

Abstract

The primary motivation at selecting the subject of my thesis was realizing an innovation idea. All along the development I had the drive to make a device real that meets my expectations, and also which serves as a base for further development of a marketable product.

I play several kinds of instruments and spend most of my spare time dealing with music. That's the reason why I was sure that I would find a subject for development in this field. I usually listen to music during travelling as well, and I tend to drum with my hands, following the rhythm of the given music. So came the idea that I would like to develop a device that enables playing the rhythm of tracks during travelling with an audible feedback of the virtual drums. When I started to think the idea over, I realized that this device would be appropriate also for practicing drums for beginners during travelling. One of the most difficult parts of drumming is to play different patterns with both hands and legs while keeping the given tempo. This can only be improved with a lot of training. It would be a great help for the users to exercise the basic rhythm patterns during travelling, while listening to actual drum sounds through their earphones.

The system consists of 4 portable units, two of them can be put on the hands as gloves, and the other two units are placed on the shoes. The system includes a central processing unit that processes data from the accelerometer sensors of the portable units. The subject of my thesis is to write the algorithms for data processing and test them on a ready-to-use hardware. This version of the system will not meet the requirement of portability yet.

The prototype is based on a LPC 1768 development board as the processing unit of the system. The accelerometers are connected via wired communication. The digital output of the sensors data are processed by the microcontroller built on the card. The processing unit sends MIDI messages via USB port to a PC. The VSTi program on the computer will convert MIDI messages into sound and play it back to the user.

One of the most important aspects that the user should feel the drumming itself natural, so the delay between the actual hit and the audible sound should be minimised. It is also important that the processing algorithm should be capable of making difference between the drumbeats according their strength. The system should also differentiate the beats based on their location in the virtual space to enable the user play on different virtual drums.

I know it for sure that playing a virtual drum cannot replace the feeling of playing a real drumset, but that is not the point of it. The device is designed for beginners to practice and /or to enjoy drumming with their favourite soundtracks during travelling.