Project number: S20-15  
Project title: Mobile Music Learning Game  
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Project Scope: Digital Signal Processing, iOS, Unity, Music

Popular play-along music games, such as “Guitar Hero” and “Rock Band”, currently allow users to play along in real time to a song using a controller designed to mimic an actual instrument. For example, the guitar controller has five colored buttons that are to be pressed in different combinations using the left hand, and a strum bar to be pressed by your right hand to imitate strumming. The players are then given a visual aid of five vertical lines, each line corresponding to a button for the left hand. Bubbles automatically scroll down these lines and the player must be pressing the correct buttons with their left hand while hitting the strum bar with their right. While users may learn and gain a stronger intuition of some musical concepts such as rhythm, the skills required to play these games will not translate into playing the actual corresponding instrument because of how simplified the controller is.

Thus, our project is a musical game where the controller is a real, physical piano instead of an electronic-instrument analog. When the user plays along with our game on the instrument, we will use signal processing on the samples collected from the microphone of an iPhone, so that we can accurately identify in real-time what notes are played based on their frequencies and will also determine the timing of these notes. We will create our game using Unity and make different levels that test different skills (e.g. keeping tempo, playing notes in the right sequences). As a result of our approach, the player will learn more effective skills necessary for playing real instruments than they would learn from playing traditional music games like “Rock Band”.