Test Author: Shutong Li				
	Test Case Name:	Unit Test 1	**Test ID #:**	UT-01
	Description:	Detects the interconnection and recognition of each sensor and chip with the computer.	**Type:**	□ white box ■ black box □ _____
Tester Information				
	Name of Tester:	Bill Green, Nicholas Potter, Shutong Li, Wenyu Bi	**Date:**	12/01/2021
	HW/SW Version:	5/0.1.0	**Time:**	3:00 pm
	Setup:	Pass Unit Test, have device, USB cable, and computer with DAW or MIDI software ready		

TEST	INPUTS	EXPECTED OUTPUTS	PASS	FAIL	N/A	Comments
1	USB from computer	Teensy has power				
2	MIDI serial from teensy	MIDI software recognizes MIDI controller named teensy				
3	Sensor manipulation (piezo tap, flex bend)	MIDI software shows MIDI activity				
	Overall test result:					

Test Author: Shutong Li				
	Test Case Name:	Unit Test 2	**Test ID #:**	UT-02
	Description:	Use an oscilloscope to check the voltage working level of piezoelectric and flexible sensors to ensure that they are operating within the correct voltage level range.	**Type:**	■ white box □ black box □ _____
Tester Information				
	Name of Tester:	Bill Green, Nicholas Potter, Shutong Li, Wenyu Bi	**Date:**	12/01/2021
	HW/SW Version:	5/0.1.0	**Time:**	3:20 pm
	Setup:	Build the test circuit with a breadboard, adjust the oscilloscope parameters, and concentrate the voltage fluctuations to the specified range on the screen.		

TEST	**INPUTS**	**EXPECTED OUTPUTS**	**PASS**	**FAIL**	**N/A**	**Comments**
1	Piezo sensor	Press the piezo, a short voltage signal change within a reasonable range appears on the screen				
2	Flexible sensor	Bending flexible sensor, the voltage signal changes with the change of the degree of bending appear on the screen				
	Overall test result:					

Unit test 2 requires an oscilloscope with at least 50 MHz sampling frequency in order to check the transient voltage peak of the piezo sensor.

The peak voltage of the piezo transient response should be tempered by the zener diode to ensure that it does not exceed 3.3V. The expected range should be from 0 to 2.4V going into the ADC. Place the probe between ground and the input to the op-amp from the piezo.

Measuring the voltage from ground to the connection from flex sensor to op-amp should give ~1.5V unbent to about 3.3V fully bent.

Test Author: Shutong Li						
	Test Case Name:	Music movement system integration test 1			**Test ID #:**	MMIT-01
	Description:	Check whether the sensors attached to your hands provide valid MIDI information to the computer.			**Type:**	□ white box ■ black box □ _____
Tester Information						
	Name of Tester:	Bill Green, Nicholas Potter, Shutong Li, Wenyu Bi			**Date:**	12/01/2021
	HW/SW Version:	5/0.1.0			**Time:**	5:00 pm
	Setup:	Complete the first two test steps, complete the soldering of the components, turn on the MIDI on the computer panel and use USB to connect the computer to the system.				
STEP	**Action**	**Expected Result**	**PASS**	**FAIL**	**N/A**	**Comments**
1	Press each of the six piezo devices on the left hand.	Six different piezo devices on the arm can get six different tones by pressing.				
2	Curved index finger and middle finger	If the index finger and middle finger are bent appropriately, the system can emit corresponding tones。				
3	Wave your hand in any direction and at any speed.	The accelerometer located in each hand can perceive the change of acceleration through the speed of the wave, and then transmit it to MIDI to emit the corresponding tone.				
4						
	Overall test result:					

This part is the first test after PCB soldering. The system has completed the debugging of individual sensors and connection conditions in the first two tests. It's time to systematically test the integrated ones.

Our digital music movement system consists of three parts: left hand, right hand, and MCU. First use USB to connect the MCU to the computer, and wait for the MIDI to adapt to the computer. Once it shows that the connection is successful, start the next step of debugging.

On the left hand part are distributed two flexible sensors, 6 piezoelectrics and an accelerometer. When you wave your left hand in any direction, the accelerometer can feel the acceleration change at this time, while bending the index finger and middle finger, the flexible sensor located on the back of the two fingers can generate bending signals. If these input signals can accurately provide MIDI information to the computer, then the change will produce different tonal output at this time.

At the same time, because there are six piezos in the left hand, the six piezos should be pressed to generate input signals during the test. If the input signals generated by these sensors can also accurately provide MIDI information to the computer, then the output can be generated by pressing Different tones.

The right-hand part is the same as the left-hand part, only six piezos are missing, so the test method is the same.