Brain Ramos
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We Made The Amazing WiiMaze

Ambitious Proposal:
We propose to build an interactive marble maze game using the Nintendo WiiMote and a game called Triple Labyrinth. The player will control the tilt of the maze board by tilting the Wiimote up, down, left, and right. By doing so, the player will have to navigate a ball through a maze while avoiding numerous holes into which the ball may fall.

We will first connect the Wiimote to the DE2 board via a USB Bluetooth receiver, and then connect the DE2 board to the game using our own custom circuit that will extend from the serial port. We will have to write our own driver for the Bluetooth receiver, and will have to research the specifications of the Wiimote. The circuit we build will entail two motors that tilt the board in the X and Y directions.

A More Modest Proposal in Iterations:
We realize that getting the USB to work with Bluetooth to work with the Wiimote is a challenging task, so we also propose to accomplish various sub-projects as we work our way up to accomplishing the complete "ambitious proposal." Any iteration described below may well turn out to be our project for the semester.

Iteration 1: Understand the USB protocol and attach a simple USB device to the board
After doing some research on the USB protocol and skimming the official 650-page specification of it, we have realized that USB is extremely difficult and interesting in its own right, and would be happy just to be able get a simple USB device such as a laser mouse to work with the board. This will entail writing VHDL code to interact with the USB mouse and perhaps even to make a pointer move on the VGA screen. We also realize that no other group has ever made use of the USB port, so we find it exciting to be the first.

Iteration 2: Understand the Bluetooth protocol and connect a USB Blutetooth dongle to the board
From what we have seen in our initial research, Bluetooth is also a non-trivial protocol. Thus, we would also be happy to simply be able to send and receive simple packets via Bluetooth. Once we have the USB port working from iteration 1, we will attempt to connect a Bluetooth USB dongle to the board and see if we can at least get an ACK from the device. Once we can do that, we will attempt to do more intricate parsing of the packets, and deal with the various parts such as the SYNC and PID.

Iteration 3: Understand the Wiimote specs and connect it to the board
The Wiimote uses the Bluetooth protocol to send and receive message, so our next step would be to figure out exactly what packets the Wiimote sends when, say, the user

presses the A button, or tilts it 45 degrees to the left. Once we understand this, connecting the Wiimote to the board via our USB Bluetooth dongle will be fairly straightforward. At this stage, we will simply try to get the board to turn on an LED when a button on the Wiimote is pressed.

Iteration 4: Connect the board to the maze game via the serial port
If we get this far, we would be ecstatic. Once our Wiimote can communicate with the DE2 board, we can begin to use it to do some neat things. We have already done some research on how to use the serial port to control motors, so we intend to build this circuit and attach the motors to the marble maze game. We will then write some more VHDL code to translate the packets coming in from Bluetooth to motor movements.

Alternative Methods:
In the interest of not reinventing the wheel, we may also decide to boot uCLinux onto the DE2 board so that we may use it's built in USB driver. We believe that we would also be able to find modules for Bluetooth support that would make connecting the Wiimote to the board much easier. If we take this approach, a large amount of our efforts will be to modify and optimize the USB and Bluetooth drivers for our particular project.

Resources:

USB:
- [DE2 Introduction](#)
- [Altera's DE2 USB Specs](#)
- [USB 2.0 Specification](#)
- [The HID Interface](#)
- [USB Protocol Specification](#)
- [USB in a Nutshell](#)

Bluetooth:
- [Bluetooth White Paper](#)
- [Official Linux Bluetooth Protocol Stack](#)
- [Bluetooth Resource Center](#)

Wiimote:
- [Wiili](#)

uCLinux:
- http://www.uclinux.org/
- http://www.uclinux.org/pub/uClinux/ports/etrax/bluetooth/