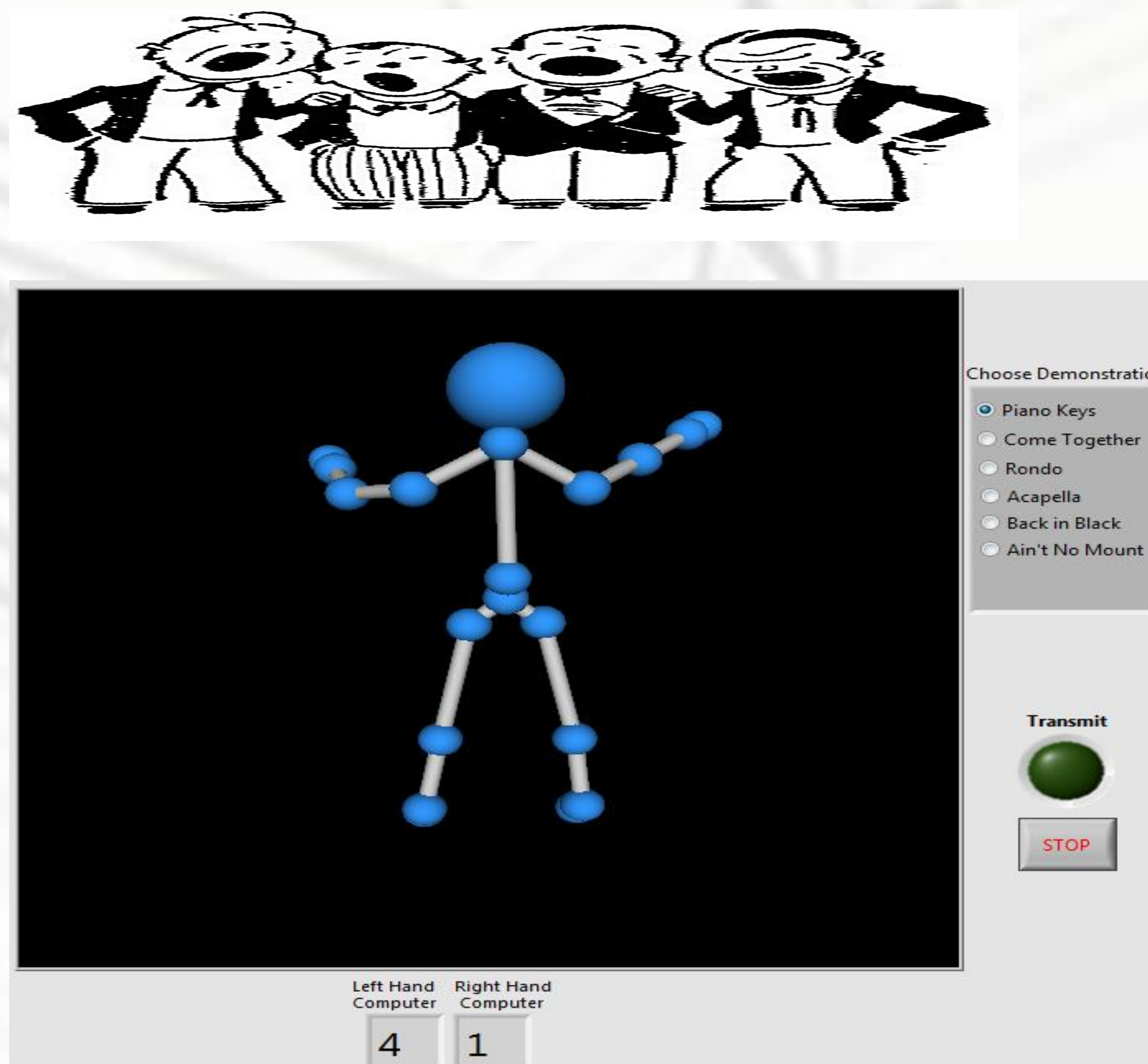


Students: Eric DeJesus, Miroslav Tomaska, Westley Propati, Songfei Zhang
Advisor: Prof. Predrag Spasojevic, Prof. David Daut, Swapnil Mhaske (LabView TA)

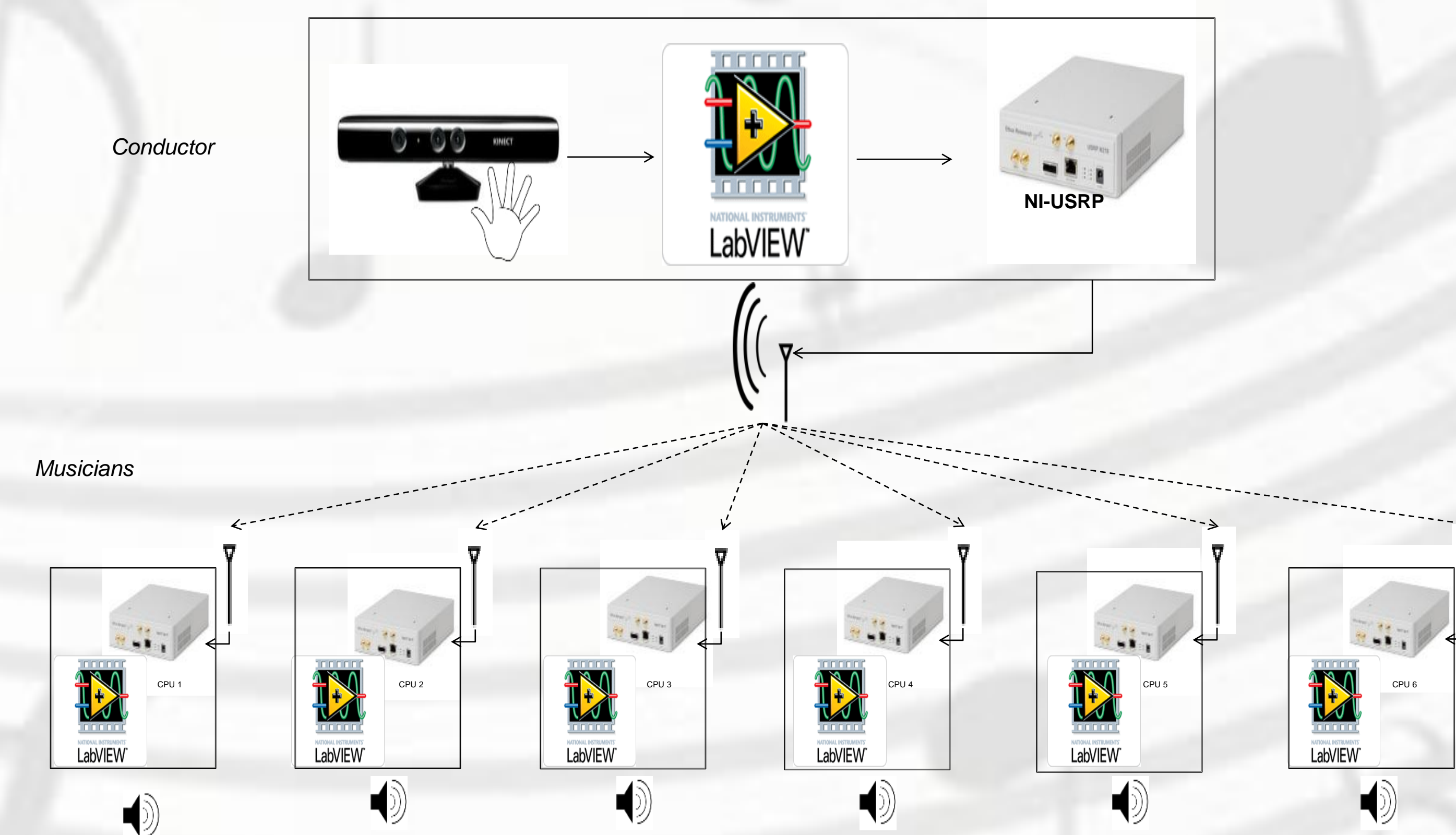
Motivation

- The Wireless Orchestra simulation environment using National Instruments hardware and software over a wireless channel.
- The hardware and software are available to the general public, Wireless Orchestra can be an open source project.
- The product can be used as a practice device for conductors, schools, and live performers.
- Microsoft Kinect and Keyboard inputs provide interactive control of the system.
- NI-USRP's transmit and receive data as and is very customizable for the designer and the users.
- The orchestra's position can be customized due to the wireless nature of the system.

Directing via Kinect and Keyboard



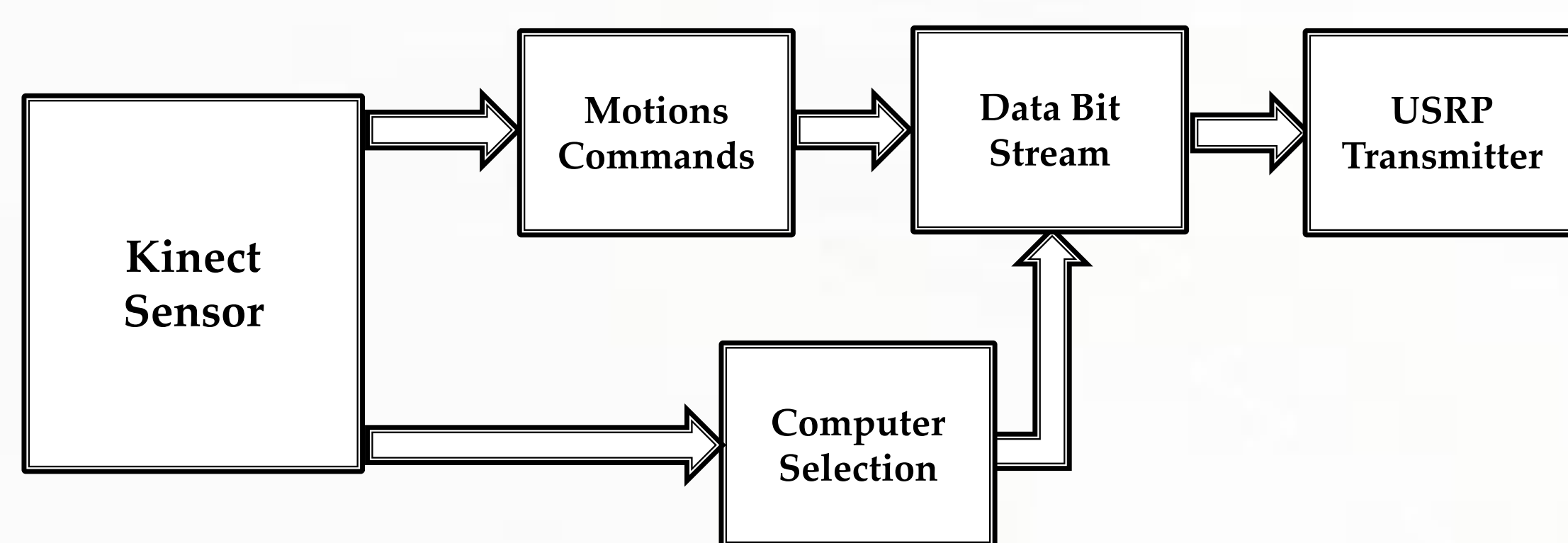
Transmitting via USRP or Wifi



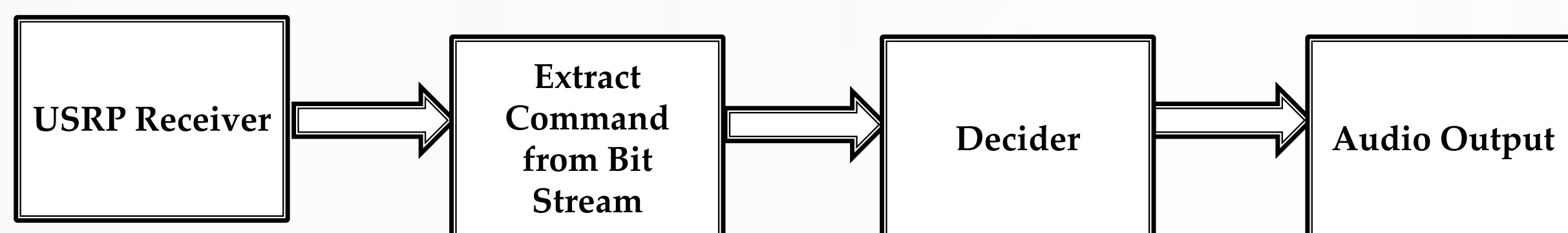
- LabView uses a USRP radio to transmit/receive commands generated from a kinect and a keyboard.
- Transmitter assigns preamble bit sequence to generated command and modulates it using QPSK modulation. The created Signal is then transmitted over wireless channel at 915MHz.
- Received signal is synchronized using the preamble and demodulated at receiver USRP.
- Resultant demodulated information is then passed to extractor and decider block.
- A wifi version of the system was also implemented, and is significantly cheaper

Data Flow

Transmitter using the USRP & Kinect



Receiver using the USRP



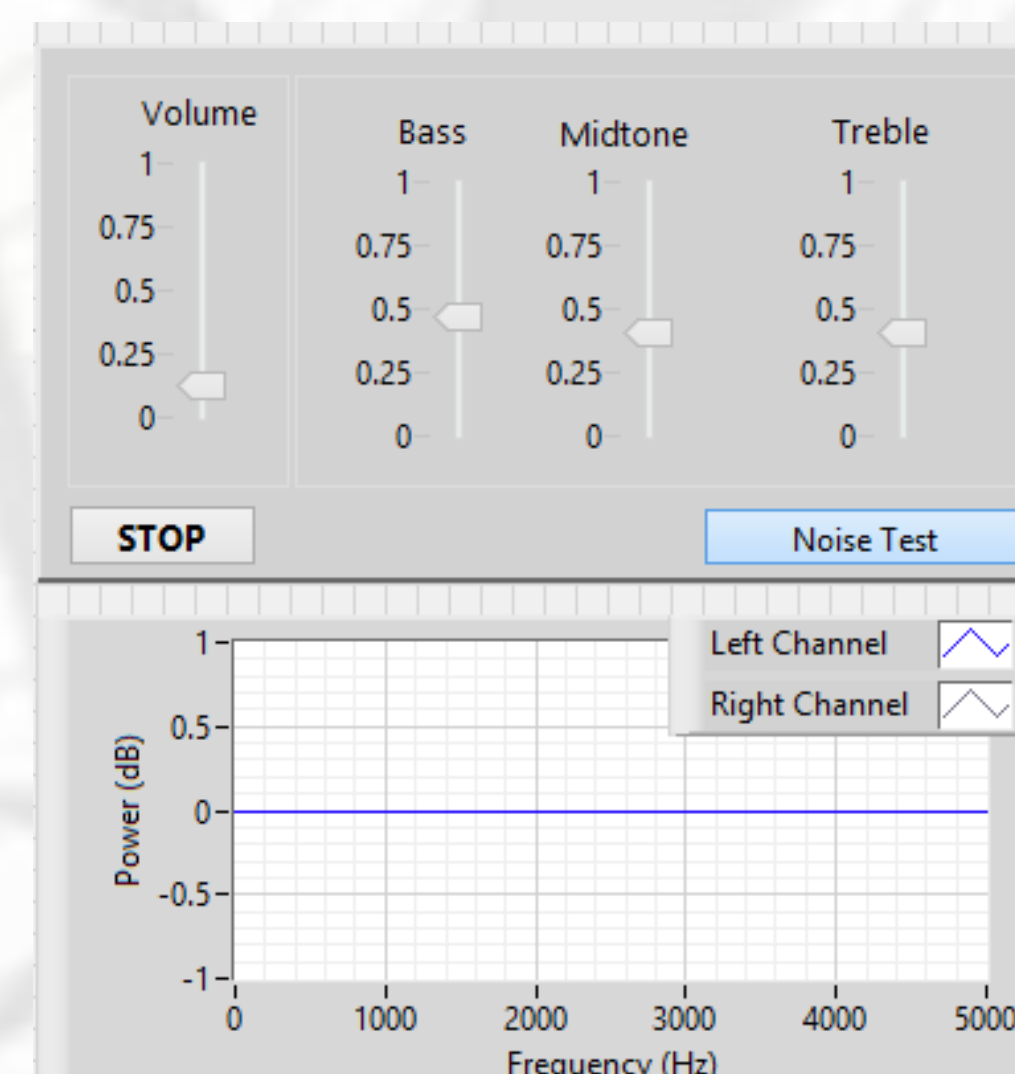
Mode	Computer 1		Computer 2		...
	Right Hand	Left Hand	Right Hand	Left Hand	
0000011	10110100	10011011	00000000	00000000	...

- Kinect Commands implemented as state machines
- Keyboard commands implemented as alternative
- Capable of transmitting commands to individual computers or broadcasting to all
- Select a computer with Kinect by performing a command in its direction
- Play different songs, control volume, equalize songs, or play notes individually

My-DAQ Equalizer

- Implementation of sound equalization using myDAQs. Resampling, filtering, D/A and A/D conversion are all features of the myDAQ

- Volume
- Base
- Midtone
- Treble



Future Work

- Introduce more Kinect gestures to expand library of commands.
- Use the National Instruments myDAQ hardware for data processing:
 - Tempo Control
 - Frequency Shifting
 - Frequency Filtering
- Implementation of repetition coding and Error detection

