Johnty Wang: Technical Projects Portfolio

2002 – 2012

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Software Projects

Multi-Track Viewer

Date: 2004 (8 months)

Purpose: Co-op work term project @ Harman/Becker Wavemakers

Description: Designed, implemented and tested a multiple waveform viewing and analysis application used by speech recognition/synthesis researchers

Skills: C++ Programming, MFC Framework, Windows Programming, GUI design

XML-based Asset Game Audio Management System

Date: 2005 (4 months)

Purpose: Co-op work term project @ Electronic Arts Canada

Description: Designed and implemented a prototype asset management system for game audio assets. Implemented examples demonstrating proposed usage of system.

Skills: C++ and C# Programming, XML Schema design and validation

Artisynth Probe Editing Interface/Articulatory Text to Speech Synthesizer

Purpose: Co-op work term project @ Human Communications Lab, UBC

Description: Designed and implemented a graphical editing interface for modifying control probes in the Artisynth modelling environment; Implemented a text to speech interface that generated articulatory controls to drive an articulatory speech synthesizer.

Skills: Java Programming, Introduction to Speech Synthesis and Bio-mechanical modelling

Super Bacteria Tap-a-song

Date: March 2011

Purpose: Entry for the Great Canadian Appathon (w. Roberto Calderon and Vincent Tsao)

Description: Designed and implemented a music-based tapping game in 48 hours with a team of 3 people. Won category prize for best art and aesthetics.

Skills: Game audio design and programming, Soundtrack creation, Windows Phone 7 programming

Mobile Phone Choir

Date: May 2011

Purpose: Masters Research; Interactivity Submission for Computer Human Interaction 2011 (w. Nicolas d'Alessandro)

Description: A "mobile phone choir" of four voices using iOS devices. An iPad "director" sends notes to each device to control harmonic progression, while each voice's relative pitch and vocal effort can be controlled via touch.

Skills: iOS application development, Open Sound Control, Touch interfaces

Hardware Projects

Miniature Microphones

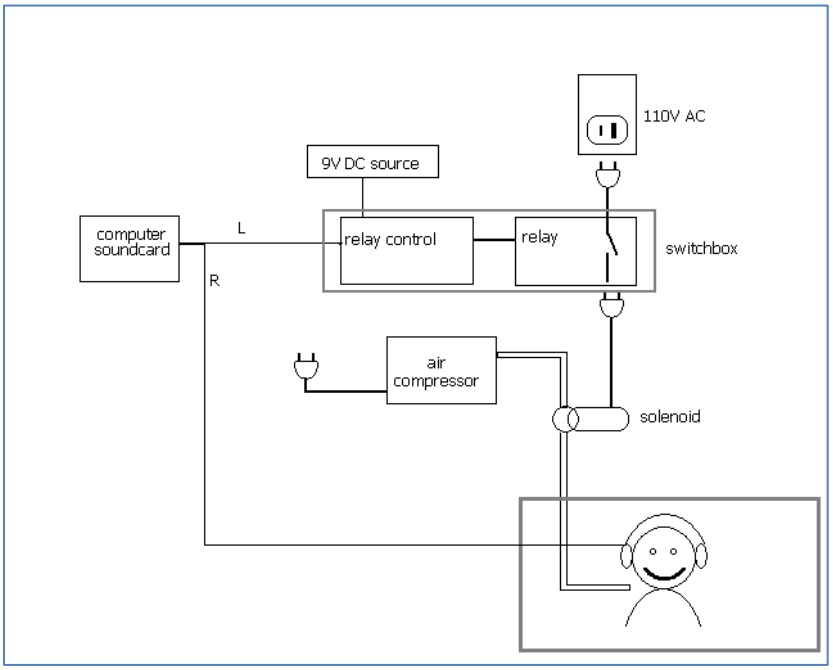
Date: 2002-2005

Purpose: Initially, to have a cheap and simple means of recording music practices. Eventually lead to a very rewarding learning process that made some extra pocket money as well.

Description: Made and sold miniature condenser microphones for MiniDisc recorders that can fit inside a 3.5mm audio plug. Acquired components from online sources; Marketed product on eBay and shipped to over 200 customers all over the world. Extended product line to simple preamps and binaural microphones.

Skills: Basic electronics, audio recording, component sourcing, online marketing.

Puff-Switch Controller



Date: April 2007

Purpose: Contract project for the Interdisciplinary Speech Research Laboratory at UBC. (w. Bryan Gick)

Description: An op-amp circuit was designed to trigger a solenoid valve controlling an air-compressor used in a perceptual linguistics experiment. The results were published in Nature, and in 2010 the experiment was reproduced by the Infant Studies Lab at UBC, requiring me to produce 2 more copies.

Skills: Analog circuit design, hardware integration

Combined Hardware/Software Projects

Smart Bike Racks

Date: 2008-2009

Purpose: Designed and implemented a prototype bike locking system. Acquired university and government funding to lead a team of summer students and volunteers.

Description: A prototype locking system for our public bike fleet to encourage user responsibility through accountability. The wi-fi enabled rack communicates with a central database server containing bike fleet and user information. A physical servo mechanism locks and unlocks the bikes, and magnetic iButtons provide identification (of both users and bikes).

Skills: Hardware design, Rabbit wireless embedded microcontrollers, Arduino, servos, MySQL database, 1-wire iButton interface

Electroacoustic Composition: Rain

Date: November 2009

Purpose: Composition for final concert for MUSC319, Electroacoustics.

Description: An electroacoustic composition using recorded sample of raindrops (recorded using homemade microphones, see “Miniature Mics” above) and processed piano samples from Chopin’s “Raindrop” prelude triggered during performance using a modified Nintendo Nunchuck controller connected to an Arduino.

Skills: Accelerometers, Arduino, Max/MSP, Audio recording and processing.

Digital Ventriloquist Actors (DiVA)

Date: Jan 2009 - present

Purpose: Masters Research (w. Sidney Fels, Bob Pritchard, Helene Day Fraser, Nicolas d'Alessandro, Marguerite Witvoet)

Description: A gesture controlled speech synthesizer used as a new instrument. Recoded Max/MSP system into C++, built custom wired and wireless hardware for triggering plosive sounds, wrote serial device drivers for input devices, built circuits to interface piano and guitar pedals as volume controls.

Skills: Max/MSP patching, Open Sound Control, Arduino, Bluetooth, Serial device drivers, C++, Java

RFID Door Lock

Date: 2010-2011

Purpose: A robust, easy to manage electronic access system for my home (w. Benny Chan)

Description: An Arduino-based RFID locking system for front door. Door can be unlocked via RFID authentication, or through an Android application on a mobile phone. A solenoid controlled strike mechanism was added to the existing lock so door can still be used with traditional keys. A Processing sketch allowed signals from the mobile phone to open the door, and played back confirmation sound effects when door locks and unlocks.

Skills: Arduino-based Hardware integration, Processing, Android application development.

Worm bin Temperature Sensor, Humidity Sensor

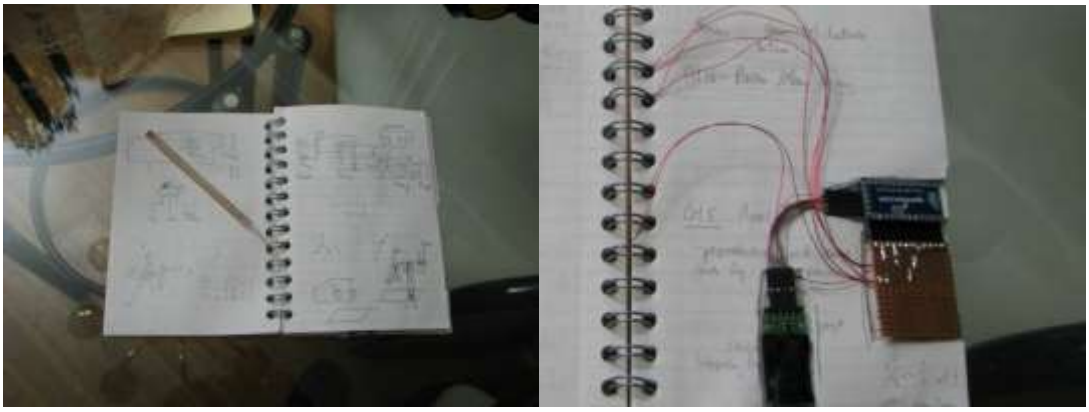
Date: 2010

Purpose: A temperature humidity monitor for an outdoor vermicomposting bin; A humidity sensor for monitoring soil moisture levels.

Description: A wireless temperature sensor was built using wireless low power microcontrollers, capable of running for many months on 2 AAA batteries. The end node in the worm bin sends temperature data wireless to the router node plugged into a computer. A Processing sketch parses the data from the router node and performs logging and visualization of the data. A Python application interfaces with a web platform (SenseTecnic) that displays the sensor data in real-time. The humidity sensor was built by casting Plaster of Paris with metal electrodes.

Skills: Sensor design, Hardware/Software integration, Texas Instruments MSP430 embedded wireless platform, Processing, Python

Singing Notebook



Date: October 2010

Purpose: Exploring speech synthesis control using physical interfaces.

Description: Flex and force sensors were embedded, along with electronics and power supply, into a notebook creating a stand-alone, wireless device. The detected signals are wirelessly transmitted to a computer running speech synthesis software via a Bluetooth serial port. A Max/MSP patch provided mapping between sensor values and speech synthesis parameters, and a Java based articulatory speech synthesizer was modified to receive controls from the Max patch. The interface was used in the performance of “Chroma Hack” by Bob Pritchard, Martin Ritter, David Dorrington and Johnty Wang in November 2010 as part of the UBC Sonic UBC Laptop Audio, Speech and Song (SUBCLASS) concert.

Skills: Wireless Arduino-based sensor design, Bluetooth, Max/MSP patching, Java programming

Squeezy: Hybrid force/touch interface

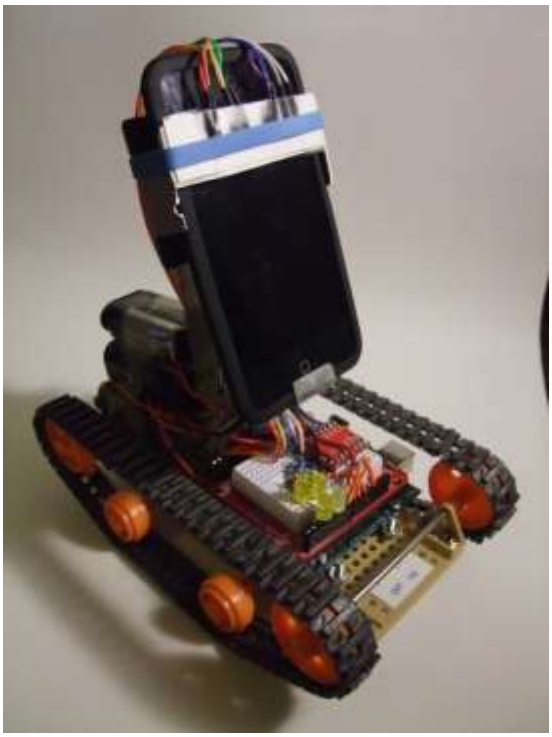
Date: November 2010

Purpose: Exploring speech synthesis control using physical interfaces. Published as a demonstration paper in New Interfaces for Musical Expression 2011 in Oslo, Norway.

Description: A hybrid squeeze/touch interface was created to control an articulatory speech synthesizer. The 2D position and orientation of the ball is detected by the touch screen (an iPad), while squeezing forces are detected by a wireless microcontroller. The combined inputs are fed to a computer running speech synthesis.

Skills: iOS application development, Max/MSP, Processing

Tippy the Teleconferencing Robot



Date: March 2011

Purpose: Started off as a fun side project. Demonstration paper accepted for the 2011 International Conference in Entertainment Computing and a 2nd place award at the 2011 IEEE UBC Project Fair. (w. Vincent Tsao, Benny Chan)

Description: By using optic substitution, we built an iTouch/iPhone based telepresence robot without implementing any iOS software: Instead, we inserted visual commands from the controller side that appears as bright boxes within a black bar at the top of the video stream. The bright boxes are detected optically and used to drive the robot.

Skills: Arduino, Motor Drivers, Optical Sensors, Mobile applications

Room #81

Date: 2011

Purpose: Installation at New Interfaces for Musical Expression 2011, Oslo, Norway. (w. Nicolas d'Alessandro, Stefanie Muller, Roberto Calderon)

Description: Wired flex sensors to cloth which, in combination with a visual webcam tracker, controlled a speech (screaming) synthesizer and projection intensity as part of an interactive installation.

Skills: Integration of electronics with fabric, Max/MSP patching, OSC communication

Footsy

Date: 2011 - present

Purpose: Collaborating with the BC Children's Hospital in the design of a shoe sensor prototype for patients recovering from leg bone lengthening procedures. (w. Andrew Ho)

Description: Children recovering from bone lengthening procedures using an Ilizarov apparatus need to put weight on the leg, but are generally reluctant to do due to pain. We are designing a weight sensing shoe with LED's to indicate when there is sufficient weight placed on the leg. A data logger will be used to provide clinicians with a history of forces exerted.

Skills: Force sensing/measurement/scaling, Arduino, Data logging, Wearable technologies.

ChoirMob/Vuzik/Vox Tactum Ensemble

Date: March 2011 – present

Purpose: Creating an ecosystem for new ways of composing, playing and performing music using large screen displays and mobile devices (w. Aura Pon, Nicolas d'Alessandro)

Description: Building upon the masters research of Aura Pon (UCalgary) and systems developed at the UBC MAGIC lab, we have created a framework for graphical composition and rendering of visual music scores, surrounded by new instruments employing various gesture recognition and synthesis techniques to be used in ensemble performance. The system has been used for performances at festivals and conferences in Vancouver BC (UBC school of music, Sonic Boom festival), Atlanta GA (Guthman Instrument Competition finalist), Greece (Audio Mostly 2012) and Slovenia (ICMC 2012) featuring works composed by Aura Pon performed by the Vox Tactum ensemble.

Collaborators

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