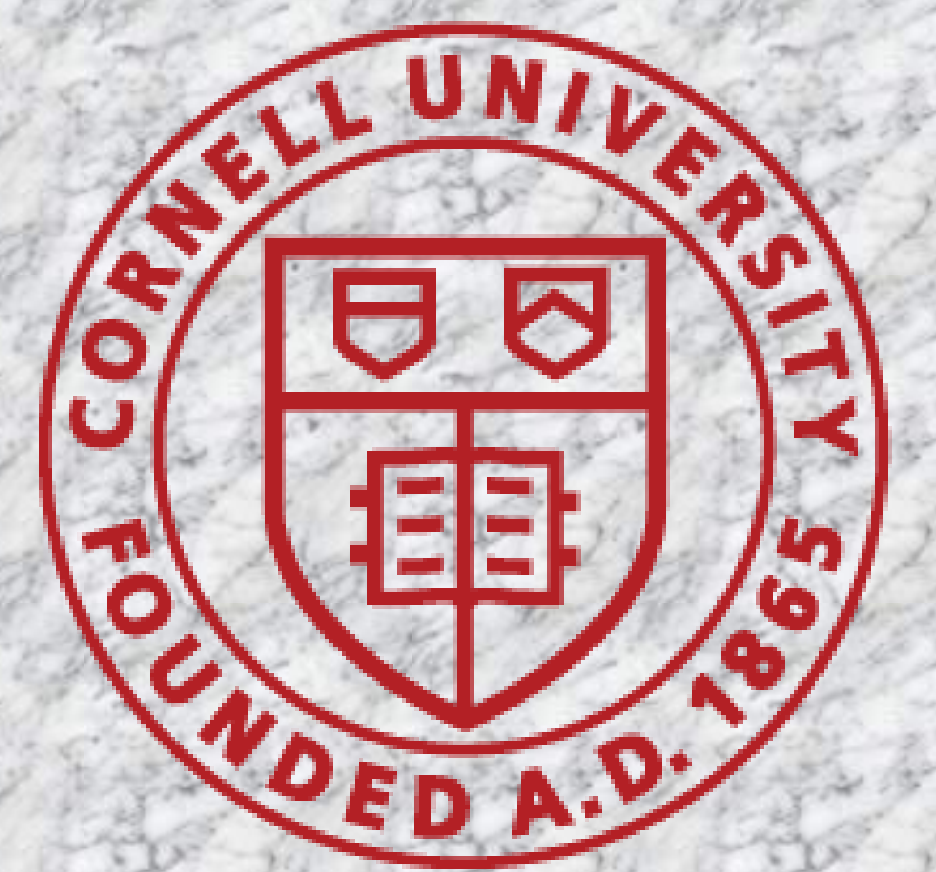


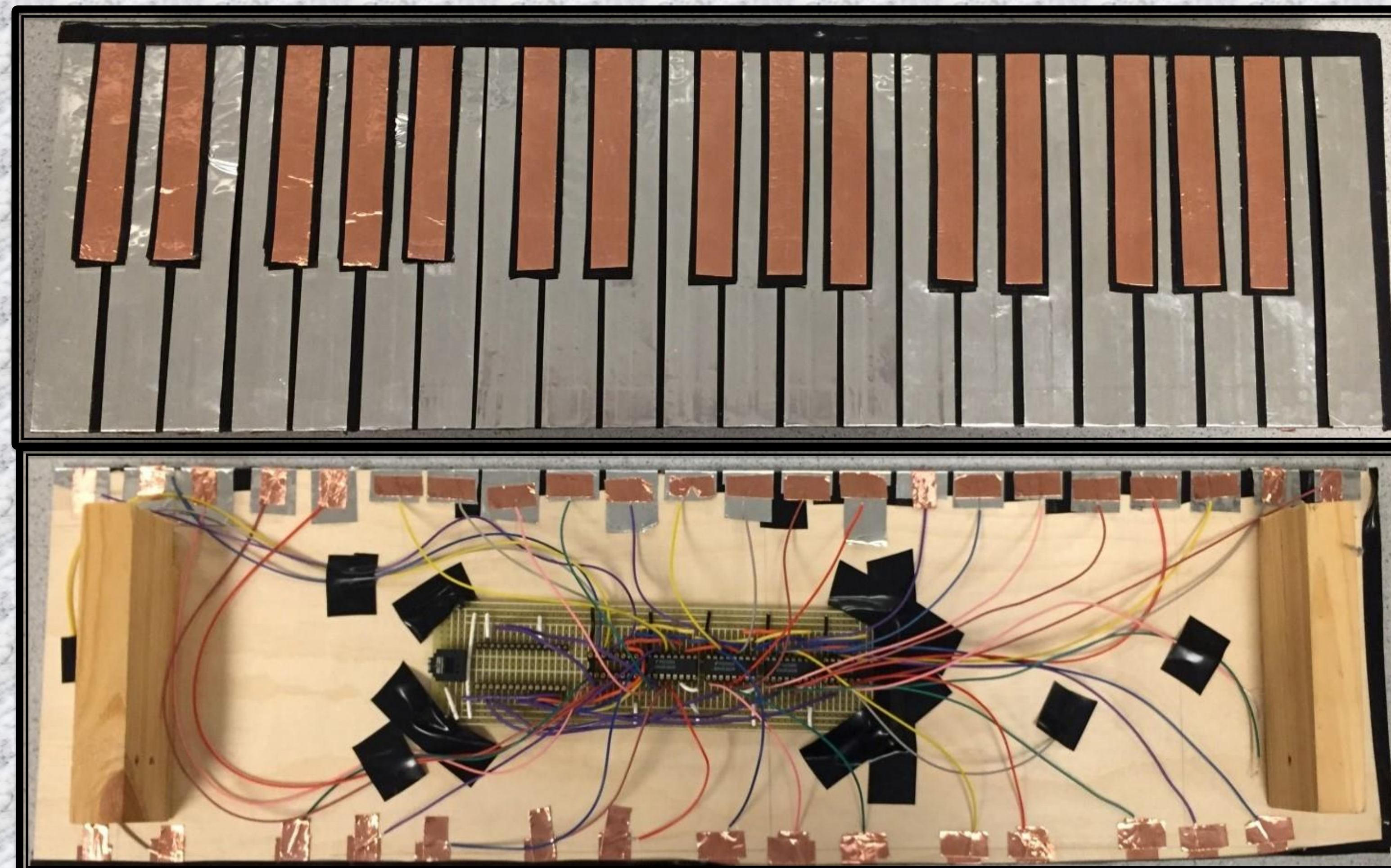
# Capacitive Touch Piano with Automatic Notation System



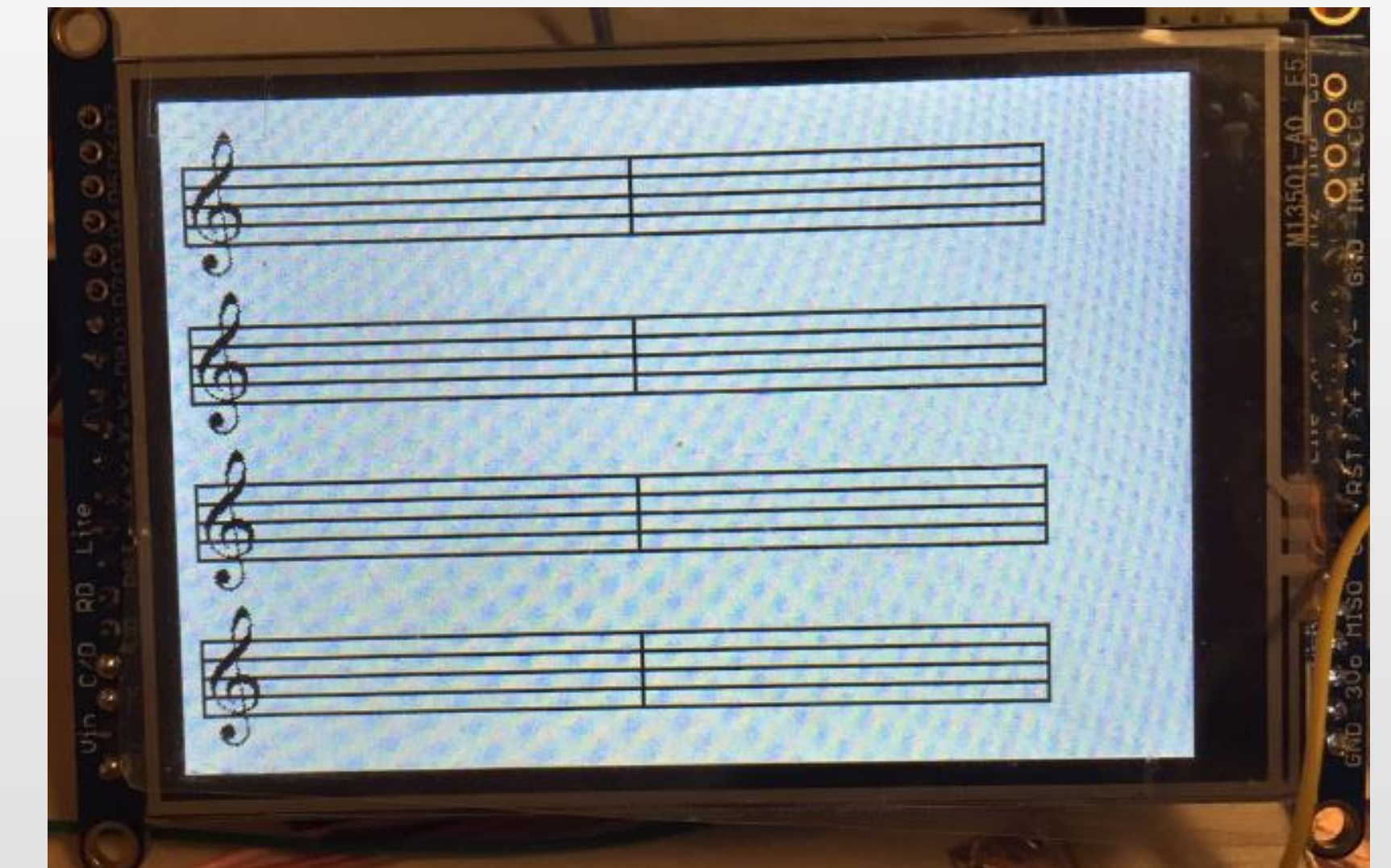
Wendian Jiang  
wj225@cornell.edu

## Introduction

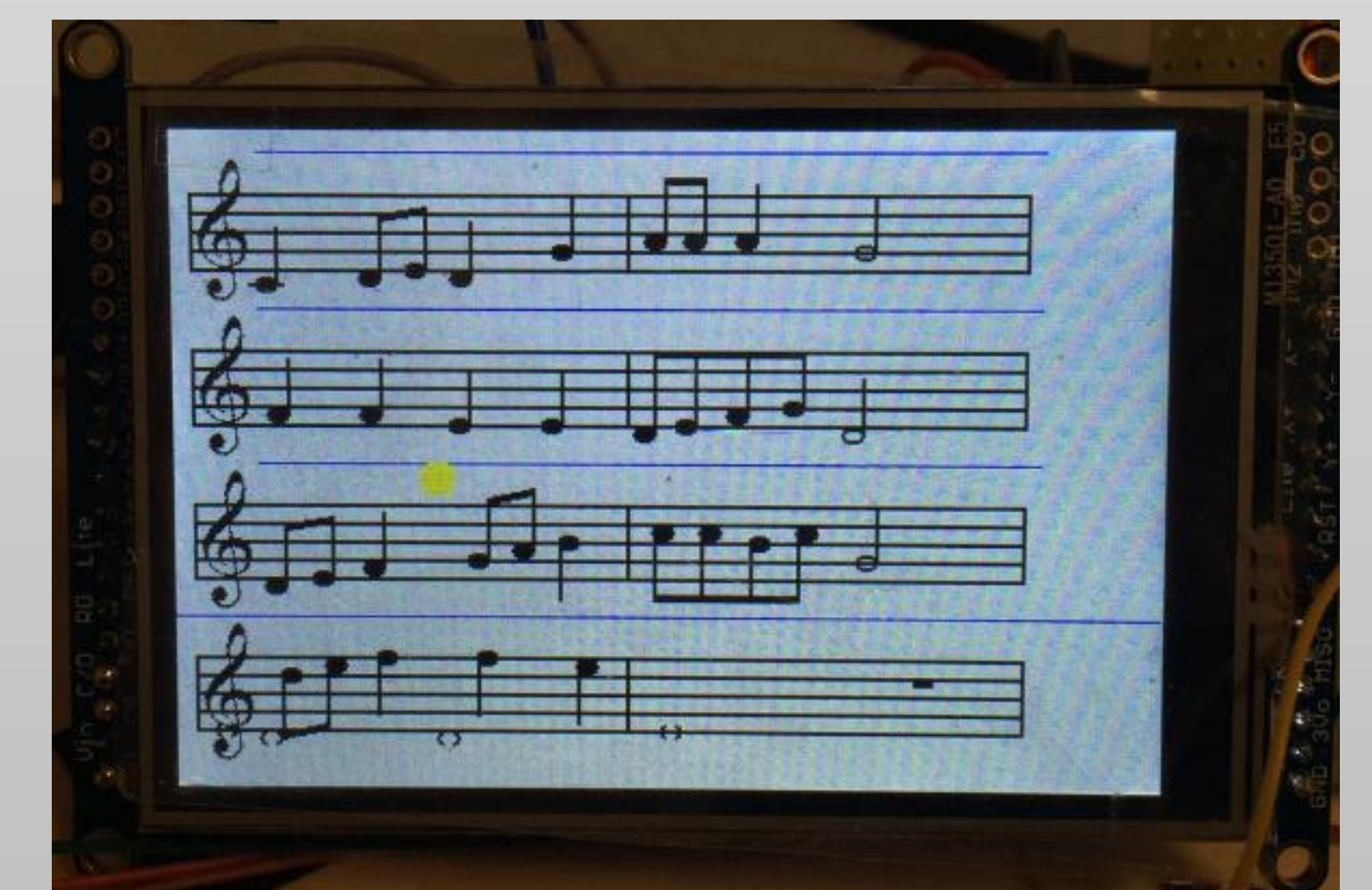
The goal of this project is to build a capacitive touch piano with an automatic musical notation system based on PIC32 microcontroller. For the piano part, it has 37 keys which can respond to human's touching. The function of the notation system is recording the notes generated by the piano keyboard and displaying them on a staff shows on LCD screen under the rules of musical notation.



## Result



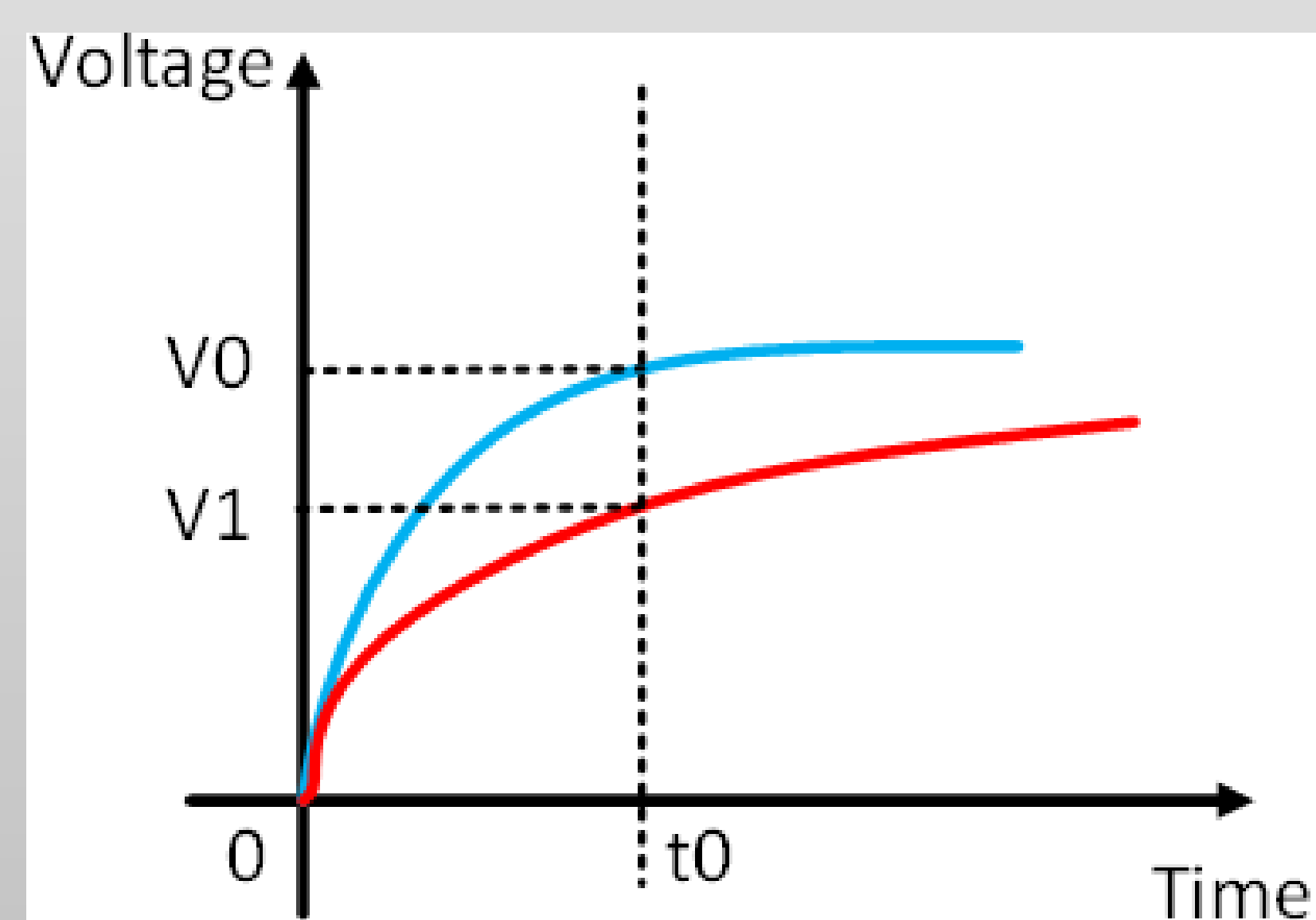
Before the system start, the screen shows like this. We have totally 8 bars to display what people play. The system will pause on this menu and waits for the input.



The system starts at the same time with the first note. As person continue playing the piano. More notes shows on the screen. After each bar's done, all notes contains in this bar will be rearranged according to related notation rules automatically.

## Capacitive Sensor

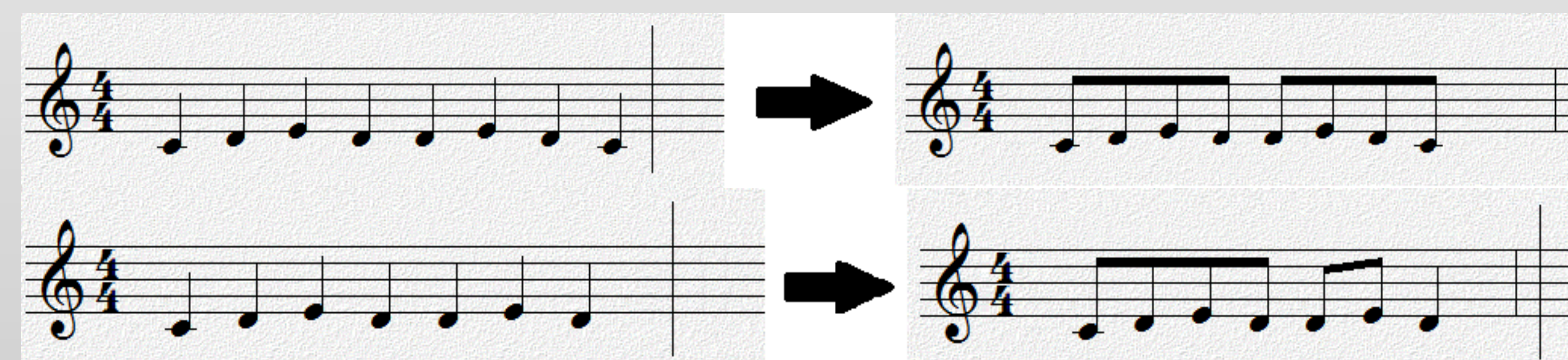
The main part in the piano is capacitive sensor. The principle of it is simple and straight-forward. Human ourselves have capacitance. So when we touch these metal pads with finger, the capacitance will increase due to human's capacitance. Therefore, we can take full use of this characteristic to trigger a sound when people touch it.



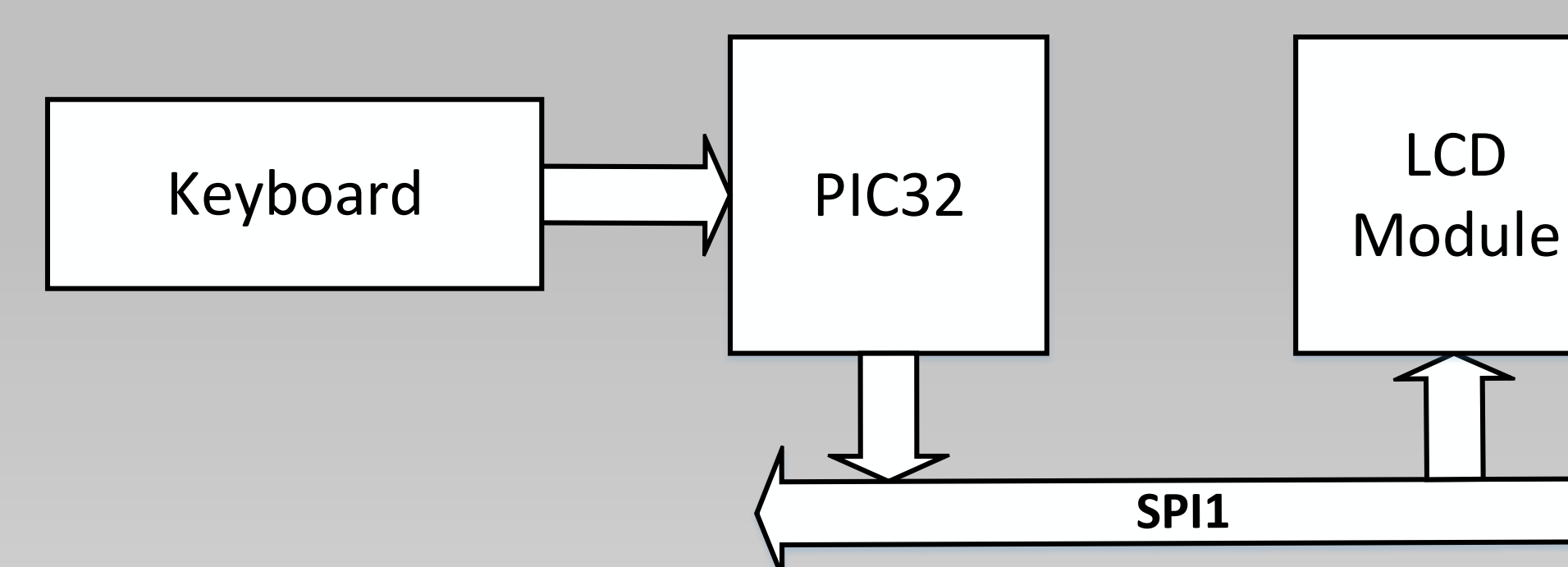
The main idea is to let the microcontroller detects the capacitance of the metal pads. If the capacitance increases, then it means someone is touching the pads. To realize that we can charge the metal pads with constant current, and read the voltage after a while to get relative value of capacity.

## Automatic Notation

As the notation process start, a arrow which indicates the current place moves rightward at the configured speed. When input signals come, corresponding notes will be drawn at the recent location of the line. After each bar complete, the notes in a bar will be rearranged to what they should be. This process will follow the rule of music notation.



The staff with recorded notes is shown on a TFT screen, which connected with PIC32 microcontroller through SPI. Also, PIC32 is hooked up with the touch piano. The input signal generated by the keyboard with be periodically sampled by PIC32. Then the sound generation and note displaying will be executed.



## Acknowledge

Special thanks to Bruce Land, advisor of this Masters of Engineering Design Project, for helping me in completing this project. His support has been outstanding throughout the project implementation.