Utilizing Motion Sensors in Creating a Movement-Based Violin Simulator Application in Android

UNDERGRADUATE THESIS

Submitted as one of the requirements to obtain Sarjana Komputer (S.Kom.)

By:
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FACULTY OF COMPUTING
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CIKARANG
MARCH, 2023

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ABSTRACT

Playing music is good for the brain because it involves multiple areas of the brain simultaneously, such as the visual, motor, and auditory cortices. Regularly exercising these areas can lead to stronger problem-solving skills, higher cognitive abilities, and better memory functions.

However, as a beginner, learning to play musical instruments can be pretty intimidating. Not only are the instruments expensive, but it also requires a high amount of cognitive load to learn to play as well as reading the music sheet. The violin is an instrument known to be one of the hardest to learn because it places a heavy burden physically and mentally. Because of this, a lot of people have started to turn to mobile musical instrument simulators as a starting point, due to its convenience, practicality, and affordability. But the simulators present a new set of challenges in that they keep the users confined to the screen, which is not ideal for instruments like violin where movement is a big part of the playing experience. This violin simulator was developed with the goal of facilitating learning and for users to develop muscle memory. The hope is that by offloading the cognitive load to the body, users will have an easier time to learn.

In this application, users are able to play normal and accidental notes across two octaves (the 4th and 5th) and with 3 common musical techniques: Pizzicato, Staccato, and Legato. To start playing, users can click on one of the 8 buttons on screen and move

the phone left and right. To change octaves, users can move the phone up and down. To play accidental notes, users can hold the phone in landscape position.

Motion sensors - specifically accelerometer and gyroscope - were used in the development of this application. Because the accelerometer can only detect the acceleration value of the phone, users would need to move the phone rather quickly in order for the application to work.

Nevertheless, the initial testing stage results in a very positive outcome. Every feature that was tested worked as expected. However, it would work better with an additional supporting board attached to the phone, which is not in scope of this project.

This project is still very basic in nature and there can be a lot more features included for future development.

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