20028-EC-019)

B.Pavan Kumar (20028-EC-011)

L.Jagadaditya (20028-EC-055)

J.Gopichand (20028-EC-057)

S.Balaji (20030-EC-229)

G.Venkata Sai srinu (20028-EC-053)

Ch.Prashanth (20028-EC-021)

K.Harshavardhan (20028-EC-073)

B.Ramji Amedkar (20028-EC-010)

G.Vardhan (20028-EC-042)

K.Balakrishna (20028-EC-069)

G.Sampath Kumar (20028-EC-038)

J.Govardhan (20028-EC-059)

G.Eswar Sai (20028-EC-050)

G.Vamsi (20028-EC-049)

ABSTRACT

We review the main components of autonomous scientific discovery, and how they lead to the concept of a Robot Scientist. This is a system which uses techniques from artificial intelligence to automate all aspects of the discovery process: it is model of scientific domain design experiments to run the physical experiments using robotic system analysing and interprets the resulting data and repeats the cycle. We believe the greater automation of both the physical and intellectual aspects of scientific investigations to be essential to the future of science. Greater automation improves the accuracy and reliability of experiments, increases the pace of discovery and, in common with conventional laboratory automation, removes tedious and repetitive tasks from the human scientist.

Rover

Robot Scientists are the next logical step in laboratory automation. They can automate all aspects of the scientific discovery process: they generate hypotheses from a computer model of the domain, design experiments to test these hypotheses, run the physical experiments using robotic systems, and then analyse and interpret the results. The main components of a robot are Manipulators, End Effectors, Feedback systems put humans in harmful situations. To prevent the loss of human life, robots Dangerous can be used. They can measure and detect variables beyondhuman perception. Robots can defuse bombs, traverse distant planets, and inspect unstable structures.

Introduction

Rover is designed by splitting into three parts like chassis, robotic arm, and communication. Rover runs based on the wheels, motors and chassis part is made up of iron to tolerate some weight.

Robotic arms named because a human arm typically mounted to the base the arm contains multiple joints act as axes that enable a degree of movement.

Main parts of the robotic arm are

- ✓ Digital I/o controller

Robotic arm is invented by George and marketed by the Joseph Engel Berger.

A robotic arm is a type of mechanical arm, usually programable, with similar functions to a human arm; the arm may be the sum of the mechanism or may be part of a more complex reboot

Robotic arm performs many tasks for human workers like pick and place and other materials handling application that can be dull and inducing

- ✓ The robot can Perceive the environment using sensors

Types of robotic arms

- Articulated arm.
- Six-axis.
- Collaborative robot.
- SCARA.
- Cylindrical.
- Spherical/Polar.
- Parallel/Delta.
- Cartesian.

Robotic arms can be used to automate the process of placing goods or product on to pallets. The use of robotic arm also free human worker from performing tasks that a risk of bodily injury.

Mechanical arms are to be composed multiple beams connected by hinges powdered by actuators one of the arms is connected to the base while the other has a tool. They can be controlled mechanical arm is called a ROBOTIC ARM

Robotic communication is an area of research that focuses on the human interaction with robots in a variety of contexts. Most commonly, this area of research is referred to as **Human-robot interaction (HRI**).

For a variety of reasons, including complexity and cost, this is no longer used and Ethernet connectivity, now standard on robots, is a widely used method for communications. In addition, other commonly used methods of communication, especially on larger industrial automation systems include Fieldbus (which connects sensors and actuators) and Profibus (message passive communication node that reacts to prompts from the master by sending a response)

Speech and sound. Almost all modern social robots are equipped with internal loudspeakers and virtual speech synthesis software so that they can be made to say anything they are programmed to say, comprehensibly to human beings around them.

To perform a particular action, robots are programmed either by guiding or by off-line programming. Most of the industrial robots are programmed by guiding a robot from point to point through the phases of an operation, with each point stored in the robotic control system.

UART stands for (universal asynchronous reception and transmission) and is simple communication protocol that allows the Arduino to communicate with serial devices

The UART system communicates with digital pin RX (RECEPTION (0), digital pin TX (TRANSMISSION) (1) and with another computer via the USB (universal serial bus) port.

They communicate with each other through X-band, which are radio waves at a much higher frequency than radio waves used for FM stations

rover communicates with the DSN (DATA SOURCE NAME) through radio waves. They communicate with each other through X-band which are radio waves at a much higher frequency than radio wave used for FM station.

objective of the work

Robotics is the intersection of science, engineering and technology that produces machines, called robots, that replicate or substitute for human actions. Culture has always been fascinated with robots — examples include the Terminator. These over-exaggerated, humanoid concepts of robots usually seem like a caricature of the real thing. Robots are gaining intellectual and mechanical capabilities that do not put the possibility of a machine out of reach in the future.

Robotics develops machines that can substitute for humans and replicate human actions. Robots can be used in many situations for many purposes, but today many are used in dangerous environments (including inspection of radioactive

materials, bomb detection and deactivation), manufacturing processes, or where humans cannot survive (e.g., in space, underwater, in high heat, and clean up and containment of hazardous materials and radiation). Robots can take any form, but some are made to resemble humans 908 in appearance. This is claimed to help in the acceptance of robots in certain replicative behaviours which are usually performed by people. Such robots attempt to replicate walking, lifting, speech, or any other human activity. Many of today's robots are inspired by nature, contributing to the field of bio-inspired robotics.

The goal of robotics is to design machines that can help and assist humans. Robotics integrates fields of mechanical engineering, electrical engineering, information engineering, mechatronics, electronics, bio engineering, computer engineering, control engineering, software engineering, mathematics, etc.

Robotics deals with the design, construction, operation, and use of robots and computer systems for their control, sensory feedback, and information processing. A robot is a unit that implements this interaction with the physical world based on sensors, actuators, and information processing.

over view

Components

s.no	Components	Quantity
1	motor	500 RPM,12 volts
2	wheels	10*4
3	Square pipe	20 feet
4	Round pipe	10 feet
5	Bearing	6
6	LB Bends	2
7	bolts	22

8	Metal sheet	3 meters
9	Solar panels	99*50/6v -10

Robot, any automatically operated machine that replaces human effort, though it may not resemble human beings in appearance or perform functions in a humanlike manner. By extension, robotics is the engineering discipline dealing with the design, construction, and operation of robots.

A robot is a type of automated machine that can execute specific tasks with little or no human intervention and with speed and precision. The field of robotics, which deals with robot design, engineering, and operation, has advanced remarkably in the last 50 years.

The overview of this project is chassis, robotic arm, and communication

The weight of the chassis is the kgs, which is made up of the iron to tolerate some weight, which can run by the help of the wheels and motors, the size of the wheels is 10*4. The RPM (revolutions per minute) of the motors is 500 and 12-volts battery supply to rotate the wheels freely.

The 20 feet square pipe is used to prepare the frame. the 10 feet round pipe is used to hold the wheels by cutting them into desired shape, the bearings is used to reduce the friction and make the rotation smoother. We have using 6 bearing to smooth running the rover

The solar panels are converting the sunlight energy into the electrical energy either through photovoltaic panels or through mirrors that concentrate solar radiation.

A solar cell panel, solar electric panel, photo-voltaic (PV) module or solar panel is an assembly of photovoltaic cells mounted in a framework for generating energy. Solar panels use sunlight as a source of energy to generate direct current electricity. A collection of PV (photovoltaic) modules is called a PV panel, and a system of PV panels is called an array. Arrays of a photovoltaic system supply solar electricity to electrical equipment and back up battery

The solar panels are used for the DC (direct current) main purpose of the solar panel charges a rechargeable battery, the total number of solar panels are used in the project is 10, size of each panel is the (99*50), the capacity of it is 6 volts,180 mAh (milliampere hour)

The main purpose of the bends is the folding and turning over, there are many types of bends like air bending, coin making and bottom making and l-bends are used in this project l-bend is something that turns the direction in a 90 degrees angle, the number of bends and Bolts are used for the fitting purpose

Chassis Body Design

Firstly, the frame is designed by using the square pipe of half inch by cutting into desired pieces, after the frame is enclosed with a metal sheet by using the small bolts.

The round pipe is cut into the pieces and make the joints with the help of the welding, and place these joints to the frame by putting holes to the frame, with the bearings by the help of bolts on the either side of the metal frame.

Later the wheels are fixed which are made up of the plastic in size (10*4), and tyres also plastic. the motors are fixed to the wheels to run which are 500 rpm and 12 volts, dc motors are used. motors in the wheels relate to the 180 gauge wire this chassis part is consisting of the 3 wheels on the either side of the frame.

We placed a metal sheet to the centre of the one edge of the frame, make a hole and insert a small bearing where the robotic arm can be placed with the plastic pipe.

180-gauge wire is used to give the connections from the motor to the battery with 2 different wires to identify the positive and negatives.

Robotic Arm

s.no	components	quantity
1	Servo motors	(MG995)-4
2	Bearings	1
3	Gripper	1
4	Plastic pipes	3
5	Arduino uno	1
6	Bluetooth module	(HC05)-1
7	Servo driver kit	(PCA9685)-1

8	Jumper wires	Required
9	5 volt battery supply	2

- A robot is a programmable machine that can complete a task, while the term robotics describes the field of study focused on developing robots and automation. Each robot has a different level of autonomy. These levels range from human-controlled that carry out tasks to fully-autonomous, and perform tasks with that any external influences

- A computer controls the robotic arm by rotating the step motors connected to individual joints. The larger robotic arms use pneumatics or hydraulics. As the step motors move in increments, the computer can move the arm precisely and perform the same movement repetitively. Robotic arms can be used to automate the process of placing goods or products onto pallets.

By automating the process, palletizing becomes more accurate, cost-effective, and predictable. The use of robotic arms also frees human workers from performing tasks that present a risk of bodily injury in industrial robots. This scientific rover can pick the objects and analysis the object

- There are two types of forces acting on the arm. Firstly weight, mass times the gravitational acceleration. The force is a desire of the mass to move downward but is stationary.

- The second type of force here is torque

Servo motors

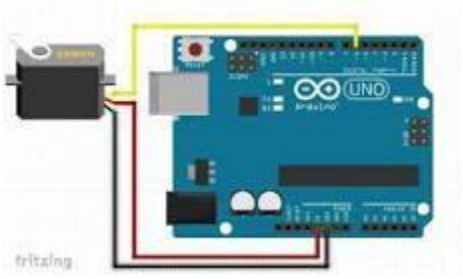
- **What is the servo motor in a robotic arm?**

- The use of the servo motors (MG 995) is to tolerate some weight.
- Servo motors are used for robotic applications that require precision positioning. Before diving too deeply into the ways servos are used in robotics, it is helpful to first learn about the basic function and form of these critical components of motion control.
- 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.

- Servo motors are used in applications such as robotics, CNC (Computerized Numerical Control) machinery, and automate manufacturing industries

MG995 servo is a simple, commonly used standard servo for your mechanical needs such as robotic head, robotic arm. It comes with a standard 3-pin power and control cable for easy using and metal gears for high torque

How do you use a servo MG995?



Interfacing MG995 Servo Motor to Arduino UNO

1. Connect the power voltage pins of the MG995 Servo motor to the 5 Volts pin and the GND pin of the Arduino UNO. This will energize the motor.

2. Connect the PWM input pin of the motor to the Arduino PWM output pin D6 to control and rotate the motor.

The end points of the servo can vary and many servos only turn through about 180 degrees. And 'continuous' servos that can rotate through the full 360 degrees.

- A brushed DC motor is about 75%–80% efficient, achieves high torque at low speeds, and is simple to control, but creates quite a bit of noise due to the brushes used to rotate the machinery

- The two major servo motors are used in the robotic arm, one for the base movements and two on the side of the base plate two transmit the motion through the various links to the arm.

- In modern cars, servo motors are used to control its speed. When stepping on the gas pedal, it sends electrical signals to the car's computer. The computer then processes that information and sends a signal to the servo attached to the throttle to adjust the engine speed.

- Servo Motors are used throughout many industries and have the following advantages; High efficiency. High output power relative to their size. More constant torque at higher speed

Bearing

- A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Most bearings facilitate the desired motion by minimizing friction.

- Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts.

Bearings are "parts that assist objects' rotation". They support the shaft that rotates inside the machinery. Machines that use bearings include automobiles, airplanes, electric generators and so on.

There are many different types of bearings, each used for specific purposes and designed to carry specific types of loads, radial or thrust.

These balls support the load of the application, as well as reducing friction between the surfaces. Ball bearings are the most common bearing type and can be found in many everyday objects, such skateboards, blenders, bicycles, DVD **(DIGITAL VIDEO DISK)** players and photocopiers

Nowadays, bearings are one of the most used machine parts because their rolling motion make almost all movements easier and they help reduce friction. Bearings have two key functions: They transfer motion, i.e., they support and guide components which turn relative to one another.

- most popular types: plain bearings, rolling element bearings, jewel bearings, fluid bearings, magnetic bearings, and flexure bearings.
- Bearings and bearings-related products are very important components in most machinery.
- Deep groove ball bearings are the most widely used bearing type and are extremely versatile. ...
- Cylindrical roller bearings can handle minimal axial loads in one direction
- The main use of the bearings is to reduce the friction, and make the movement free

Gripper

In the simplest terms, grippers are devices that enable robots to pick up and hold objects. When combined with a collaborative industrial robot arm, grippers enable manufacturers to automate key processes, such as inspection, assembly, pick & place, and machine tending

- There are four types of robotic grippers
- Vacuum grippers
- Pneumatic grippers
- Hydraulic grippers
- Servo electric grippers

- Manufacturers choose grippers based on which handling application is required and the type of material in use.

- The gripper is connected to the compressed air supply system. As the compressed air is introduced into the cylinder, it powers the piston rod. The piston rod is connected to the gripping fingers. As the air pressure moves the piston up and down, the fingers open or close in a parallel or angular manner.

- Mechanical grippers will normally use compressed air operated actuators. This use compressed air operated pistons to move the gripper fingers and to hold them

- Either open or closed, i.e., there is no continuous compressed air discharge and the amount of air used is limited to that needed to move the piston.

- Grippers, sometimes called hand grippers, are primarily used for testing, and increasing the strength of hands the; this specific form of grip strength has been called crushing grip, which has been defined as meaning the prime movers are the four fingers, rather than the thumb.

- Some grippers look just like hands, while others look like a hand with two or three fingers. Some grippers do not look like hands at all; they look more like

robot claws. Other grippers come with giant suction cups. Some grippers look like a soft round ball. Some have magnetized tips. And grippers receive their power in different ways, from electrical to pneumatic (air) and hydraulic (hydraulic fluid)

The choice of the gripper that you settle on should be determined by the part that you intend the robot to handle. It is easier for some grippers to handle some shapes than others. For example, if the part is flat and is not raised high enough, then something that grips it from the top is the best solution

Gripper is a robot end effector that grasps objects by literally sticking to them. In its most primitive form, this type of gripper consists of a rod, sphere, or other solid object covered with two-sided tape.

Arduino uno

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc and initially released in 2010. The board is equipped with sets of digital and Analog input/output (I/O) pins that may be interfaced to various expansion

boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 Analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB (UNIVERSAL SERIAL BUS) cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

Arduino UNO is a low-cost, flexible, and easy-to-use programmable open-source microcontroller board that can be integrated into a variety of electronic projects. This board can be interfaced with other Arduino boards, Arduino shields, can control relays, LEDs, servos, and motors as an output.

What is Arduino Uno in IOT (INTERNET OF THINGS)

Arduino Uno is an open-source microcontroller board developed by Arduino.cc. It is based on the Microchip ATmega328P microcontroller. It is one of the most popular Arduino development boards and is universally known as 'stock Arduino'. It is a small development board having size 2.7 in * 2.1.

Where is Arduino used in life?

Today Arduino is used for the control of traffic lights, it can also be used for the real time control system with programmable timings, pedestrian lighting etc.

The Arduino Uno is programmed using the Arduino Software (IDE), our Integrated Development Environment common to all our boards and running both online and offline.

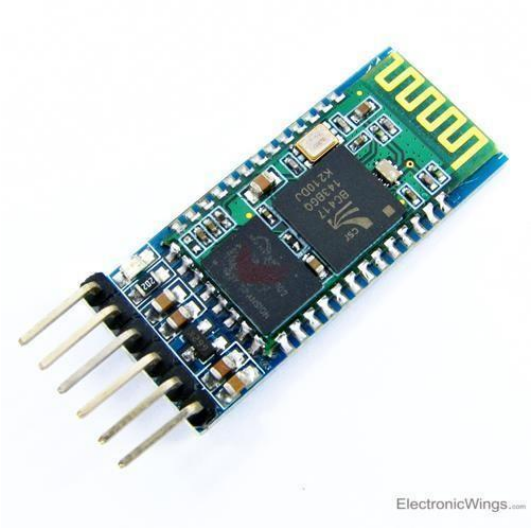
How many pins Arduino Uno have?

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP (IN CIRCUIT SERIAL PROGRAMMING) header, and a reset button.

Bluetooth module

- HC-05 has red LED **(LIGHT EMITTING DIODE**) which indicates connection status,whether the Bluetooth is connected or not. Before connecting to HC-05 module this red LED blinks continuously in a periodic manner. When it gets connected to any other Bluetooth device, its blinking slows down to two seconds

- This module works on 3.3 V. We can connect 5V supply voltage as well since the module has on board 5 to 3.3 V regulator.



- As HC-05 Bluetooth module has 3.3 V level for RX/TX (transmission and reception) and microcontroller can detect 3.3 V level, so, no need to shift transmit level of HC-05 module. But we need to shift the transmit voltage level from microcontroller to RX of HC-05 module.

- HC-05 Bluetooth Module is an easy-to-use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with controller or PC (PERSONAL C OMPUTER).

What is the use of Bluetooth module?

It is used as Bluetooth Serial port prototype module. It can be easily programmed as master and slave. It is fully enhanced with data rate 3 Mbps modulation with complete 2.4 (giga hertz) radio transceiver and baseband.

Frequency. Bluetooth only does its work on a 2.4GHz frequency, whereas many Wi-Fi networks these days will run on both 2.4GHz and 5GHz frequencies.

- It can lose connection in certain conditions.
- It allows only short-range communication between devices.
- Security It has low bandwidth as compared to Wi-Fi.

- is a very key aspect as it +can be hacked

Which protocol is used in Bluetooth?

Radio frequency communication (RFCOMMUNICATION)

The Bluetooth protocol RFCOMM is a simple set of transport protocols, made on top of the L2CAP protocol, providing emulated RS-232 serial ports (up to sixty simultaneous connections to a Bluetooth device at a time). The protocol is based on the ETS (education testing service) standard TS (transmission system)

Bluetooth—named for a 10th-century Danish king, incidentally—uses radio waves to transmit What is information between two devices directly. The radio waves used by Bluetooth are much weaker than those involved with Wi-Fi or cellular signals, two other common ways to connect devices

Robot will receive the data from android device. This data will be received by Bluetooth module first then it will forward the data to ATmega-16 micro-controller using UART (universal asynchronous receiver-transmitter) Microcontroller will process the data and output of this will be movement of the robot according to the input given by user.

Bluetooth controlled Robot is controlled by using Android mobile phone instead of any other method like buttons, gesture etc. Here only needs to touch button in android phone to control the Robot in forward, backward, left, and right directions

We can give specific voice commands to the robot through an Android app installed on the phone. At the receiving side, a Bluetooth transceiver module receives the commands and forwards them to the Arduino, and thus the robotic wheels is controlled

servo driver

what is servo driver?

The PCA9685 servo driver module is used applications where large number of servo motors are used such as robot arm, hexapod and robots. It increases the number pf PWM output of your microcontroller. Using only two pins, you can control 16 free-running PWM (pulse width modulation) outputs.

A servo drive is an electronic amplifier used to power electric servo mechanisms.

A servo drive monitors the feedback signal from the servomechanism and continually adjusts for deviation from expected behaviour

A servo drive receives a command signal from a control system, amplifies the signal, and transmits electric current to a servo motor in order to produce motion proportional to the command signal. Typically, the command signal represents a desired velocity, but can also represent a desired torque or position.
A sensor attached to the servo motor reports the motor's actual status back to the servo drive. The servo drive then compares the actual motor status with the commanded motor status. It then alters the voltage, frequency, or pulse width to the motor to correct for any deviation from the commanded status.

In a properly configured control system, the servo motor rotates at a velocity that very closely approximates the velocity signal being received by the servo drive from the control system. Several parameters, such as stiffness (also known as proportional gain), damping (also known as derivative gain), and feedback gain, can be adjusted to achieve this desired performance. The process of adjusting these parameters is called performance tuning.

Although many servo motors require a drive specific to that motor brand or model, many drives are now available that are compatible with a wide variety of motors.

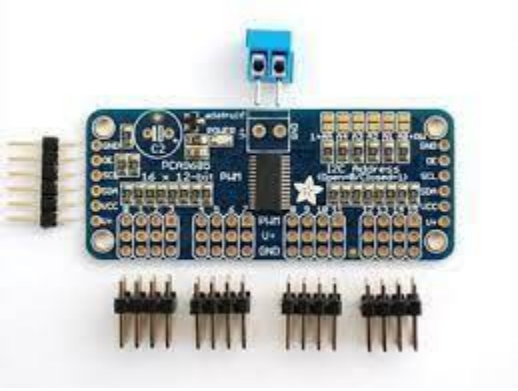
The PCA9685 is a 16 Channel 12 Bit PWM I2C-bus controlled Servo motor Driver. The Driver can very easily connect to your Arduino, Raspberry Pie and easily programmed to control single or multiple servo motors and make your own RC plane, car, ship, Quadra pod, hexapod or anything you want.

How do you use servo motor……?

1. First connect VCC of the PCA9685 Servo Driver module to the 5V of the Arduino.
2. Next connect SDA (structural design and analysis) to A4 if you are using Arduino Mega connect to pin 20 instead.
3. Connect the SCL (serial clock line) pin to A5 of the Arduino if you are using an Arduino mega once again connect this to pin 21 instead

How does a servo work…?

A servo motor is an electromechanical device that produces torque and velocity based on the supplied current and voltage. A servo motor works as part of a closed loop system providing torque and velocity as commanded from a servo controller utilizing a feedback device to close the loop



What is servo control system?

Servo control is the regulation of speed (velocity) and position of a motor based on a feedback signal. The most basic servo loop is the speed loop. This produces a torque command to minimize the error between speed command and speed feedback

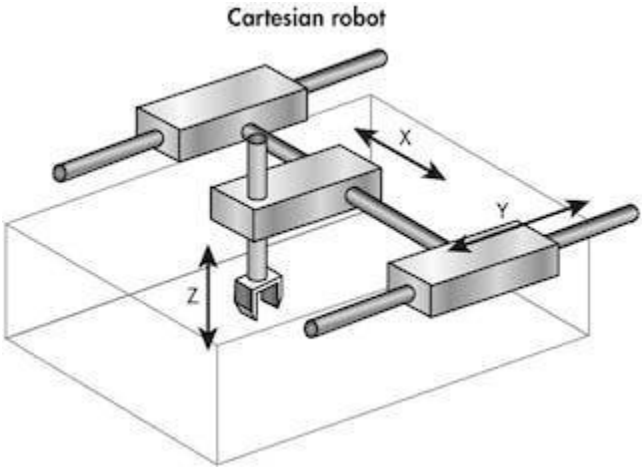
Basically, the name servo motor is related to the term servomechanism, which means that the motor is constantly monitored to control its motion.
High efficiency. High output power relative to their size. More constant torque at higher speed

Servo systems can be used in **CNC (COMPUTER NUMERICAL CONTROL)** machining, factory automation, and robotics, among other uses. Their main advantage over traditional DC (direct current) or AC (alternative current) motors is the addition of motor feedback. This feedback can be used to detect unwanted motion, or to ensure the accuracy of the commanded motion. The feedback is generally provided by an encoder of some sort. Servos, in constant speed changing use, have a better life cycle than typical AC wound motors. Servo motors can also act as a brake by shutting off generated electricity from the motor itself.

Features of the servo motor

- Absolute multi-turn battery-less encoder
- Wider ambient operating temperature range (-20° to 100° C)
- Industry standard 24 VDC I/O
- Separate 24 V supply for logic backup
- NEMA 17, 23 and 34 frame sizes
- Inline brake options for all models
- Easy connection to diagnostics over USB
- Compatriotic technology is standard

Cartesian Robotic Arm



A Cartesian coordinate robot (also called linear robot) is an industrial robot whose three principal axes of control are linear (i.e., they move in a straight line rather than rotate) and are at right angles to each other. The three sliding joints correspond to moving the wrist up-down, in-out, back-forth.

The primary advantage of Cartesians is that they can move in multiple linear directions. In addition, Cartesians can do straight-line insertions into furnaces and are easy to program. Cartesians have the most rigid robotic structure for a given length, since the axes are supported at both ends

Cartesian robots (Application examples) - Industrial Robots | Yamaha Motor Co., Ltd. Ceiling-mount, and inverse type SCARA robots. Dust-proof and drip-proof SCARA robots.

People most often identify 3D printers with cartesian robot technology. They are often built over tables or conveyor systems. They will typically have 3 axes of motion. They can move up/down, forwards/backwards, and left/right

Cartesian Robots are one of the most used robot types for industrial applications and are often used for CNC machines and 3D printing.

A Cartesian coordinate system in a plane is a coordinate system that specifies each point uniquely by a pair of numerical coordinates, which are the signed distances to the point from two fixed perpendicular oriented lines, measured in the same unit of length. Each reference coordinate line is called a coordinate axis or just axis (plural axes) of the system, and the point where they meet is its origin, at ordered pair (0, 0). The coordinates can also be defined as the positions of the perpendicular projections of the point onto the two axes, expressed as signed distances from the origin

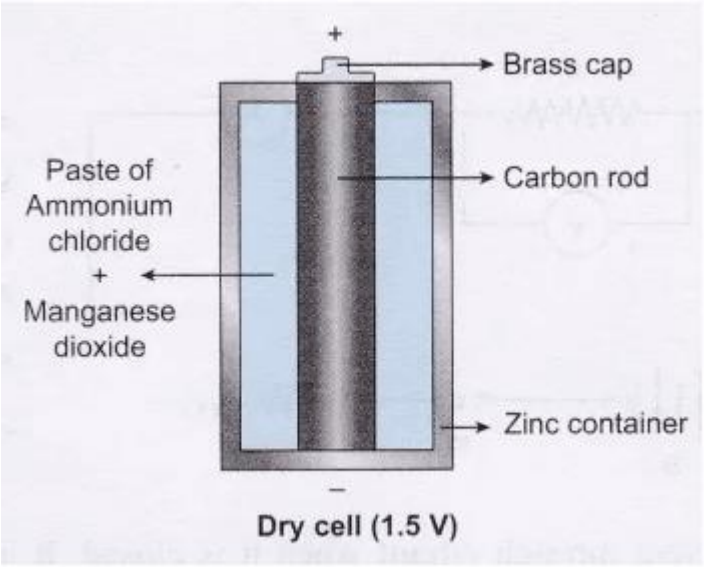
There are three major parts to a cartesian plane. When trying to identify a point on the cartesian plane or build the graph of a function, these three pieces are crucial. The following is a list of the major parts of a cartesian plane: Axes: The axes are the two lines that intersect to produce the cartesian plane. The x-axis refers to the horizontal line. The y-axis is the vertical line that runs perpendicular to the x-axis. Origin: The origin is defined as the place where the two perpendicular axes x and y meet. The origin's coordinates are given by (0, 0). The origin divides the axes into two equal pieces. Quadrants: The cartesian plane is divided into four parts when the x and y axes intersect. These are referred to as quadrants, and they can go on indefinitely

Battery supply

5V power supplies (or 5VDC power supplies) are one of the most common power supplies in use today. In general, a 5VDC output is obtained from a 50VAC or 240VAC input using a combination of transformers, diodes, and transistors.

A standard voltage required by chips and drives in a computer. The power supply converts 120v alternating current (AC) into 5 volts of direct current (DC), as well as 3.3v and 12v

A 5V output is most used when the end application needs powering via a USB connector, for example a mini/micro-B or Type-C plug. Or, if space is at a premium, the DC (DIRECT CURRENT) cable and USB (UNIVERSAL SERIAL BUS) plug can be removed altogether and replaced with a female socket on the case like on phone chargers



Jumper wires

A jumper wire is an electric wire that connects remote electric circuits used for printed circuit boards. By attaching a jumper wire on the circuit, it can be short-circuited and short-cut (jump) to the electric circuit.

What are jumper wires in Arduino?

Jumper wires are used for making connections between items on your breadboard and your Arduino's header pins. Use them to wire up all your circuits!

Jumper wires should be placed on the component side of the circuit board assembly when possible. Of course, many circuit board designs have components on both sides, but, since jumper wires are considered components, they should be placed on the side of the circuit board with most large components.

In a computer, a jumper is a pair of prongs that are electrical contact points set into the computer motherboard or an adapter card. When you set a jumper, you place a plug on the prongs that completes a contact. In effect, the jumper acts as a switch by closing (or opening) an electrical circuit.

Rechargeable batteries

9-volt batteries power our smoke alarms, household items and toys. They can be found in most homes. But these batteries can be a fire hazard if not stored safely or disposed of with care. Keep batteries in original packaging until you are ready to use them.

The most used types of 9V batteries are lithium and alkaline. Lithium types, like Lithium-Ion, last significantly longer than alkaline. However, alkaline is much cheaper.

Lithium 9-volt batteries are disposable high-energy-density batteries Some manufacturers claim the energy density can be five times that of alkaline.

The nine-volt battery, or 9-volt battery, is an electric battery that supplies a nominal voltage of 9 volts. Actual voltage measures 7.2 to 9.6 volts, depending on battery chemistry. Batteries of various sizes and capacities are manufactured; a very common size is known as PP3, introduced for early transistor radios. The PP3 has a rectangular prism shape with rounded edges and two polarized snap connectors on the top.

A nine-volt battery, either disposable or rechargeable, is usually used in smoke alarms, smoke detectors, walkie-talkies, transistor radios, test and instrumentation devices, medical batteries, LCD (liquid crystal display) displays, and other small portable appliances.

9V batteries will last anywhere between 1.5 hours to 35 hours in an average guitar pedal. However, the current draw – measured in mA(milli ampere) – is important.

Miniature circuit breaker

An MCB (miniature circuit breaker) is an automatically operated electrical switch. Miniature circuit breakers are intended to prevent damage to an electrical circuit as a result of excess current. They are designed to trip during an overload or short circuit to protect against electrical faults and equipment failure.

The primary function of a miniature circuit-breaker is to protect an installation or appliance against sustained overloading and short-circuit faults, but it will also give protection against earth faults provided that the earth fault loop impedance is low enough.

A circuit breaker is an electrical safety device designed to protect an electrical circuit from damage caused by an overcurrent or short circuit. Its basic function is to interrupt current flow to protect equipment and to prevent the risk of fire. Unlike a fuse, which operates once and then must be replaced, a circuit breaker can be reset (either manually or automatically) to resume normal operation.

Circuit breakers are made in varying sizes, from small devices that protect low-current circuits or individual household appliances, to large switchgear designed to protect high voltage circuits feeding an entire city. The generic function of a circuit breaker, or fuse, as an automatic means of removing power from a faulty system, is often abbreviated as OCPD (Over Current Protection Device).

Communication part

Camera

An Internet Protocol camera, or IP camera, is a type of digital video camera that receives control data and sends image data via an IP network. They are commonly used for surveillance, but, unlike Analog **closed-circuit television (CCTV)** cameras, they require no local recording device, only a local area network. Most IP cameras are webcams, but the term or netcam usually applies only to those that can be directly accessed over a network connection.

Some IP (internet protocol) cameras require support of a central network video recorder NVR (**NETWORK VIDEO RECORDER**) to handle the recording, video, and alarm management. Others can operate in a decentralized manner with no NVR

needed, as the camera is able to record directly to any local or remote storage. The first IP Camera was invented by Axis Communications in 1996.

The specifications of camera are like Resolution, lens aperture, lens focal length, zoom range, lens quality, vision, pixel capacity, white balance, image sensor, image processor focussing, exposure control.

Previous generations of Analog CCTV (Closed circuit television) cameras use established broadcast television formats (e.g., CIF **(customer information file)** NTSC **(national television standards committee),** PAL**(phase alternative line)** and SECAM **(sequential and colour memory)** Since 2000, there has been a shift in the consumer TV business towards high-definition (HD high definition)resolutions(e.g., 1080P (Full-HD), 4K resolution (Ultra-HD) and 16:9 widescreen format).

IP cameras may differ from one another in resolution, features, video encoding schemes, available network protocols, and the API for video management software.

To address IP video surveillance standardization issues, two industry groups formed in 2008: the Open Network Video Interface Forum (ONVIF) and the Physical Security Interoperability Alliance (PSIA). PSIA was founded by 20 member companies including Honeywell, GE Security, and Cisco. ONVIF was founded by Axis Communications, Bosch, and Sony. Each group now has numerous additional members, thus cameras and recording hardware that operate under the same standard are compatible with each other

” IP security cameras do not require an outside connection to the Internet. All that is required is a connection to your local area network.

IP cameras have the advantage over HD Over Coax systems in terms of cabling and resolutions; however, a major drawback with IP systems comes in terms of network knowledge required when things do not work out. Network knowledge required when things do not work out. IP cameras capture videos, cameras

- The name of the CAM is Apna HD wireless cam, the quality of the cam is HD, nothing but high definition.
- Simple wi-fi setup one key wi-fi configuration on the app
- The size of the pixels is 1080p FHD video with pristine
- The access of the camera is easy remote access on android and IOS
- Motion detection (motion activated recording and alarm)
- It can support TF (trans flash) up to 64 GB
- Two-way audio (voice communication in real time)
- It supports clear night vision upto5m feet never in the dark again

Depending on their functionality, IP Cameras are generally classified as fixed, varifocal, or pan–tilt–zoom (PTZ camera). Fixed cameras feature an immobile perspective on the subject, whereas varifocal cameras can remotely adjust the zoom of the image. In addition, PTZ (pant, tilt, zoom) cameras can direct the camera assembly in any direction remotely. This can be used to track

motion or manually adjust the monitoring area. IP Cameras can be designed for indoor or outdoor use. Outdoor cameras are often rated IP65/IP67 in order to withstand outdoor conditions.

IP Cameras can offer a variety of digital imaging technologies such as multi-sensor cameras, panoramic cameras, and thermal imaging cameras.

Cloud and local storage

Some camera manufacturers offer cloud subscriptions where users may remotely view and download recent video clips by paying recurring subscription fees. Cloud subscription plans typically come with several days of looping storage, and the videos will be overwritten beyond this duration.

Some cameras include a micro-SD (secure digital card) slot so users can store videos locally. Most IP Cameras can be programmed to overwrite old video once the storage medium is full. Accessing the video on the camera can normally be done via a direct network connection to the device.

Node MCU (micro controller unit)

Node MCU is a low-cost open source IoT platform. It initially included firmware which runs on the ESP8266 Wi-Fi (wireless fidelity) SoC from Expressive Systems, and hardware which was based on the ESP-12 module. Later, support for the ESP (electrostatic precipitator) 32-bit MCU was added

Node MCU is an open-source firmware for which open-source prototyping board designs are available. The name "Node MCU" combines "node" and "MCU" (micro-controller unit). Strictly speaking, the term "Node MCU" refers to the firmware rather than the associated development kits’

The module has a wireless Wi-Fi transceiver operating in an unlicensed frequency range of 2400-2484 MHz in standard, with support for communication protocol stack and Wi-Fi security including WAP3. (Wireless application protocol)

Both the firmware and prototyping board designs are open source

The firmware uses the Lua scripting language. The firmware is based on the Eula project, and built on the Expressive Non-OS SDK for ESP8266. It uses many open-source projects, such as Launceston and SPIFFS Due to resource constraints, users need to select the modules relevant for their project and build a firmware tailored to their needs. Support for the 32-bit ESP32 has also been implemented.

The prototyping hardware typically used is a circuit board functioning as a dual in-line package (DIP) which integrates a USB controller with a smaller surface-mounted board containing the MCU and antenna. The choice of the DIP format allows for easy prototyping on breadboards. The design was initially based on the ESP-12 module of the ESP8266, which is a Wi-Fi SoC integrated with a Ten silica Extensa LX106 core, widely used in IoT applications

Node MCU provides access to the GPIO (General Purpose Input/Output) and a pin mapping table is part of the API documentation

As Arduino.cc began developing new MCU (micro controller unit) boards based on non-AVR processors like the ARM (advanced risk manage) /SAM (smart arm based controller) MCU used in the Arduino Due, they needed to modify the Arduino IDE so it would be relatively easy to change the IDE to support alternate toolchains to allow Arduino C/C++ to be compiled for these new processors. They did this with the introduction of the Board Manager and the SAM Core. A "core" is the collection of software components required by the Board Manager and the Arduino IDE to compile an Arduino C/C++ source file for the target MCU's machine language. Some ESP8266 enthusiasts developed an Arduino core for the ESP8266 Wi-fi SoC, popularly called the "ESP8266 Core for the Arduino IDE". This has become a leading software development platform for the various ESP8266-based modules and development boards, including Node MCUs.

How does Node MCU ESP8266 work?

Node MCU is an open-source platform based on ESP8266 which can connect objects and let data transfer using the Wi-Fi protocol. In addition, by providing some of the most important features of microcontrollers such as GPIO, (general purpose input/output) PWM, (pulse width modulation) ADC, etc., it can solve many of the project's needs alone

- If you have completed various Arduino projects and are familiar with Arduino, using Node MCU instead of Arduino Uno is the logical next step if you are looking for a more compact module that encompasses Wi-Fi. Node MCU is predicated on the expressive ESP8266-12E Wi-Fi System-On-Chip. It is based on Lua-based firmware and is open-source.

- It is perfect for IoT projects, especially other Wireless connectivity projects as Arduino does not work wirelessly. We either need to connect it to a Bluetooth or nerve module This chip has a great deal in common with the Arduino – they are both microcontroller-equipped prototyping boards that can be programmed using the Arduino IDE. The ESP8266 is more updated and younger than Arduino, and therefore the ESP has stronger specifications than Arduino.

- Operating Voltage: 2.5 to 3.3V
- Operating current: 800 mA
- 3.3V 600mA on-board voltage regulation
- ESP8266 comes up with 2 switches one is reset and another one is flash button, reset button is used to reset Node MCU and flash button is used to download and is used while upgrading the firmware. The board has built in LED indicator which is connected to D0 pin.
- The Node MCU board also contains a CP2102 USB to UART module to convert the data from USB to serial so that it can be controlled and programmed via computer.
- The esp8266 has 4 power pins: One VIN pin for input power supply and three 3.3V pins for output power supply. Even if 5V regulated supply is given through VIN, the voltage regulator will decrease it to 3.3v during output.
- The esp8266 has 3 GND pins which indicate ground supply. Generally, the negative terminals are connected to these pins.
- Esp8266 board also has I2C pins which can be used both as I2C master and I2C Slave. These pins are used to connect various I2C sensors and peripherals in your project. I2C interface functionality can be controlled via programming, and the clock frequency is 100 kHz at a maximum.
- Esp8266 Node MCU has 17 GPIO pins which can be assigned to various functions such as UART (universal Asynchronous receiver and transmitter), PWM, I2C, IR and Button via programming. When configured as an input pin, the GPIO pins can also be set to edge-trigger or level-trigger to generate CPU interrupts.
- ESP8266 Node MCU has 2 UART interfaces, i.e., UART0 and UART1, which offer asynchronous communication, and may communicate at up to 4.5 Mbps. TXD0, RXD0, RST0 & CTS0 pins can be used for communication. It supports fluid control. However, TXD1 pin features only data transmit signal so, it is usually used for printing log.

- ESP8266 has two SPI in slave and master modes. These SPIs also support the following general features: 4 timing modes of the SPI format transfer. Up to 64-byte FIFO (first in first out) buffer.
- Esp8266 has a secure digital I/O(INPUT) interface which is used directly control the SD cards.
- Esp8266 has 4 channels of Pulse width modulation (PWM). The output can be controlled via programming and is frequently used for driving motors and LEDs. The frequency ranges from 100Hz to 1KHz.
- There are three control pins on the esp8266: The enable pin (EN), the reset pin (RST) and the wake pin.
- The esp8266 chip works when the enable pin is high. When the enable pin is low, the chip works on minimum power.
- The reset pin is used to reset the esp8266 chip.
- The wake pin is used to wake up the chip from deep sleep mode.

Node MCU ESP8266 Specifications & Features

- Microcontroller: Ten silica 32-bit RISC CPU (CENTRAL PROCESSING UNIT) Extensa LX106.
- Operating Voltage: 3.3V.
- Input Voltage: 7-12V.
- Digital I/O Pins (DIO): 16.
- Analog Input Pins (ADC): 1.
- UARTs: 1.
- SPIs: 1.
- I2Cs: 1.

ESP8266 Node MCU has 17 GPIO (general purpose input and output) pins which can be assigned to various functions such as I2C, I2S, UART(universal asynchronous receiver-transmitter, 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.

How much RAM does ESP8266 have?

ESP8266EX Wi-Fi SoC integrates memory controller and memory units including SRAM (static random-access memory) and ROM (READ ONLY MEMORY). The size of the RAM (RANDAM ACCESS MEMORY) memory is 160 KB in total, among which 64 KB is IRAM (INTELLIGENT RAM) and 96 KB is DRAM (dynamic random access memory). There is no programmable ROM in the SoC, therefore, user program must be stored in an external SPI (SERIAL PERIPHERAL INTERFACE) flash memory.

The ESP8266 has three modes; mode 1 which is “Station” mode, mode 2 which is “Access Point” mode, and mode 3 which is “AP + Station” mode where the device can act as a Wi-Fi client and access point simultaneously

The Node MCU (Node Micro Controller Unit) is an open-source software and hardware development environment that is built around a very inexpensive System-on-a-Chip (Soc) called the ESP8266

power requirement

As the operating voltage range of ESP8266 is 3V to 3.6V, the board comes with a LDO (LOW DROPOUT) voltage regulator to keep the voltage steady at 3.3V. It can reliably supply up to 600mA, which should be more than enough when ESP8266 pulls as much as 80mA during RF transmissions. The output of the regulator is also broken out to one of the sides of the board and labelled as 3V3. This pin can be used to supply power to external components.

Power to the ESP8266 Node MCU is supplied via the on-board Microbe USB connector. Alternatively, if you have a regulated 5V voltage source, the VIN pin can be used to directly supply the ESP8266 and its peripherals.

Some people state that ESP8266 is tolerant of 5 V logic levels on its GPIOs, while others vehemently disagree, pointing at the datasheet-stated 3.6 V maximum.

What are the applications of Node MCU?

Node MCU V3 is mainly used in the Wi-Fi Applications which most of the other embedded modules fail to process unless incorporated with some external Wi-Fi protocol

To see if it works, open the Wi-Fi settings on your computer, look for a network called "ESP8266 Access Point", enter the password "there is no spoon", and connect to it. Then open a terminal, and ping to 192.168. 4.1 (this is the default IP address of our ESP AP).

Node MCU version 2

Node MCU is an open source IoT (internet of things) platform based on the ESP-12 module. The board is pre-loaded with LUA firmware that enable you to prototype your IoT product within a few Lua script lines. You can also program it using Arduino IDE. (Arduino Integrated Development Environment)

Node MCU is an open-source LUA based firmware developed for the ESP8266 wi-fi chip. By exploring functionality with the ESP8266 chip, Node MCU firmware comes with the ESP8266 Development board/kit i.e., Node MCU Development board

Node MCU Dev Kit/board consist of ESP8266 wi-fi enabled chip. The ESP8266 is a low-cost Wi-Fi chip developed by Expressive Systems with TCP/IP protocol. For more information about ESP8266, you can refer to the ESP8266 Wi-Fi Module.

There is Version2 (V2) available for Node MCU Dev Kit i.e., Node MCU Development Board v1.0 (Version2)**,** which usually comes in black coloured PCB.

For more information about Node MCU Boards available in the market refer to Node MCU Development Boards

Node MCU Dev Kit has Arduino like Analog (i.e., A0) and Digital (D0-D8) pins on its board.

It supports serial communication protocols i.e., UART, SPI, I2C, etc.

Using such serial protocols, we can connect it with serial devices like I2C enabled LCD (liquid crystal display) display, Magnetometer HMC5883, MPU-6050 Gyro meter + Accelerometer, RTC real timeclock chips, GPS(global positioning system) modules, touch screen displays, SD(secure digital) cards, etc.

GPS(GLOBALPOSITIONINGSYSTEM)

What a GPS receiver does is locate the four or more satellites and calculate the distance between each one of them. Using this information, the GPS tracking system in our car or other devices finds out its current location. The information is presented as maps, latitude, and longitude specification, etc.

The Global Positioning System (GPS), originally Nav star GPS, is a satellite-based radionavigation system owned by the United States government and operated by the United States Space Force. It is one of the global navigation satellite systems (GNSS) that provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. they do not require the user to transmit any data, and operates independently of any telephonic or Internet reception, though these technologies can enhance the usefulness of the GPS positioning information. It provides critical positioning capabilities to military, civil, and commercial users around the world. Although the United States government created, controls and maintains the GPS system, it is freely accessible to anyone with a GPS receiver.[1]

- Location — Determining a position.
- Navigation — Getting from one location to another.

- Tracking — Monitoring object or personal movement.
- Mapping — Creating maps of the world.
- Timing — Making it possible to take precise time measurements

How can I track GPS location?

Install a GPS tracking device in each vehicle or asset you want to track. Signals are transmitted from the satellite to the receiver. The receiver calculates the distance between itself and the satellites in real time. A report is created showing your vehicle's travel distance or movement, coordinates, and speed.
GPS signal
No distance limit under good. Longer answer? It depends on your software, hardware, and signal. But the rule of thumb is that a real-time GPS tracking device with perfect line-of-sight cellular coverage can be accurate to 6 feet and will work anywhere cellular coverage exists.

Applications

- Aircraft tracking
- Assert tracking
- Animal tracking

A GPS receiver in your phone listens for these signals. Once the receiver calculates its distance from four or more GPS satellites, it can figure out where you are

This is where the GPS speedometer comes in. The speedometer in your satellite navigation or dedicated GPS speedometer communicates with the 30 or so satellites that orbit the Earth at certain time intervals, and carries out a calculation to determine how fast you are travelling.
Signals are transmitted from the satellite to the receiver. The receiver calculates the distance between itself and the satellites in real time. A report is created showing your vehicle's travel distance or movement, coordinates, and speed

Communication through GPS

The navigational signals transmitted by GPS satellites encode a variety of information including satellite positions, the state of the internal clocks, and the health of the network. These signals are transmitted on two separate carrier frequencies that are common to all satellites in the network. Two different encodings are used: a public encoding that enables lower resolution navigation, and an encrypted encoding used by the U.S. military….

Coding for four servo motors

The above code is for running of four servo motors of the rover with the wheels


```
#include <Servo.h>
Servo myservo1, myservo2, myservo3, myservo4;

byte serialA;

void setup()
{
  myservo1.attach(9);
  myservo2.attach(10);
  myservo3.attach(11);
  myservo4.attach(3);

  Serial.begin(9600);//change your baudrate to your Bluetooth modules baudrate if
needed.
}

void loop()
{
  if (Serial.available() > 2) {serialA = Serial.read();Serial.println(serialA);}
  {
    unsigned int servopos = Serial.read();
    unsigned int servopos1 = Serial.read();
    unsigned int realservo = (servopos1 *256) + servopos;
    Serial.println(realservo);

    if (realservo >= 1000 && realservo <1180){
    int servo1 = realservo;
    servo1 = map(servo1, 1000,1180,0,180);
    myservo1.write(servo1);
```

```
    Serial.println("servo 1 ON");
    delay(10);

    }

    if (realservo >=2000 && realservo <2180){
      int servo2 = realservo;
      servo2 = map(servo2,2000,2180,0,180);
      myservo2.write(servo2);
      Serial.println("servo 2 On");
      delay(10);

    }

    if (realservo >=3000 && realservo < 3180){
      int servo3 = realservo;
      servo3 = map(servo3, 3000, 3180,0,180);
      myservo3.write(servo3);
      Serial.println("servo 3 On");
      delay(10);
    }
    if (realservo >=4000 && realservo < 4180){
      int servo4 = realservo;
      servo4 = map(servo4, 4000, 4180,0,180);
      myservo4.write(servo4);
      Serial.println("servo 4 On");
      delay(10);
    }



  }


}
```

we are starting by defining the library for Servo motor. Then we are initializing all the three servos as Servo1, Servo2, Servo3. And then we set setting all the servo's input pin with Arduino. In the void loop () function

how to connect four servo motors on Arduino?

1. Connect each servo connector to PCA9685 pins (servo1 to pins 0, servo2 to pins 1, etc)
2. Connect PCA9685 pin SCL to Arduino pin SCL.
3. Connect PCA9685 pin SDA to Arduino pin SDA.
4. Connect PCA9685 pin VCC to Arduino pin 5V.
5. Connect PCA9685 pin GND to Arduino pin GND.

Can multiple servo motors run with single Arduino?

To use the external supply, you just must short the Arduino ground to external supply ground. Use the Arduino code given below to program your Arduino and connect all the Servo Motors as shown in the circuit diagram with proper power supply to Motors. Therefore, all servos will work together without any interrupt

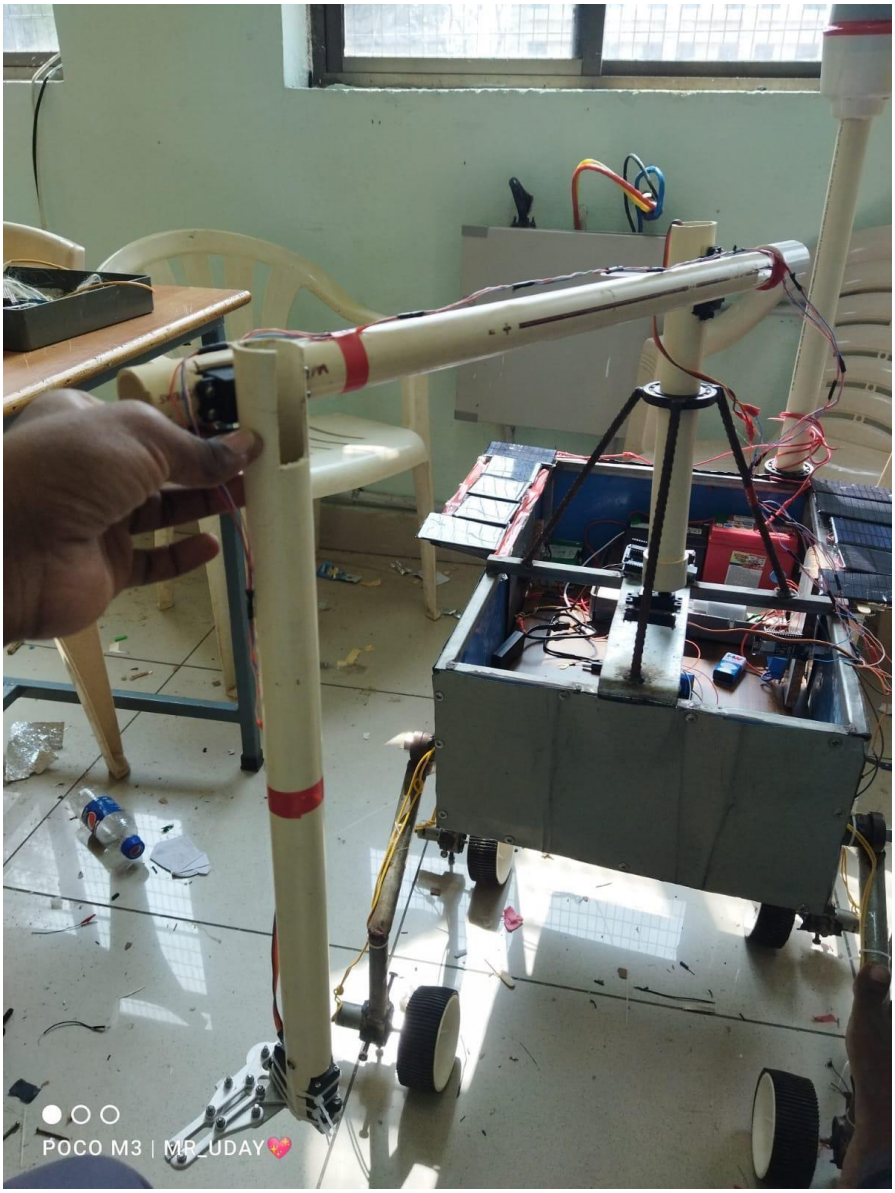
How many motors can an Arduino handle?

The Arduino Mega 2560 can control 14 stepper motors: May be but it can control a lot more than simply 14. Remember it only takes 2 outputs to control a motor so divide the number of outputs by two to get the maximum number without adding more outputs from a port expander.

ROBOTIC ARM PROGRAMMING

```
//Include the library files
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

//Define the relay pins
#define relay1 D0
#define relay2 D1

#define BLYNK_AUTH_TOKEN "qD1bANAGK89upCcJxH6AveQR1SzlI9Lm" //Enter your blynk
auth token

char auth[] = "qD1bANAGK89upCcJxH6AveQR1SzlI9Lm";
```

```
char ssid[] = "JioFi2_16F753";//Enter your WIFI name
char pass[] = "t5b4h3e78y";//Enter your WIFI password

//Get the button values
BLYNK_WRITE(V0) {
  bool value1 = param.asInt();
  // Check these values and turn the relay1 ON and OFF
  if (value1 == 1) {
    digitalWrite(relay1, LOW);
  } else {
    digitalWrite(relay1, HIGH);
  }
}

//Get the button values
BLYNK_WRITE(V1) {
  bool value2 = param.asInt();
  // Check these values and turn the relay2 ON and OFF
  if (value2 == 1) {
    digitalWrite(relay2, LOW);
  } else {
    digitalWrite(relay2, HIGH);
  }
}

void setup() {
  //Set the relay pins as output pins
  pinMode(relay1, OUTPUT);
  pinMode(relay2, OUTPUT);

  // Turn OFF the relay
  digitalWrite(relay1, HIGH);
  digitalWrite(relay2, HIGH);

  //Initialize the Blynk library
  Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);
}

void loop() {
  //Run the Blynk library
  Blynk.run();
}
```


POCO M3 | MR_UDAY

What is a robotic arm used for?

Robotic arms can be used to automate the process of placing goods or products onto pallets. By automating the process, palletizing becomes more accurate, cost-effective, and predictable. The use of robotic arms also frees human workers from performing tasks that present a risk of bodily injury.

The above robotic arm is rotating on 3 axes like cartesian plane…

What is a cartesian robot used for?

A cartesian robot system that uses XYZ coordinates to move multiple axes—typically three—to a specific location within its workspace. Cartesian robots can be extremely beneficial for engineers that are looking to automate their warehouses, improve their current systems, or solve unique design challenges.

3D Printers are the examples of the cartesian plane. A system in which the location of a point is given by coordinates that represent its distances from perpendicular lines that intersect at a point called the origin

CONCLUSION

Now a days the robotic technology is more useful to reduced the work ablities, particular in this rover can do the un know places to work ,the rovers is the adepolyable system using specific technologies the ultimate aim of this scenario is to provide.

This technology involves automatic availabilty of information of services basaed on the current location of the user, we belive that rover technoloy will greatly enhance the user experience in the large number of places including shopping malls , game fields,offices and business centers.

The main aim of this project is to decrese the human interferenc and understanding the unknow places to discover the truths.