

Robo-Manipal Task phase report

Day 1

- What is Github?
- Working with Github.

Day 2

- Learnt how to access git through terminal.
- Learning basic linux commands.
- How to compile our c/c++/python files.
- Uploaded our first task on git through terminal

Day 3

- Learning what an arduino board is.
- Programming through IDE.
- Understanding digital write/read, pinMode and void setup and loop.
- Write programmes for basic blink and fade of a a LED. Pulse Width Modulation(PWM) was used for fading.

Day 4

- LDR room problem.Switching on a LED in absence of sufficient light.
- Arduino Board components.
- UART,SPI,I2C protocols.
<https://maker.pro/arduino/tutorial/common-communication-peripherals-on-the-arduino-uart-i2c-and-spi>
- Pull-up/pull-down resitors
<https://learn.sparkfun.com/tutorials/pull-up-resistors/all>
- Diff between microcontrollers and microprocessors

Day 5

- Ultrasonic sensor HC-SR04. Found distance of nearby objects and found out the sensor's range.
- How ultrasound pulses work
- IR sensor
 - Used it to find presence of objects. The sensor works by sending infrared waves and then receiving them.
 - Also found out a way to calculate distance by relating distance and voltage received by sensor.

Day 6

- 8 LED sensor array.
- Used in line following robots to navigate a black line on a white background.
- Used sensor to differentiate between black and white background. The LED's light up when they sense white color.
- In another application, program the sensor to give out average position of a line. This is especially useful in line navigation bots.

Day 7

- Using Tinkercad to simulate basic arduino programs
- <http://engineering.electrical-equipment.org/panel-building/difference-between-open-loop-closed-loop-systems.html>
- Servo motors
 - <https://www.instructables.com/id/Arduino-Servo-Motors/>
 - <https://www.allaboutcircuits.com/projects/servo-motor-control-with-an-arduino/>
 - <https://howtomechatronics.com/how-it-works/how-servo-motors-work-how-to-control-servos-using-arduino/>
- Stepper motors

They move in steps based on pulses sent to the stator windings, thus they do not have a horsepower rating because they do not actually rotate continuously. The speed of the motor is controlled by the frequency of the pulses. The **stepper motor** is used for precise positioning with a motor, such as hard disk drives, robotics, antennas, telescopes, and some toys. Stepper motors cannot run at high speeds, but have a high holding torque.

 - https://www.tutorialspoint.com/arduino/arduino_stepper_motor.htm
 - <https://circuitdigest.com/microcontroller-projects/arduino-stepper-motor-control-tutorial>

Day 8

- World coordinates to local coordinates
- Degree of freedoms of joints
- Hand has 7 DOF (??).
- Position vectors of points, vector addition.
- Universal joint, Revolute joint, prismatic joint.

Day 9

- Bluetooth module (HC=05)
<https://howtomechatronics.com/tutorials/arduino/arduinoand-hc-05-bluetooth-module-tutorial/>
- Communicating between 2 aruidinos

Day 10

- Markdown
- Tower of hanoi
- debuggerserial
- PID and NCHW library
- ROS

1st October-2019

L293D

<https://www.rakeshmondal.info/L293D-Motor-Driver>

<https://components101.com/l293d-pinout-features-datasheet>

8th October-2019

<https://www.rakeshmondal.info/4-Wheel-Drive-Robot-Design>

<https://blog.miguelgrinberg.com/post/building-an-arduino-robot-part-ii-programming-the-arduino>
<https://tutorial.cytron.io/2015/04/05/using-mdd10a-arduino-uno/>
MDD10

13th October-2019

Python

- Basic data types
int, str, float, complex
- Array-type data types
[] list , {} dict , () tuple , 6, tuple
- a=list("hello")
print(str(a))
- str_1="hello world"
print(str_1.split("_"))
- a=input("enter name") //by default input is string type
enter namePranjal
- a=int(input("enter age")) //typecast
enter age76

- **If else**
a=3
b=7
if a>b:
print("a is greater")
else:
print("b is greater")

- If-else in python use tab for indentation

- **Bool data types**
a=10
b=5
a>b
True
a<b
False
bool(1) , bool(110) , bool(-1)
True
bool(0)
False
x=a>b
print(x)
True
type(x)
<class 'bool'>

- **Another Conditional statement**
a=10
x=a if a>b else b
print(x)

10

- **len(str_1)** //length of string or any array type

- **For loop**

```
for s in str_1 or for i in range(len(str_1))
    print(s)        print(str_1[i])
```

```
for s in str_1:
    print(s,end=" ")
    h e l l o   w o r l d   p r a n j a l
```

- **Functions**

```
def quad(a,b,c,x):
    return(a*(x**2)+b*x+c)
```

- **Array type**

```
a1={1,3,4,"hello"}
    type(a1) <class 'set'>
a2=[1,3,4,"hello"]
    type(a1) <class 'list'>
a3=(1,3,4,"hello")
    type(a1) <class 'tuple'>
a4={"integer" :1, "floating":3.4, "string" : "hello"}
    type(a4) <class 'dict'>
>>> a4={int : 1,float : 3.14,str : "hello"}
>>> print(a4[float])
3.14

>>> a4={"a" : 1,"b" : 3.14,"c" : "hello"}
>>> print(a4["b"])
3.14
```

23rd October-2019

- IMU razor

9DOF Razor IMU – sen 10736

- Connections:

tx0-sda	gnd-gnd
rx0-scl	cts was already grounded
3.3v-3.3v	dtr

- Sensors:

ITG-3200(gyro)
ADXL345(acc)
HMC5883L(mag)