Arduino Air Drums

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A device that enables musicians to easily transport, set up, play and record the drums anywhere, anytime.

Sankalpa 2012 Project entry

Introduction

Few instruments in mainstream music have as many separate pieces as a drum set. Playing them is a task in itself, but moving them can be just as much work, if not more. Because the separate pieces have their own small attachments and tightly attached thin heads, the problem of damage is a concern when transporting the kit.

A even more daunting task is recording the drums and microphone placement within the room while doing so:

- Recording the drums usually requires many more microphones to fully capture the full range and combination of loud and soft sounds. Multiple microphones means you will need multiple inputs to keep the tracks separate.
- Also with multiple microphones, phase cancellation can be a huge problem causing drums to sound thin and weak.

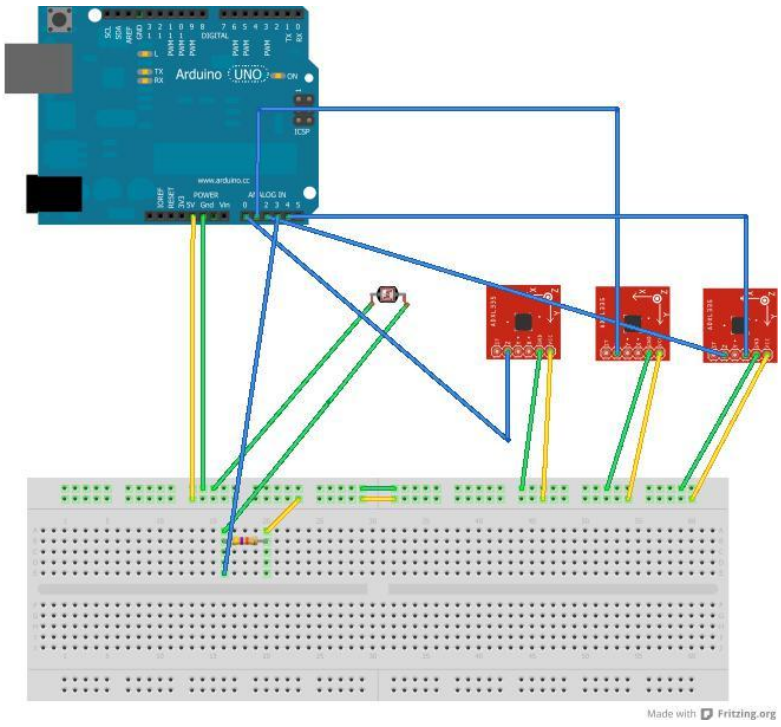
The typical drum kit consists of a kick drum, snare, two tom-toms mounted on stalks from the kick drum, a floor tom, a hi-hat, and two cymbals — maybe a crash and a ride.

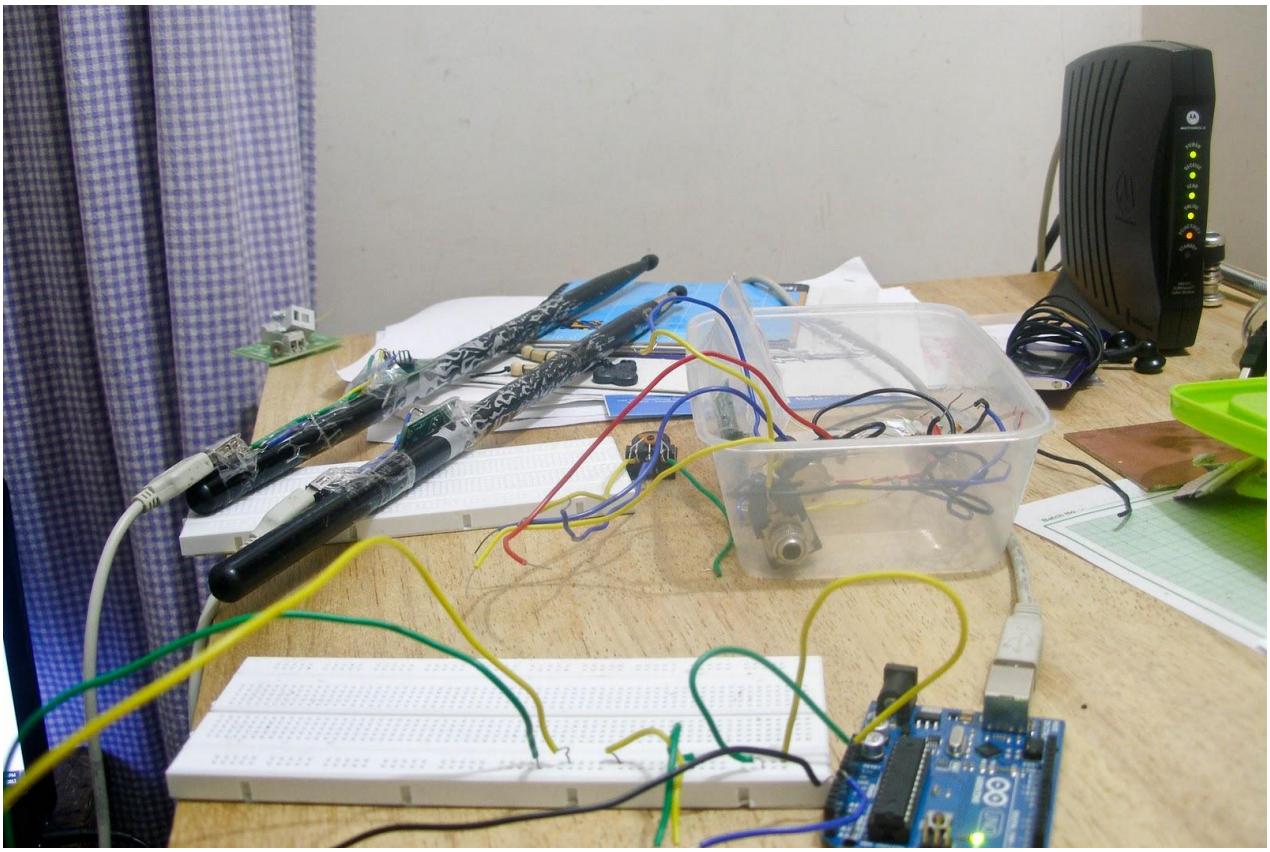
As we can imagine, setting up, tuning, microphone placement, and recording a drum kit might take several hours of work. We plan to eliminate that with some accelerometers and the Arduino prototyping board.

Concept

We made use of three ADXL335 accelerometers on two drumsticks and a pair old sandals, whose data outputs are read by the Arduino board. A photocell was used on the other sandal to reproduce the effect of a ‘hi-hat stand’. We made use of a serial to MIDI converting software that converted the 24bit data sent by the Arduino (after every event) to a MIDI message that the Microsoft GS Wavesynth software played as sound.

The breadboard view of our circuit:





Our finished circuit

The end result was that the device was producing the required sounds with very little lag in time when the specific events were carried out.

- A open hi-hat sound when the left stick was swung and the hi hat pedal was up.
- A closed hi-hat sound when the left stick was swung and the hi hat pedal was down.
- A Bass drum sound when the bass drum pedal was moved.
- A snare sound when the snare stick was moved.

Some improvements we would like to carry out in the future:

- A button on the snare stick that would produce a pre-programmed drumroll.
- A more responsive bass pedal for double-bass type effects.

- A crash cymbal sound when the hi hat stick is swung harder.
- A ride sound when the hi hat stick is swung sideways.

References

1. Maayan Midgal's Youtube video: http://www.youtube.com/watch?v=jjvy_jzGlAQ
2. Spikenzie Labs: http://spikenzielabs.com/SpikenzieLabs/Main.html
3. S2MIDI: Serial to MIDI converter for Windows: http://code.google.com/p/s2midi/
4. Official Arduino website: http://www.arduino.cc/