

# FINGER SLAVE

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**Abstract:** The aim of our project is to develop a device which is allowing the presenters to control the mouse cursor sway from their notebooks, especially without a desk. It is wireless, wearable, small and light enough to wear around. This device is including two parts. The first part includes power supply system, Arduino microcontroller, Bluetooth transmitter and sensors, which are gyroscopes and accelerometers. This part will be worn on the user's hand. The other part will connect to the computer and encompass a Bluetooth and another Arduino microcontroller.

## 1 Introduction

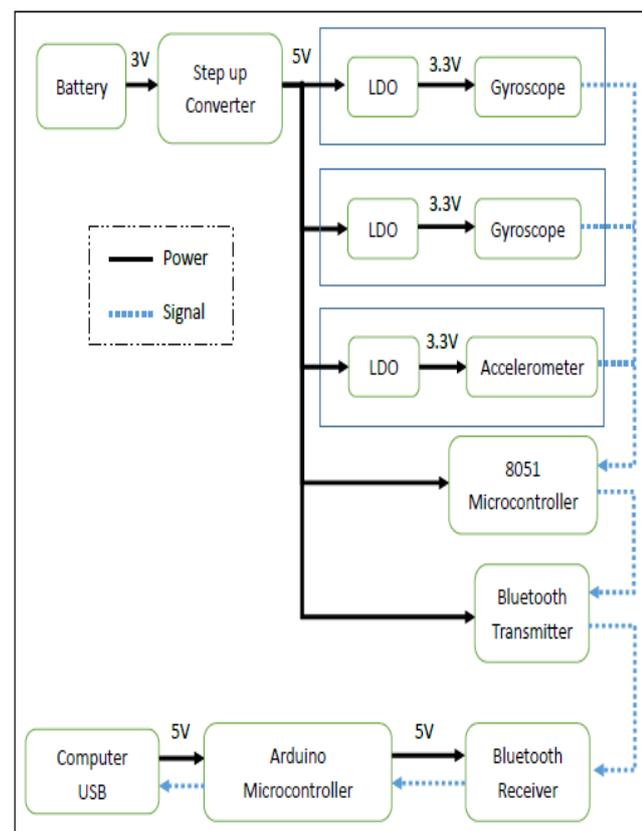
We choose this project because we noticed that presenters always need somebody to help him/her control the Power-point. Although some of them can deal with this by a laser pointer. However, if they want to draw pictures, present a video, or do some other kinds of interaction with the listeners, they have to walk back to their computer to achieve this, which waste a lot of time and interrupt the presentation.

So, our idea is to invent a wireless wearable mouse, which is small and light enough to wear around, while allowing the presenters to control the computer curser away from their PCs, even without a desk!

## 2 Material and Methods

There are two separate parts in our project. One is on our finger which includes gyroscopes and Bluetooth transmitter. And the other one including microcontroller and Bluetooth receiver will connect with the computer. The following figure is a diagram of our whole

system. The solid line represents the power path and the dotted line means the signal path.



### Block description

#### i) Power Supply

We are considering using 3V button cell (watch battery) to serve as basic power supply for the device circuits. Gyroscopes and accelerometer need 3.3V power supplies whereas 8051 microcontroller and Bluetooth transmitter need 5V power supplies.

#### ii) Gyroscope and Accelerometer

We plan to put two gyroscopes and one accelerometer on user's fingers. Gyroscope1 is on the first finger and others (Gyroscope2 and

Accelerometer) are on the middle finger. Gyroscopes will detect the angular velocity whereas accelerometer will measure the acceleration of user's fingers.

**iii) 8051 Microcontroller**

8051 microcontroller is before the Bluetooth transmitter. It will receive the raw data from sensors and control Bluetooth transmitter to transmit it.

**iv) Bluetooth Transmitter**

Bluetooth transmitter on the user's hand will be controlled by an 8051 microcontroller and transmit the raw data from sensors that are gyroscopes and accelerometer to the Bluetooth receiver.

**v) Bluetooth Receiver**

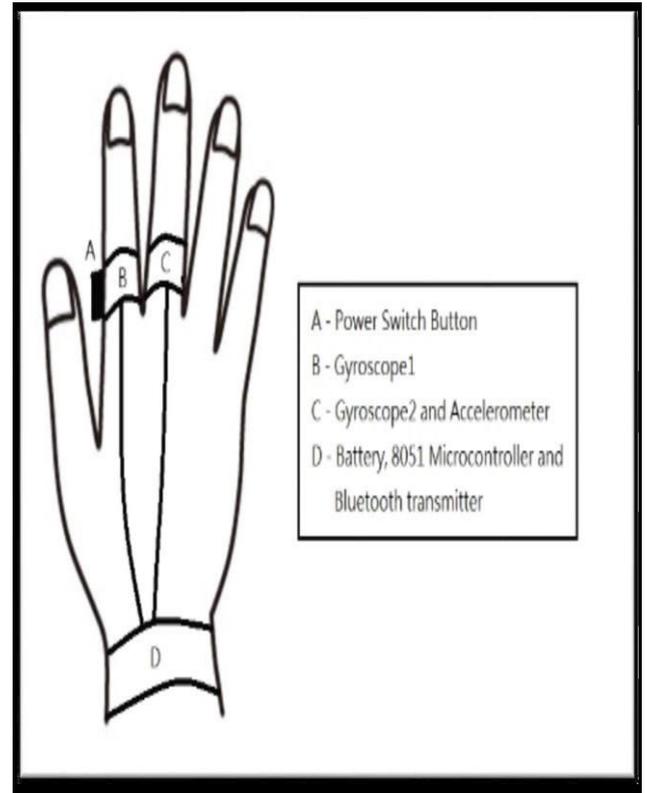
The Bluetooth receiver will receive the data from transmitter and then pass it to the microcontroller (Arduino). Its power will be supplied from the computer via the USB.

**vi) Arduino Microcontroller**

Arduino microcontroller monitors the data from the Bluetooth receiver. After receiving and analyzing the data, Arduino will transfer it to a specific form that can be used and then transmit it to the computer to control the cursor. 5V power supply of the Arduino will be provided by the computer through USB.

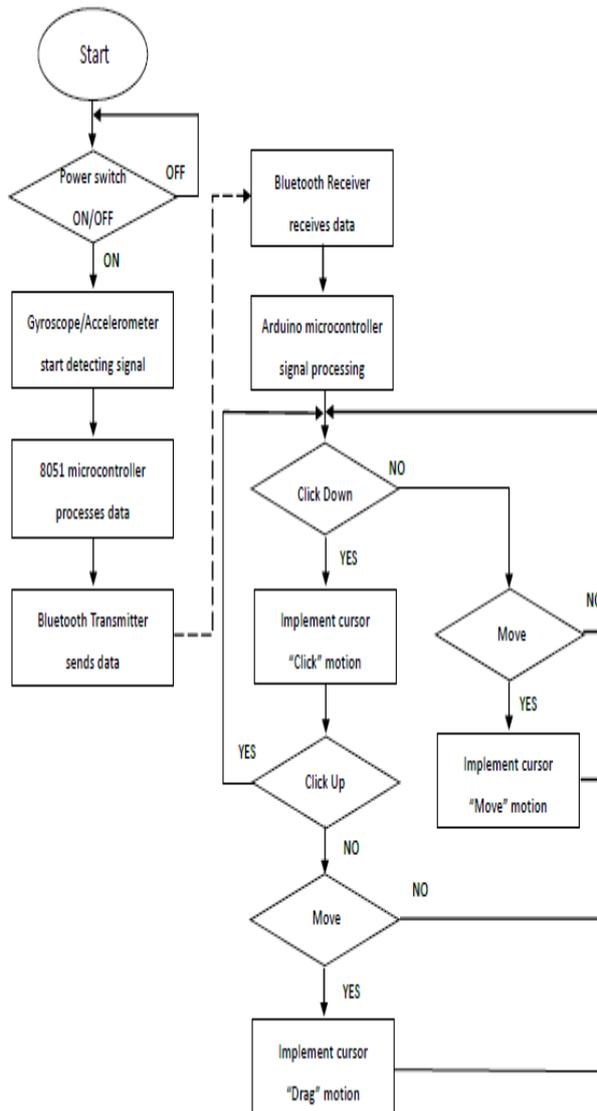
**vii) Computer**

Computer will supply 5V voltage to Arduino Microcontroller and Bluetooth receiver via USB. On the computer, we will write a Java program to communicate with the Arduino microcontroller and deal with the data from it.



**Flow Chart**

**Device Illustration**



### 3 Result

Able to do cursor drifting with hand rotation, and left/right finger clicking with finger movement. Dragging fails due to heavy lagging, because dragging is viewed as a sequence of continuous robot input instruction of cursor drifting and clicking, it gives too much workload to the computer processor. Dragging from left to right ends in discontinuous point instead of a line.

### 4 Conclusion

In Summary, the final function of our device is similar to the concept we constructed at the beginning of the semester. There are some functions we cannot implement very well like drag and some gesture. Because the hardware part of our project is very complete. If we can improve the algorithm of data processing, we think that our device will be more powerful and practical.

### Accomplishments

- The finger mouse controls the mouse cursor with rotation and consequently implement the 4-direction drift and clicking.
- The wireless transmission distance can attend to 7.5 meters and use our device without desk.
- A full-charged battery can support the device for at least one hour.

### 5 Future Scope

- To implement drifting motion by processing data from accelerometers instead of gyroscope's rotation.
- Eliminate light vibration and small movement of human body and consequently reduce the noise of data.
- To implement more useful gestures by improving the algorithm of data processing.
- Design more efficient power supply to reduce power loss.

### 6 References

1. Air mouse  
<https://www.youtube.com/watch?v=m6j8SFJs4lA>
2. AT89S51 datasheet  
[http://www.keil.com/dd/docs/datashts/atmel/at89s51\\_ds.pdf](http://www.keil.com/dd/docs/datashts/atmel/at89s51_ds.pdf)
3. HC-05 Bluetooth-to-Serial Module datasheet

<http://www.electronica60norte.com/mwfls/pdf/newBluetooth.pdf>

4. 8051 controlled Bluetooth transmitter circuit

[https://www.pantechsolutions.net/media/k2/attachments/Interfacing Bluetooth With 8051.pdf](https://www.pantechsolutions.net/media/k2/attachments/Interfacing_Bluetooth_With_8051.pdf)

5. L6920D datasheet

<http://www.st.com/web/en/resource/technical/document/datasheet/CD00002171.pdf>

6. L3GD20H module description

<https://www.pololu.com/product/2129>

7. L3GD20H datasheet

[https://www.pololu.com/file/download/L3GD20H.pdf?file\\_id=0J731](https://www.pololu.com/file/download/L3GD20H.pdf?file_id=0J731)

8. Calculation of boost converter's power stage

<http://www.ti.com/lit/an/slva372c/slva372c.pdf>

9. LSM303D module description

<https://www.pololu.com/product/2127>

10. Arduino and Java

<http://playground.arduino.cc/Interfacing/Java>

11. Battery datasheet

[http://www.adafruit.com/datasheets/maxell\\_cr2032\\_datasheet.pdf](http://www.adafruit.com/datasheets/maxell_cr2032_datasheet.pdf)