

EE 368 Digital Image Processing Project proposal

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April 29, 2015

1 TITLE AND DESCRIPTION

Augmented reality musical instruments

We aim to develop image processing software that will allow us to simulate a musical instrument. Every laptop comes with a front facing camera. We intend to use this camera to capture live video which will be processed in real-time by the software. The user will act as if he is actually playing the musical instrument, the software will recognize his actions and output appropriate music to the speakers.

We will release a specially designed sheet of paper that has a musical keyboard printed on it. The user has to print this sheet, keep it in front of the camera and start 'pressing' the keys of the printed keyboard, as if it were a real-life keyboard. Our software which runs in the background, tries to simulate the key presses and generate appropriate sound. Replace the printed sheet by another that has drums on it and you can now play drums without changing anything else.

2 TECHNICAL MILESTONES

1. Design appropriate sheets that will correspond to different musical instruments. These sheets should be designed in a manner that is easy for the camera to capture, while minimizing the effect of natural occlusions of hand parts while playing the instrument.
2. Developing a program using OpenCV that will perform the following:

- a) Perform calibration to determine the locations of keyboard keys/drums in the real world.
 - b) Recognise the gestures/movements of the user and relate them to the playing of the musical instrument.
 - c) Output appropriate sound that corresponds to those gestures.
3. Optimize the program for real-time processing. We observe that most augmented reality products in the market suffer from latency issues. That is, the effect, in this case the music, is not heard as soon as the key press is simulated. To solve this problem, we need to ensure that our program performs in a very efficient manner, and this usually requires a lot of code optimization in terms of speed and memory.

3 EXTENSIONS

Connecting an android device with the laptop via bluetooth and playing the music in real-time on the phone while the user is playing in front of the laptop.

REFERENCES

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