FAU FLORIDA ATLANTIC UNIVERSITY
COLLEGE OF ENGINEERING & COMPUTER SCIENCE

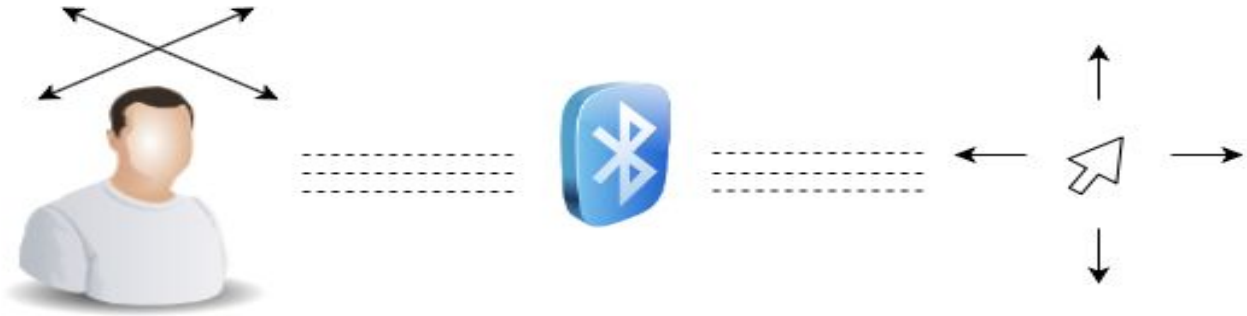
Hands Free Computer Mouse Interface

Intro to Embedded Systems → Executive Summary

Objectives

Mobility is an aspect of life that most people take for granted. What if you had limited to no movement of your hands and/or arms? How would you manipulate the mouse efficiently? This research project aims at solving this dilemma of a hands free computer mouse. This project must satisfy the following criteria:

- Tracking the movement of the user's head
- These movements are translated in to HID mouse commands
- Wireless transmission to host computer
- No external buttons



General Description

In order to achieve a completely hands free device, the movement of the head will be utilized. Tilting the head in certain directions will trigger appropriate HID mouse commands and cursor movement. The orientation of the head will be sensed by the MPU6050 9-degrees-of-freedom accelerometer and gyroscope. A Texas Instruments MSP430G2553 microcontroller interprets the accelerometers data. Finally the appropriate HID mouse command and movement data transmits to the computer via Bluetooth.

The MPU6050 will control the up, down, left, and right movements of the cursor. This is done using the pitch and roll measurements calculated from the sensor. The clicking is implemented using a method called dwell clicking. This is done by moving the mouse cursor over a desired object and hovering over it for a predetermined amount of time. After the clicking timer threshold is exceeded, the mouse will execute a double Left Click. This method ensures that the device is completely hands free and does not require external buttons. This is important to the simplicity of the users input.

What I Learned

When mobility is hindered, finding an elegant solution to simple problems can be challenging. Multipurpose movements such as the dwell clicking threshold were essential in the formulation of this solution. The positive implementations of this device are endless. The most obvious of potential users would be paraplegic and amputees. However there are many more degenerative diseases, such as ALS and Parkinson's, in which the users could utilize the features. Simple point and click games and/or communication devices can also be controlled with this device.