

# FPGA Piano-Playing Robot

Max Hardy, Brendan Ashworth, and Anthony Nardomarino

## Initial Goals/Commitment:

1. **Audio analysis:** Can print fundamental frequencies of piano to screen.
2. **Music FSM:** Pause music while playing, play backwards, pause, go forwards, play double speed.

## Goals:

1. Hardcoded piano riff that demonstrates all fingers actuating on beat and rhythmically.
2. Play chopsticks recording (with harmonics) for 30 seconds into a microphone. Press play, the robot plays chopsticks on the keyboard without more input.

## Stretch Goals:

1. Visualize spectrogram from Audio Analysis & Storage module on a VGA display.
2. Isolate specific instrument from a recording of an ensemble (>1 instrument) and play that back.

## Initial Module Tasks (subject to change):

1. Iterative Filtering (Max)
2. Fast Fourier Transform (Max)
3. Fundamental Isolator (Anthony)
4. Start-End Detector (Brendan)
5. Music FSM (Brendan)
6. Frequency-Key Map (Anthony)
7. Synchronization & Timing
8. Angle to PWM (Anthony)
9. Key Serial to Actuator (Anthony)