

PROJECT REPORT

USING ACCELEROMETER AS A MOUSE FOR YOUR COMPUTER

TEAM MEMBERS:

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Objective:

To use the 2 axis' of the accelerometer as reference for motion of the mouse cursor on the computer screen.

Introduction:

The cursor motion on commercial laptops is due to the capacitive touchpad. This requires contact of finger tips. Our main aim is to eliminate this arduous procedure and controlling it with the wrist motion.

Instruments Used:

1]3 Axis Accelerometer:



An accelerometer is a device that measures proper acceleration. The proper acceleration measured by an accelerometer is not necessarily the coordinate acceleration (rate of change of velocity). Instead, the accelerometer sees the acceleration associated with the phenomenon of weight experienced by any test mass at rest in the frame of reference of the accelerometer device. For example, an accelerometer at rest on the surface of the earth will measure an acceleration $g = 9.81 \text{ m/s}^2$ straight upwards, due to its weight. By contrast, accelerometers in free fall or at rest in outer space will measure zero. Another term for the type of acceleration that accelerometers can measure is g-force acceleration.

Accelerometers have multiple applications in industry and science. Highly sensitive accelerometers are components of inertial navigation systems for aircraft and missiles. Accelerometers are used to detect and monitor vibration in rotating machinery. Accelerometers are used in tablet computers and digital cameras so that images on screens are always displayed upright.

Single- and multi-axis models of accelerometer are available to detect magnitude and direction of the proper acceleration (or g-force), as a vector quantity, and can be used to sense orientation (because direction of weight changes), coordinate acceleration (so long as it produces g-force or a change in g-force), vibration, shock, and falling in a resistive medium (a case where the proper acceleration changes, since it starts at zero, then increases). Micromachined accelerometers are increasingly present in portable electronic devices and video game controllers, to detect the position of the device or provide for game input.

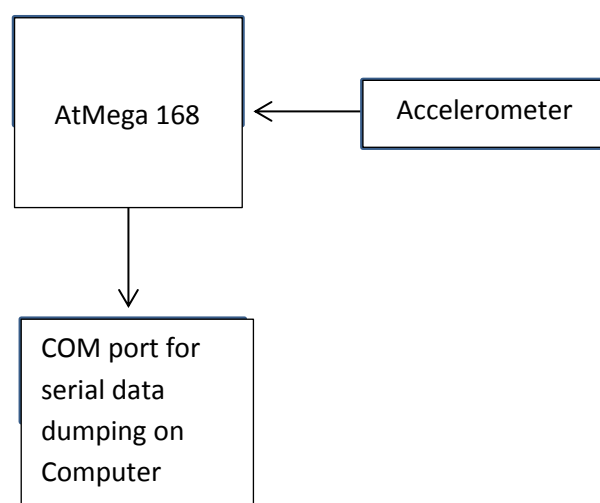
In our application , using the accelerometer as mouse we will be using the data obtained against x and y axis' acceleration against gravity. The x axis' acceleration against gravity corresponds to the horizontal motion of the cursor and y axis' corresponds to vertical motion.

2] Arduino duemilanove AtMega 168:

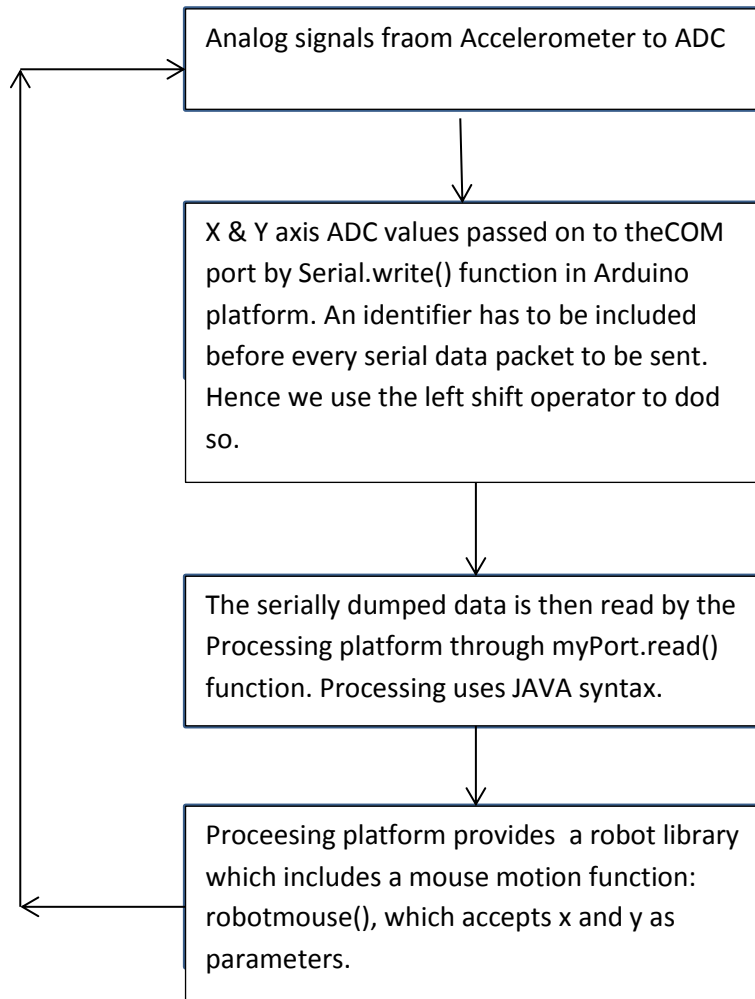
The Atmega 168 is a 8-bit Atmel microcontroller with 16k Flash programmable memory. It also has a Analog to digital convertor. The Atmega168 provides a 10 bit resolution. The accelerometer will give us 2 analog readings for x and y respectively, which the ADC converts into digital values to processed further.

3] Jumper Wires: Are simple pin to pin connector wires.

Block Diagram:



Algorithm:



Program in Processing platform: JAVA syntax

```
import processing.serial.*;
import java.awt.Robot;
import java.awt.AWTException;
import java.awt.event.InputEvent;

Robot myRobot;

Serial myPort; // Create object from Serial class

public static final short portIndexmouse = 0;
int val;
void setup()
{
    size(200, 200);
    println(Serial.list());
    println(" Connecting to -> " + Serial.list()[portIndexmouse]);
    //println(" Connecting to -> " + Serial.list()[portIndexkey]);
    String portName = Serial.list()[0];
    myPort = new Serial(this,Serial.list()[portIndexmouse], 9600);
    try {
        myRobot = new Robot(); // the Robot class gives access to the mouse
    }
    catch (AWTException e) { // this is the Java exception handler
        e.printStackTrace();
    }
}

void draw()
{
    while (myPort.available()>=3 | myPort.available()>=3) {
```

```
    switch(myPort.read()){  
  
        //put conditions here to read the values for accelerometer as mentioned & update the mouse  
        pointer x,y  
  
        Case 0xff:  
  
        val=((myPort.read())|(0xff));  
  
        break;  
  
    }  
    myRobot.mouseMove(x,y);  
}
```

Program in Arduino platform:

```
void setup()  
{  
    Serial.begin(9600);  
}  
  
void loop()  
{  
    int a=analogRead(0);  
    // int b=analogRead(1);  
    //Serial.print("x");  
    // Serial.print(a);  
    Serial.write(0xff);  
    Serial.write((a>>8) & 0xff);  
    Serial.write(a & 0xff);  
    // Serial.write(b);  
    //Serial.print(" ");
```

```
// Serial.print("y");  
// Serial.println(b);  
//delay(50);  
}
```

REFERENCES:

- 1]Arduino.cc/tutorials
- 2] <http://processing.org/reference/libraries/serial/index.html>
- 3] http://en.wikipedia.org/wiki/Serial_communication

