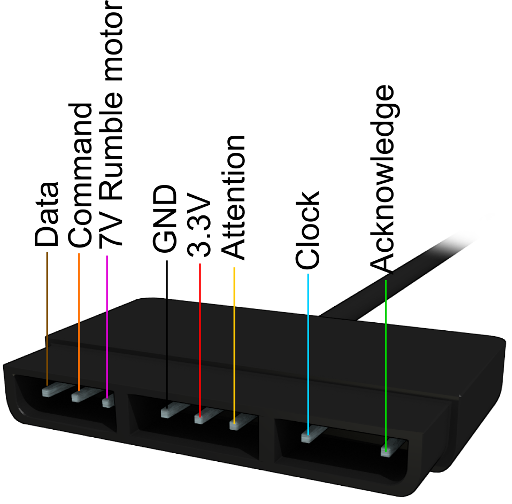
**TASK 2:**

**PS2 pin connections:**



**Ps2 test code:**

#include <PS2X\_lib.h>

PS2X ps2x;

#define PS2\_DAT 13

#define PS2\_CMD 11

#define PS2\_SEL 10

#define PS2\_CLK 12

int green=0; int red=0; int blue=0; int pink=0;

int L1=0; int L2=0; int R1=0; int R2=0;

int UP=0; int DOWN=0; int LEFT=0; int RIGHT=0;

int SELECT=0; int START=0;

void setup() {

ps2x.config\_gamepad(PS2\_CLK, PS2\_CMD, PS2\_SEL, PS2\_DAT, false, false);

Serial.begin(9600);

}

void loop() {

ps2x.read\_gamepad();

green=ps2x.ButtonPressed(PSB\_GREEN);

red=ps2x.ButtonPressed(PSB\_RED);

blue=ps2x.ButtonPressed(PSB\_BLUE);

pink=ps2x.ButtonPressed(PSB\_PINK);

L1=ps2x.ButtonPressed(PSB\_L1);

L2=ps2x.ButtonPressed(PSB\_L2);

R1=ps2x.ButtonPressed(PSB\_R1);

R2=ps2x.ButtonPressed(PSB\_R2);

UP=ps2x.ButtonPressed(PSB\_PAD\_UP);

DOWN=ps2x.ButtonPressed(PSB\_PAD\_DOWN);

LEFT=ps2x.ButtonPressed(PSB\_PAD\_LEFT);

RIGHT=ps2x.ButtonPressed(PSB\_PAD\_RIGHT);

SELECT=ps2x.ButtonPressed(PSB\_SELECT);

START=ps2x.ButtonPressed(PSB\_START);

if(green==1 && R1==0){

Serial.println("Triangle just pressed");

red=0;

}

if(red==1){

Serial.println("Circle just pressed");

blue=0;

}

if(blue==1){

Serial.println("X just pressed");

pink=0;

}

if(pink==1)

Serial.println("Square just pressed");

if(L1==1 && R2==0){

Serial.println("L1 just pressed");

R1=0;

}

if(L2==1 && LEFT==0){

Serial.println("L2 just pressed");

R2=0;

}

if(R1==1 && green==1)

Serial.println("R1 just pressed");

if(R2==1 && L1==1)

Serial.println("R2 just pressed");

if(UP==1 && START==0){

Serial.println("UP just presses");

RIGHT==0;

}

if(DOWN==1 && RIGHT==0){

Serial.println("DOWN just presses");

LEFT=0;

}

if(LEFT==1 && L2==1)

Serial.println("LEFT just presses");

if(RIGHT==1 && DOWN==1)

Serial.println("RIGHT just presses");

if(SELECT==1 )

Serial.println("SELECT just presses");

if(START==1 )

Serial.println("START just presses");

/\*if(ps2x.Analog(PSS\_LX)<110)

{

}\*/

//Serial.print("Left Stick:");

int l\_axis=(114-ps2x.Analog(PSS\_LY));

int r\_axis=(ps2x.Analog(PSS\_RX)-114);

if((l\_axis>20)&&(r\_axis>-10)&&(r\_axis<10))

Serial.println("GO FRONT");

else if((l\_axis<-20)&&(r\_axis>-10)&&(r\_axis<10))

Serial.println("GO BACK");

/\* Serial.print(ps2x.Analog(PSS\_LY));

Serial.print(" Right Stick:");

Serial.print(ps2x.Analog(PSS\_RX));

Serial.print(",");

Serial.println(ps2x.Analog(PSS\_RY));\*/

else if((r\_axis>30)&&(l\_axis>-50)&&(l\_axis<50))

Serial.println("GO RIGHT");

else if((r\_axis<-30)&&(l\_axis>-50)&&(l\_axis<50))

Serial.println("GO LEFT");

else if((r\_axis>20)&&(l\_axis>20))

Serial.println("TURN RIGHT FORWARD");

else if((r\_axis<-20)&&(l\_axis>20))

Serial.println("TURN LEFT FORWARD");

}

**Left and Right Analog:**

Apart from the buttons we did the calibration of the 2 analog buttons so that the left analog is used just for moving front and back whereas the right analog is used for moving left and right .We have also made a combination when the left analog is moved forward and right analog is used simultaneously. Therefore we can use whatever combination we want for a specific movement of the bot.

**Problems Faced:**

The ps2 controller gives random values on pressing individual values as in it gives multiple buttons pressed when we press triangle ,square etc .Therefore we need to first initialize all the buttons as 0 and while reading the value of each individual button we need to make the unwanted buttons as 0.

Apart from this we wasted some time to figure out why the ps2 wasn’t giving proper outputs and we found that 2 jumpers were damaged .

Since there are limited buttons in the ps2 controller we need to either make combinations or use a flag as condition to control multiple tasks.

Also while using the ps2 controller one needs to press hard the buttons and wait before each action as there is a very minute delay between 2 actions.

**Code For Using Combination of Buttons:**

#include <PS2X\_lib.h>

PS2X ps2x;

#define PS2\_DAT 13

#define PS2\_CMD 11

#define PS2\_SEL 10

#define PS2\_CLK 12

int pin1=6;

int green=0; int red=0; int blue=0; int pink=0;

int L1=0; int L2=0; int R1=0; int R2=0;

int UP=0; int DOWN=0; int LEFT=0; int RIGHT=0;

int SELECT=0; int START=0;

void setup() {

ps2x.config\_gamepad(PS2\_CLK, PS2\_CMD, PS2\_SEL, PS2\_DAT, false, false);

Serial.begin(9600);

Serial.println("Start");

delay(2000);

}

void loop()

{

ps2x.read\_gamepad();

green=ps2x.ButtonPressed(PSB\_GREEN);

red=ps2x.ButtonPressed(PSB\_RED);

blue=ps2x.ButtonPressed(PSB\_BLUE);

pink=ps2x.ButtonPressed(PSB\_PINK);

R1=ps2x.ButtonPressed(PSB\_R1);

SELECT=ps2x.ButtonPressed(PSB\_SELECT);

START=ps2x.ButtonPressed(PSB\_START);

UP=ps2x.ButtonPressed(PSB\_PAD\_UP);

DOWN=ps2x.ButtonPressed(PSB\_PAD\_DOWN);

LEFT=ps2x.ButtonPressed(PSB\_PAD\_LEFT);

RIGHT=ps2x.ButtonPressed(PSB\_PAD\_RIGHT);

L1=ps2x.ButtonPressed(PSB\_L1);

L2=ps2x.ButtonPressed(PSB\_L2);

R2=ps2x.ButtonPressed(PSB\_R2);

if(pink==1)

pneumatic(1);

else if(green==1 && R1==0 )

{

red=0;

pneumatic(2);

}

else if(red==1)

{

pneumatic(3);

blue=0;

red=0;

}

else if(START==1)

{

pneumatic(4);

}

else if(R1==1 && green==1)

pneumatic(5);

}

//global

int pneumatic(int a)

{

UP=ps2x.ButtonPressed(PSB\_PAD\_UP);

DOWN=ps2x.ButtonPressed(PSB\_PAD\_DOWN);

LEFT=ps2x.ButtonPressed(PSB\_PAD\_LEFT);

RIGHT=ps2x.ButtonPressed(PSB\_PAD\_RIGHT);

L1=ps2x.ButtonPressed(PSB\_L1);

L2=ps2x.ButtonPressed(PSB\_L2);

R2=ps2x.ButtonPressed(PSB\_R2);

Serial.println(a);

/\* Serial.println("pneumatic is activated ");\*/

if(a==1)

{

if(UP==1 && START==0)

{

Serial.println(a);

//Serial.println(" will extend pneumatic");

digitalWrite(pin1,HIGH);

}

else if(DOWN==1 && RIGHT==0)

{

Serial.println(a);

//Serial.println(" will contract pneumatic");

digitalWrite(pin1,LOW);

}

else if(L2==1 && LEFT==0)

{

Serial.println(a);

Serial.print(" will leave the bottle pneumatic");

}

else if(L1==1 && R2==0)

{

Serial.println(a);

Serial.println(" will grip the bottle pneumatic");

}

}

else if(a==2)

{

Serial.print("Inside") ;

Serial.println(a);

if(L1==1 && R2==0)

{

Serial.println(a);

Serial.print("HEllo") ;

Serial.println(" will grip the bottle pneumatic");

red=0;

}

else if(L2==1 && LEFT==0)

{

Serial.println(a);

Serial.print("Hello") ;

Serial.print(" will leave the bottle pneumatic");

red=0;

}

else if(UP==1 && START==0)

{

Serial.println(a);

Serial.println(" will extend pneumatic");

red=0;

}

else if(DOWN==1 && RIGHT==0)

{

Serial.println(a);

Serial.println(" will contract pneumatic");

red=0;

}

}

else if(a==3)

{

if(UP==1 && START==0)

{

Serial.println(a);

Serial.println(" will extend pneumatic");

}

else if(DOWN==1 && RIGHT==0)

{

Serial.println(a);

Serial.println(" will contract pneumatic");

}

else if(L1==1 && R2==0)

{

Serial.println(a);

Serial.println(" will grip the bottle pneumatic");

}

else if(L2==1 && LEFT==0)

{

Serial.println(a);

Serial.print(" will leave the bottle pneumatic");

}

}

else if(a==4)

Serial.println("Extend base pneumatic");

else if(a==5)

Serial.println("Contract base pneumatic");

}

**EXPLANATION:**

In this we tried using the pneumatics using combination of buttons like when **(square + up button)** on left side of joystick would be pressed the arms of the bot would extend when square and L2 would be pressed the gripper would extend and when L1 will be pressed the gripper will grip the bottle. After that when we press the **(square + down button)** the arms would come back to original position.

Similarly we set the combinations for triangle and circle.

**Problems while using combinations of buttons:**

Both the square and circle combinations are working properly but while using the triangle it gives absurd values which made it quite difficult to fix the issue.

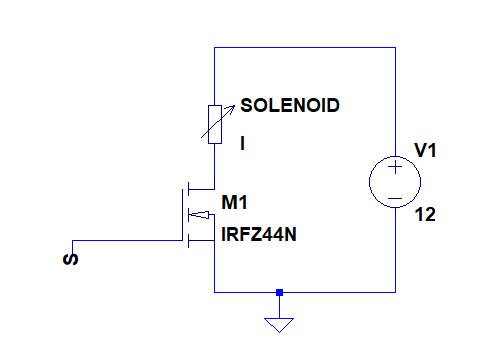
Therefore we decided to use flags instead to combinations .Using flags gives an added advantage of using the same button for both actions(extending and contraction of pneumatics).

**Pneumatics:**

**Circuit Diagram:**

Initially we made a circuit where we connected the load in parallel to the 12V supply in which we had to give 0 for switching on the mosfet and 1 for switching off, but due to the complexity of the circuit and better understanding we connected the load in series with the supply.

We also thought of using 14 mosfets and we designed the board according to that but due to lack of time and unavailability of components we switched to rather 4 mosfets .



Hsere my S is the Arduino which uses a digital pin to give supply to the mosfets and in our task we have used 4 mosfets for 4 single acting pneumatics 1 for both arms working together, 2 for gripping and 1 for base.

**Final code for Pneumatic based on flag:**

#include <PS2X\_lib.h>

PS2X ps2x;

#define PS2\_DAT 13

#define PS2\_CMD 11

#define PS2\_SEL 10

#define PS2\_CLK 12

int pnuematic1=7;

int pnuematic2=6;

int pnuematic3=5;

int pnuematic4=4;

int pnuematic5=3;

int green=0; int red=0; int blue=0; int pink=0;

int L1=0; int L2=0; int R1=0; int R2=0;

int UP=0; int DOWN=0; int LEFT=0; int RIGHT=0;

int SELECT=0; int START=0;

int c=0,c1=0,c2=0,c3=0,c4=0,c5=0,c6=0,c7=0; //Counters

void setup() {

Serial.begin(9600);

ps2x.config\_gamepad(PS2\_CLK, PS2\_CMD, PS2\_SEL, PS2\_DAT, false, false);

delay(5000);

pinMode(pnuematic1,OUTPUT);

pinMode(pnuematic2,OUTPUT);

pinMode(pnuematic3,OUTPUT);

pinMode(pnuematic4,OUTPUT);

pinMode(pnuematic5,OUTPUT);

/\*digitalWrite(pnuematic1,LOW);

digitalWrite(pnuematic2,LOW);

digitalWrite(pnuematic3,LOW);

digitalWrite(pnuematic4,LOW);

digitalWrite(pnuematic5,LOW);\*/

}

void loop() {

ps2x.read\_gamepad();

green=ps2x.ButtonPressed(PSB\_GREEN);

red=ps2x.ButtonPressed(PSB\_RED);

blue=ps2x.ButtonPressed(PSB\_BLUE);

pink=ps2x.ButtonPressed(PSB\_PINK);

L1=ps2x.ButtonPressed(PSB\_L1);

L2=ps2x.ButtonPressed(PSB\_L2);

R1=ps2x.ButtonPressed(PSB\_R1);

R2=ps2x.ButtonPressed(PSB\_R2);

UP=ps2x.ButtonPressed(PSB\_PAD\_UP);

DOWN=ps2x.ButtonPressed(PSB\_PAD\_DOWN);

LEFT=ps2x.ButtonPressed(PSB\_PAD\_LEFT);

RIGHT=ps2x.ButtonPressed(PSB\_PAD\_RIGHT);

SELECT=ps2x.ButtonPressed(PSB\_SELECT);

START=ps2x.ButtonPressed(PSB\_START);

//green button for pnuematic 1

if(green==1 && R1==0 && c==0)

{

Serial.println("Green Activated");

//digitalWrite(pnuematic1,LOW);

digitalWrite(pnuematic1,HIGH);

c=1;

red=0;

}

else if(green==1 && R1==0 && c==1)

{

Serial.println("Green DeActivated");

c=0;

red=0;

digitalWrite(pnuematic1,LOW);

}

//red button for pnuematic2

if(red==1 && c3==0)

{

c3=1;

blue=0;

digitalWrite(pnuematic2,HIGH);

}

else if(red==1 & c3==1)

{

c3=0;

blue=0;

digitalWrite(pnuematic2,LOW);

}

//blue button for pnuematic3

if(blue==1 && c1==0)

{

pink=0;

c1=1;

digitalWrite(pnuematic3,HIGH);

}

else if(blue==1 && c1==1)

{

pink=0;

c1=0;

digitalWrite(pnuematic3,LOW);

}

//pink button for pnuematic4

if(pink==1 && c2==0)

{

c2=1;

digitalWrite(pnuematic4,HIGH);

}

else if(pink==1 && c2==1)

{

c2=0;

digitalWrite(pnuematic4,LOW);

}

//L1 button for pnuematic5

if(L1==1 && R2==0 && c4==0){

R1=0;

c4=1;

digitalWrite(pnuematic5,HIGH);

}

else if(L1==1 & R2==0 && c4==1){

R1=0;

c4=0;

digitalWrite(pnuematic5,LOW);

}

}