menlo robotics

Analog Joystick

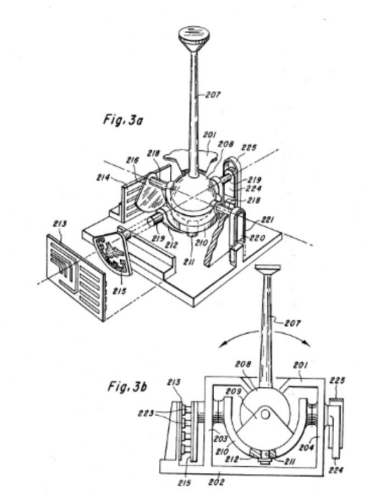
What is a joystick

A joystick(analog) is 2 potentiometers and optional a press button. The pots return to center position through a spring mechanism which can be tuned on some pots for both flexibility , speed of operation to default position. Joysticks are used many places in game controllers, jog runners high end editing equipment to controllers on earth movers.

Why are they important to learn?

Joystick is a very unique learning tool for electronics they allow to study many lessons:

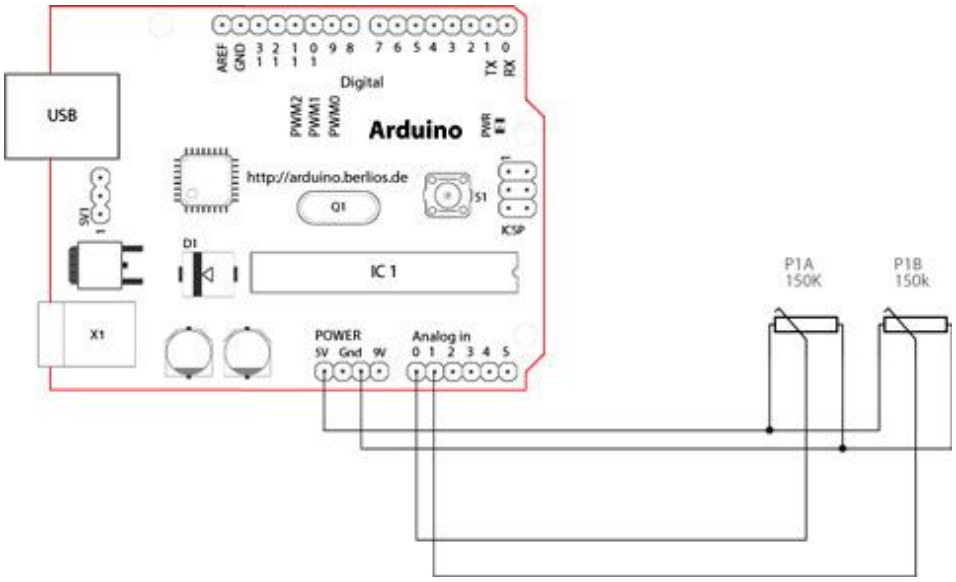
1. Basic: analog input, digital input, programming, game control
2. Medium: Sampling
3. Advanced: Sampling, pid, pin - pullup, pin-pulldown, correct way of peripheral interfacing, digital and analog pin pulling.



Mechanical Design

Joysticks come in many different forms but many have mechanisms to “return to center”. Also have spring mechanism to “return to default”. Some advanced joysticks come with pressure and center controls.

Some joysticks are digital (they use digital sampling to mimic analog mechanism), but for our study purpose we will use analog joysticks.



Tutorial

We will connect our joystick using as per the diagram to connect to analog in 0 and 1 and also connect digital push button to 2 with pullup or pulldown resistor.

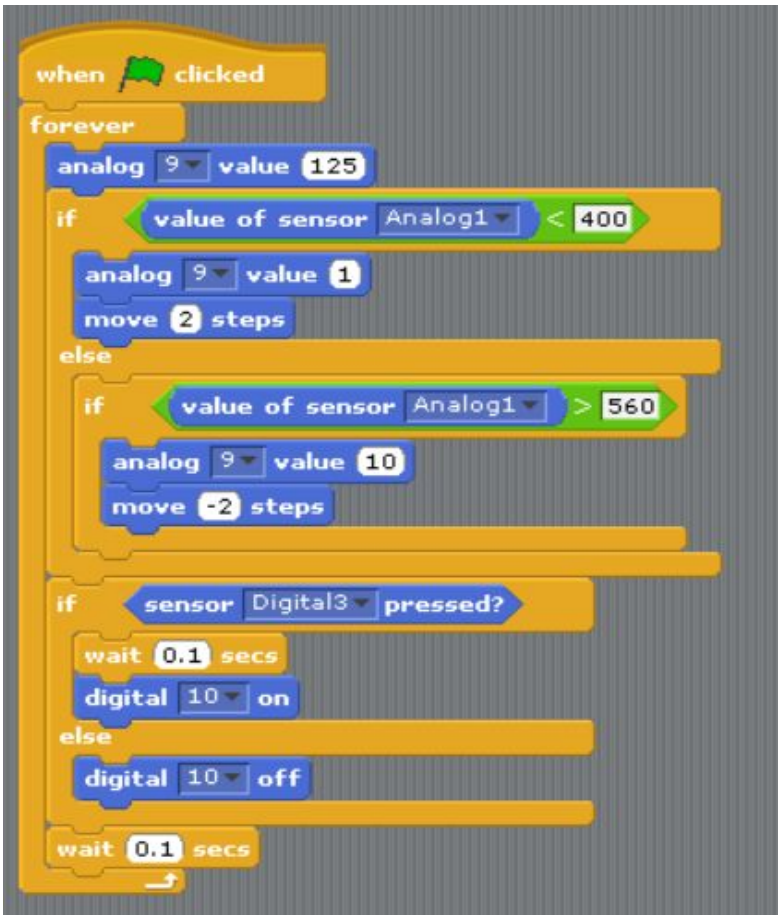
Program

We will write a s4a/arduino program to move the actor left-right+up-down based on joystick movement and when button is pressed make actor say “clicked”

Test

Students after this exercise should be able to use joystick, interface a potentiometer, and use buttons with electronics board. Also they should learn how to pull up and pull down (digital or wired).

Sample Example Program


when clicked
forever
analog 9 value 125
if value of sensor Analog1 < 400
analog 9 value 1
move 2 steps
else
if value of sensor Analog1 > 560
analog 9 value 10
move -2 steps
if sensor Digital3 pressed?
wait 0.1 secs
digital 10 on
else
digital 10 off
wait 0.1 secs

```
int ledPin = 13;
int joyPin1 = 0;                 // slider variable connecetd to analog pin 0
int joyPin2 = 1;                 // slider variable connecetd to analog pin 1
int value1 = 0;                  // variable to read the value from the analog pin 0
int value2 = 0;                  // variable to read the value from the analog pin 1

void setup() {
 pinMode(ledPin, OUTPUT);              // initializes digital pins 0 to 7 as outputs
 Serial.begin(9600);
}

int treatValue(int data) {
 return (data * 9 / 1024) + 48;
}

void loop() {
 // reads the value of the variable resistor
 value1 = analogRead(joyPin1);
 // this small pause is needed between reading
 // analog pins, otherwise we get the same value twice
 delay(100);
 // reads the value of the variable resistor
 value2 = analogRead(joyPin2);

 digitalWrite(ledPin, HIGH);
 delay(value1);
 digitalWrite(ledPin, LOW);
 delay(value2);
 Serial.print('J');
 Serial.print(treatValue(value1));
 Serial.println(treatValue(value2));
}
```