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05/08/2009

Final Project: *Physical Computing Research*

Midi Laser Instrument

Objective:

I decided for my final project, to branch into something unfamiliar, and new. I've been doing screen-based work for the last few years, including computer programming, 2D and 3D compositional art, and flash-based animations. Breaking away from digital art in the traditional sense, into more structural or physical art, has opened many new possibilities. Learning to use electronics and computer chips to build artwork the fits into the physical world is what I'm most interested in now; and I think that in regard to *Electronic Media Art and Technology*, reaching beyond limitations of the personal computer is the ultimate creative height, because it literally transforms anything into a computing medium. Therefore, my final project was to attempt building a laser-based musical instrument, where the user would break a series of laser-beams, to generate MIDI data, which would play sound through a computer synthesizer. The instrument would also feature other physical sensing electronics to determine the distance of the users hand while breaking the beam in order to derive a pitch value. In this way, my goal is to create an expressive form of physical interaction with a computing medium.

Results:

Sadly, I was unable to produce a functioning instrument for the final art show for UT. I found the task more difficult than first expected, and hit multiple snags along the way. While working within this new environment of electronics and microcontrollers, it took a number of weeks just to feel comfortable. For instance, I needed to refresh my memory on working with basic principles of electronic circuits, such as ohm's law, schematics, and electrical component ratings. Another couple weeks were dedicated just to finding the right electronic components, and building materials. I decided to use green lasers because of the higher visibility, and because they look cooler. They are also less common than the typical red. Some of the other main components of my instrument included the Arduino Microcontroller, which is one of the most popular microcontroller platforms to date. It has many capabilities, and it relatively easy to get set up. However, using it to any degree of efficiency requires lots of practice, something I didn't have enough time for this semester. I also implemented a series of range sensors from Sharp know as GP2D12 detectors. These provide a triangulation distance, which draws current every 40 milliseconds and sends a voltage rating. The voltage has to be converted into a linear distance by applying a formula within the Arduion code. The last major component of the instrument controlled the beam detector circuit. The lasers were designed to shoot across into a detector circuit which implemented a series of light dependent resistors. I've had a lot of trouble getting this to translate correctly, and switch on the pitch value of the range sensors. Completing the laser instrument will depend on getting the beam detector circuit to cooperate with the Arduino Microcontroller.

Plans:

I plan to continue my research, and finish building my laser instrument throughout the next few months. My goal is to become proficient with the Arduino platform, as well as electronic circuit building, and learn to build more physical computing applications while studying at

Rhode Island School of Design.