Project Abstract with Block Diagram(s)

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Project Name: **Finger Pointer**

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**Project Abstract:**
Our project is intended to replace a mouse with a glove that the user will wear. The cursor will track the index finger of the user while clicking will be achieved by pressing buttons connected to the middle and ring finger of the user. These buttons can easily be pressed with the thumb of the user, while still maintaining pointing ability with the index finger.

We plan to accomplish our goal by using an ultrasonic transducer on the index pointer that will be detected by ultrasonic detectors at the monitor. Based on the detectors, an algorithm implemented on a microcontroller will determine the appropriate position of the mouse. Then, following USB HID (Human Interface Device) Protocol, the microcontroller will send the data packets to the computer through a USB cable. If the protocol is followed correctly, our project should work on a Windows or Mac computer without the need for additional drivers.
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Introduction:
Nothing commercially exists for a product such as this, but individuals have come up with such devices. There were gloves made by MIT students to mimic the gloves in the movie “Minority Report”. The main difference between our design and this design is that our glove uses sound to determine position compared to their design using a camera. Also, our design will connect to a computer through a USB port while theirs was communicating to an FPGA and controlling a mouse that was shown moving on an image generated by the FPGA. There have also been IR devices used as a mouse, including Nintendo Wii Console controllers turned into a mouse and an IR pen used as a tablet type device. Both of these devices modified Nintendo Wii equipment to achieve their goals, whereas we will design our project from scratch. Also, our project is a glove to be worn by the user, further differentiating our design.

Technical Objectives:
The main objective is to accurately detect finger movement and translate the movement correctly into mouse position.

- Our current solution to detect the index finger is to use multiple ultrasonic detectors around the monitor to detect distances from one transducer (placed on the index finger). We hope to be able to detect differences and translate these differences into mouse positions.
- Next, we need to wirelessly transmit a signal stating when the left or right mouse button (located on the glove) has been clicked.
- There will be a main box where the microcontroller will be placed and the sensors will be wired to. Also, the USB cable will exit from this box to be connected to the computer. The glove will have wireless communication with this box.
- Another big challenge is communicating with the computer using the USB cable. The HID protocol will have to be followed to get the computer to recognize our design as a mouse.

A preliminary block diagram of our device is shown below:
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Cost Objectives:
We expect the price of Finger Pointer to be under $100. A partial list of the part prices will be given in the Preliminary Design Report. There are no similar devices available on the market with which to compare the costs.

References or Bibliograph:
http://www.digi.com/products/wireless/point-multipoint/xbee-series1-module.jsp#specs

Materials and Resources:

1. LM324 Op Amp
2. XBee RF Module
3. Air Ultrasonic Ceramic Transducer
4. (4) Air Ultrasonic Ceramic Receiver
5. Glove
6. PIC Microprocessor