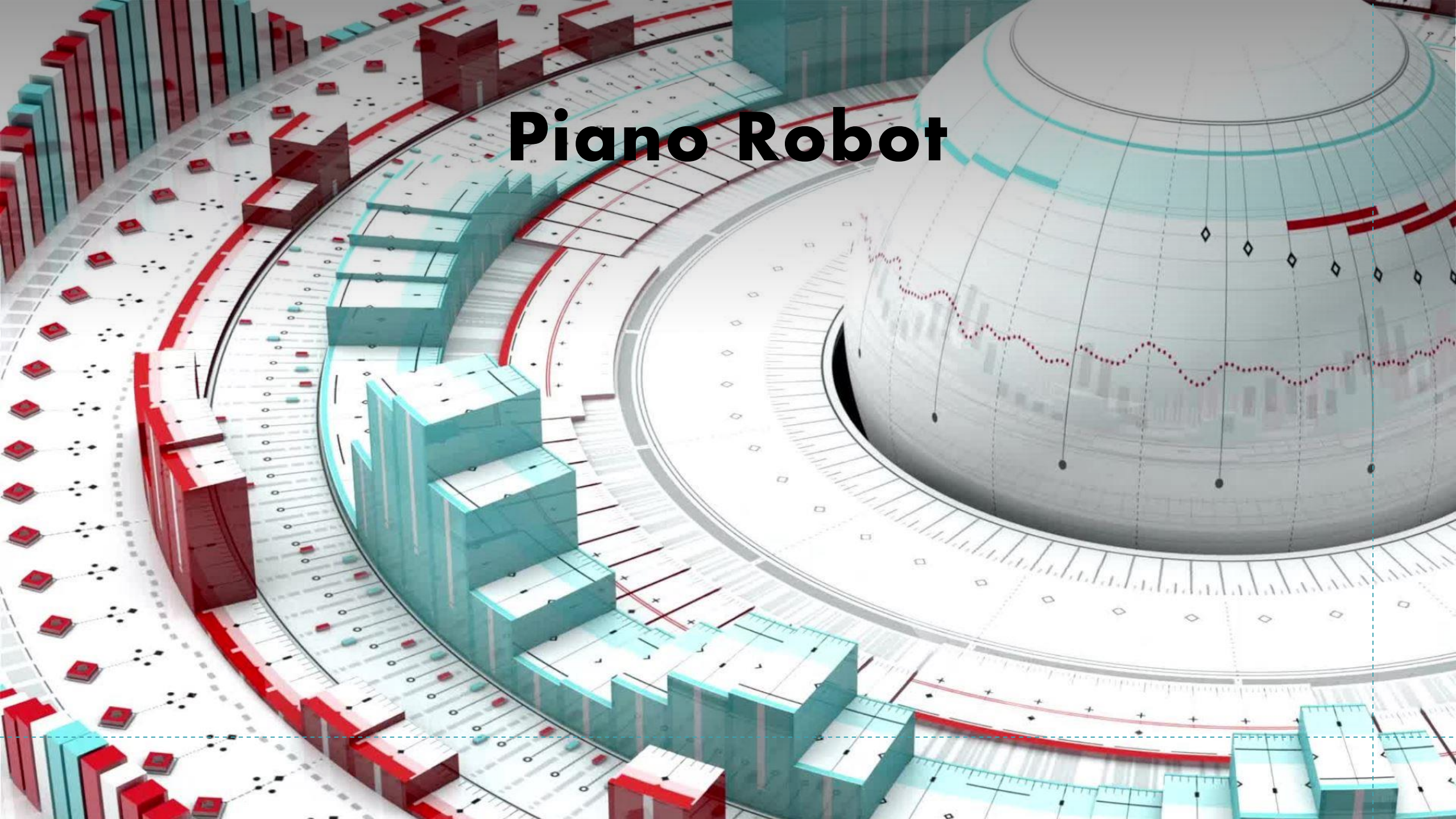
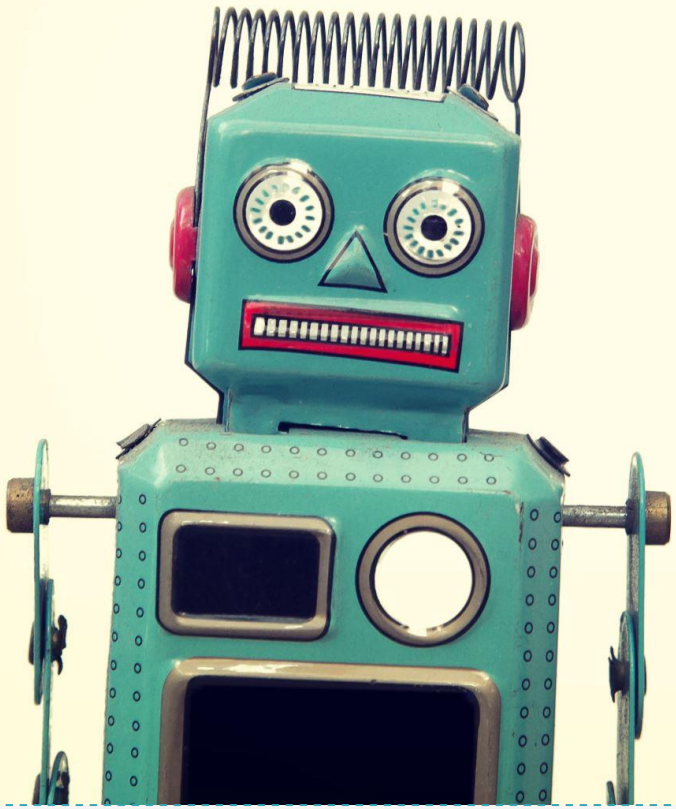

Piano Robot



Piano Robot

Member

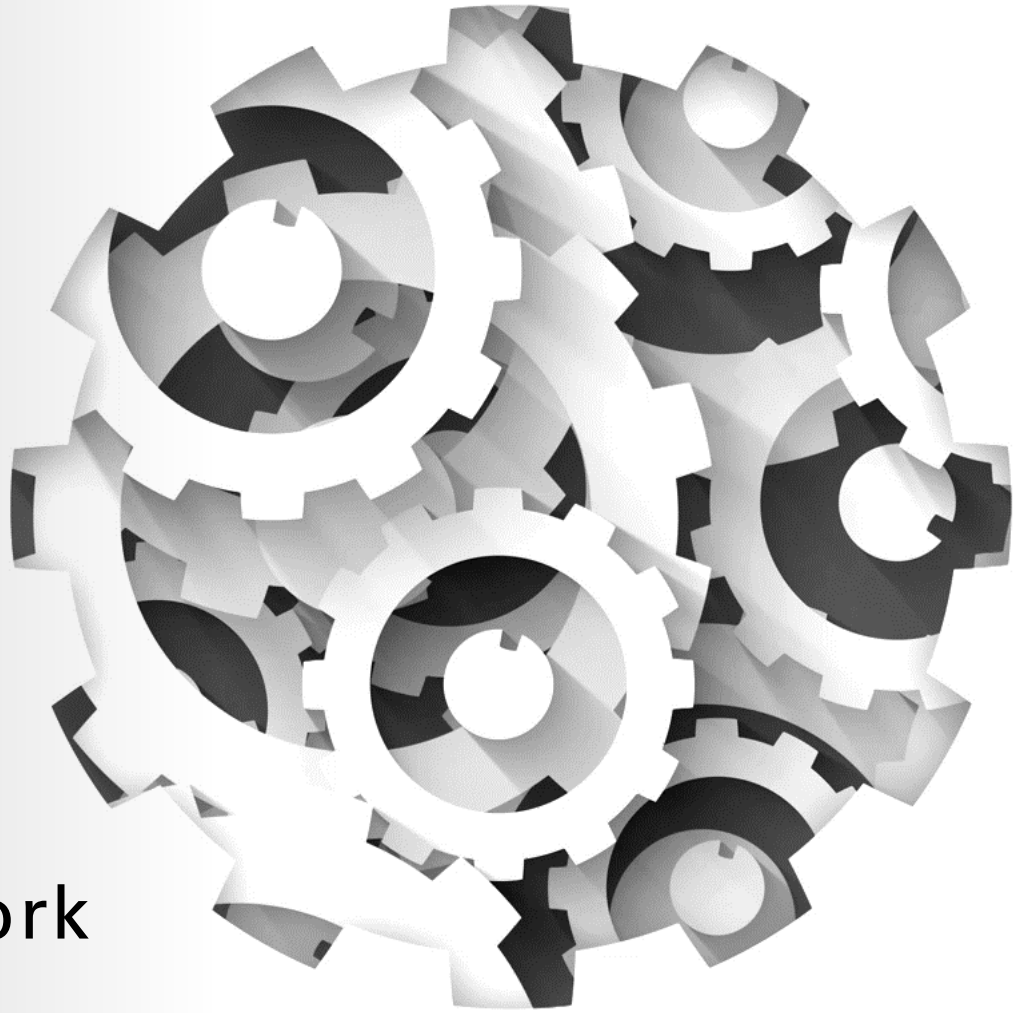
MS. PAILIN SOMANUST

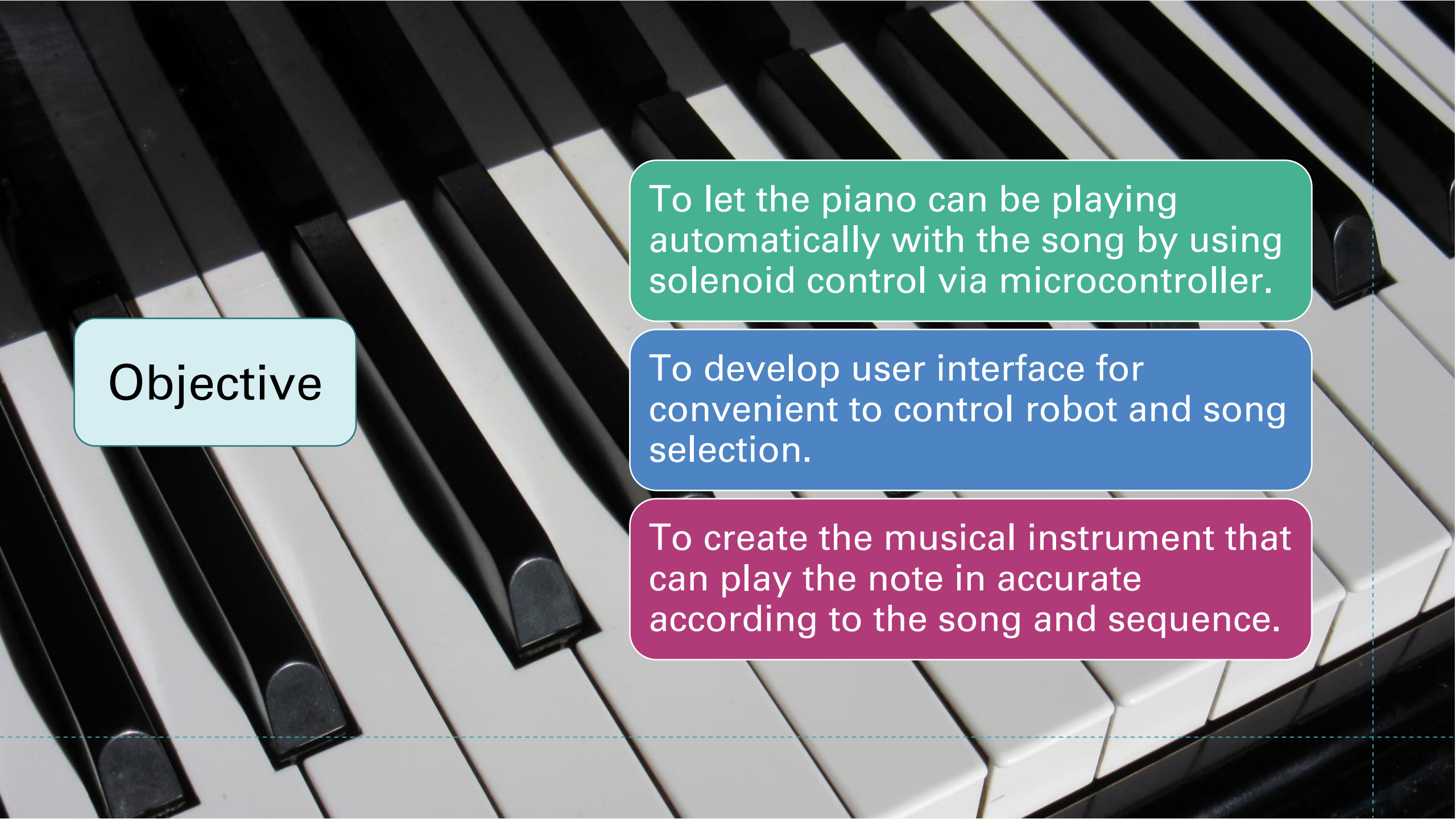
MR.THANPRASERT PRASERTKAEW

MR. ADITHEP SIHA-UAN

Content

- Objective
- System Overview
- System Architecture
- Hardware Part
- Software Part
- Conclusion
- Recommend Future Work





Objective

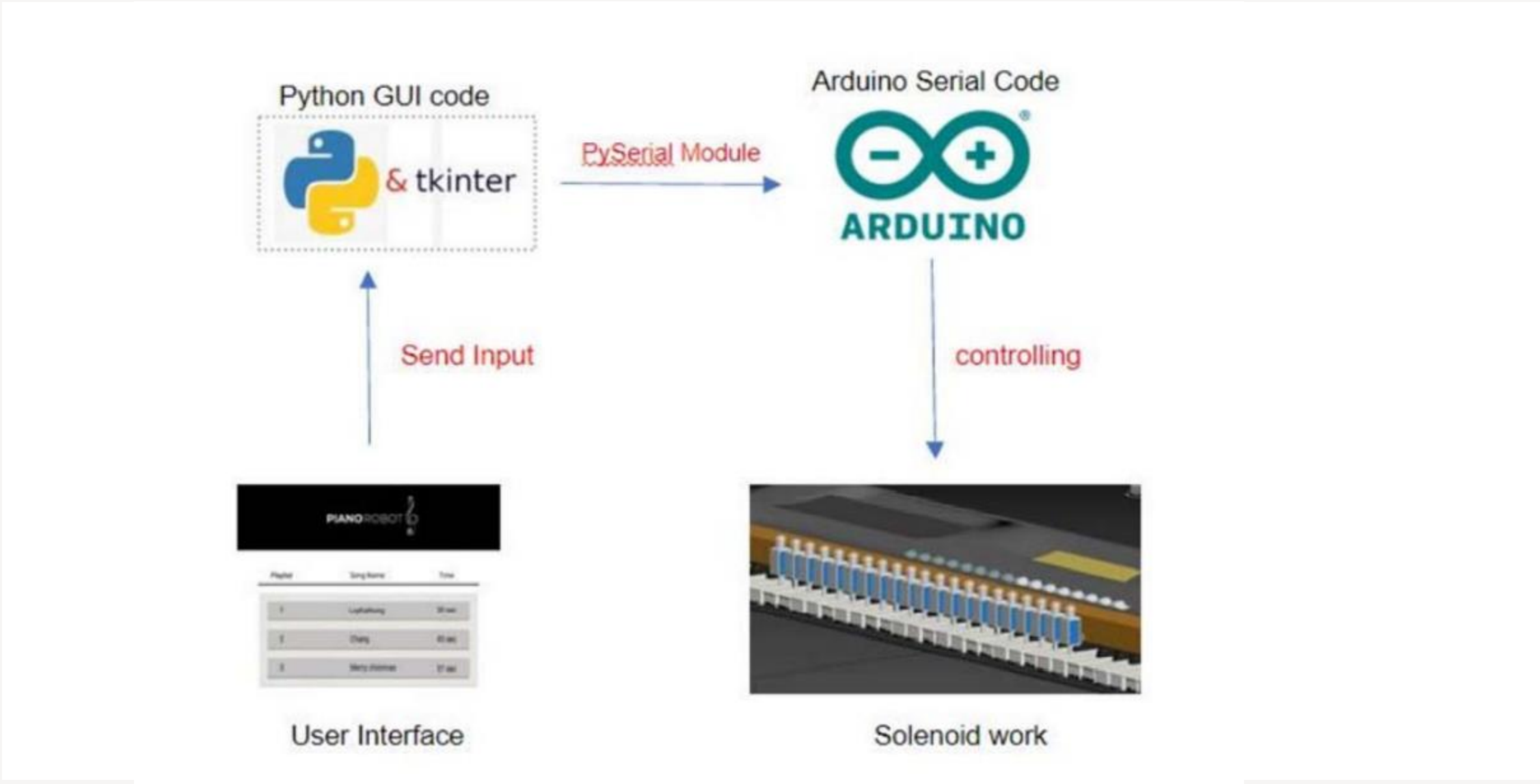
To let the piano can be playing automatically with the song by using solenoid control via microcontroller.

To develop user interface for convenient to control robot and song selection.

To create the musical instrument that can play the note in accurate according to the song and sequence.

System Overview

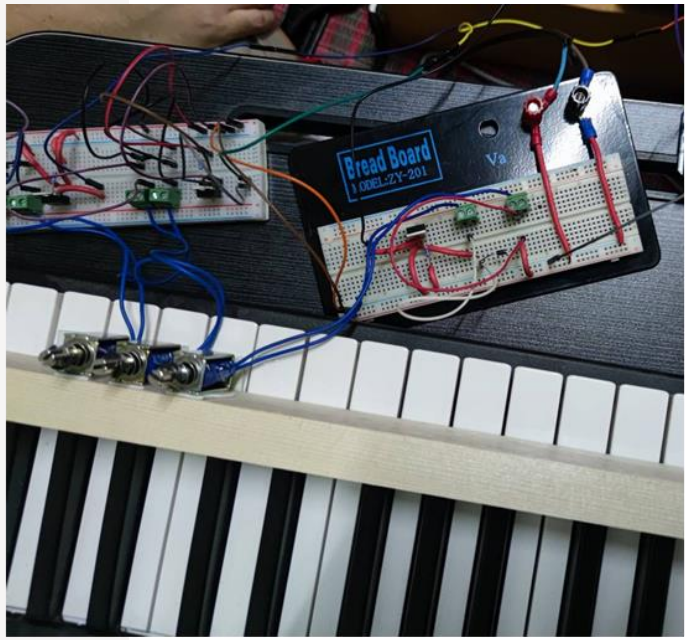
System Architecture

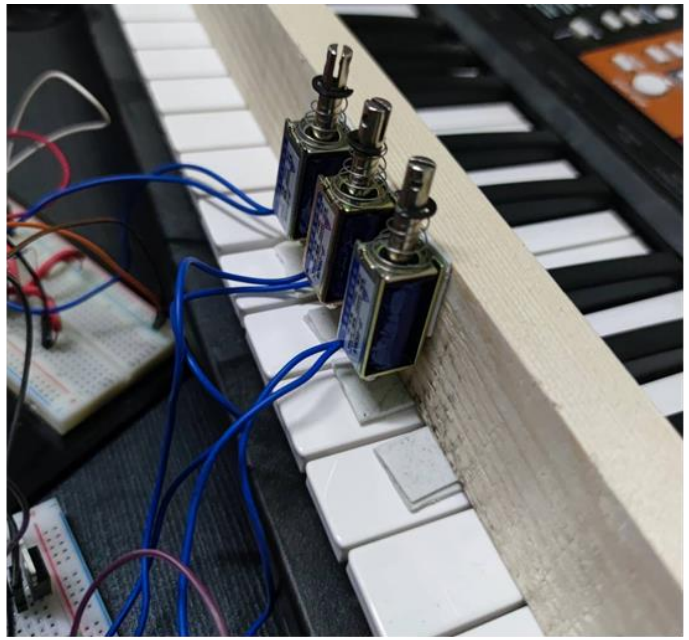


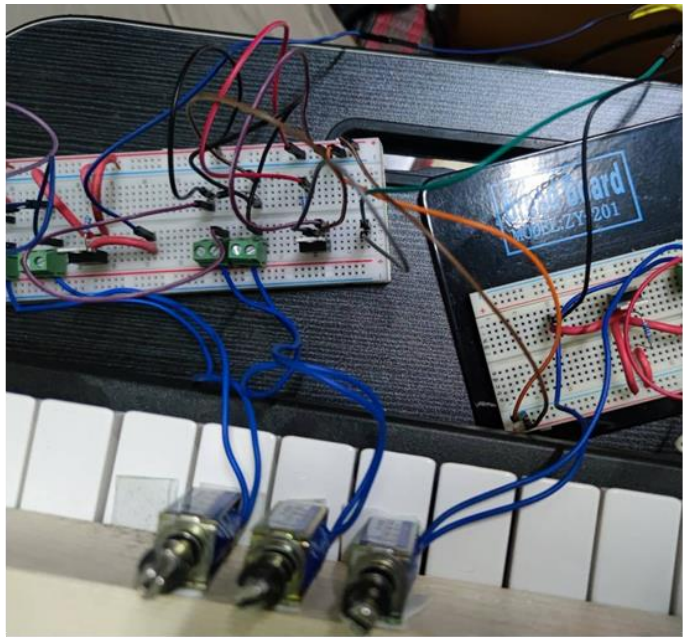
First Prototype

First Prototype

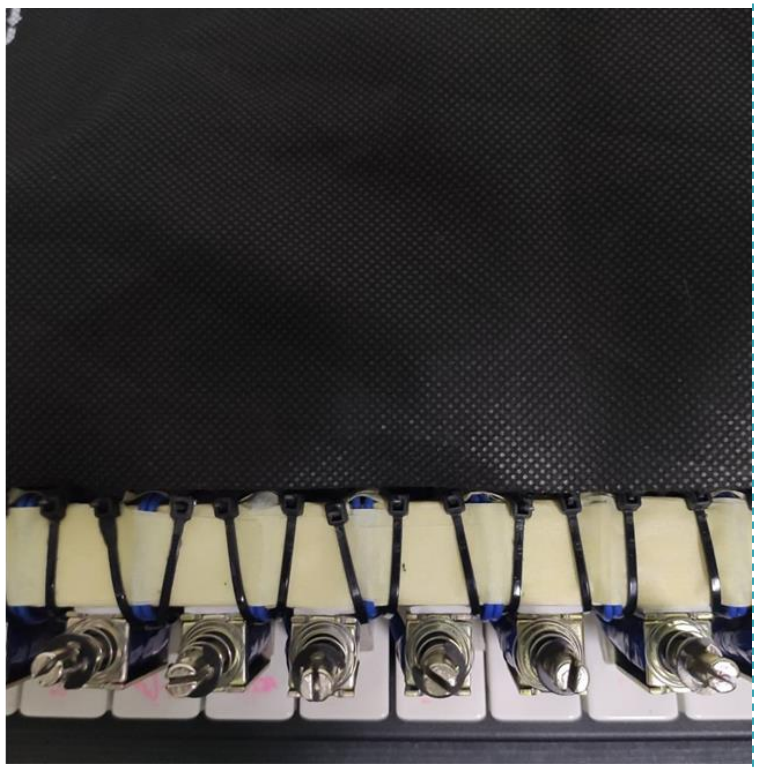
- We are mounting the solenoid on the wood and wiring direct to circuit.
- Tape and Glue to install.
- No orderliness.

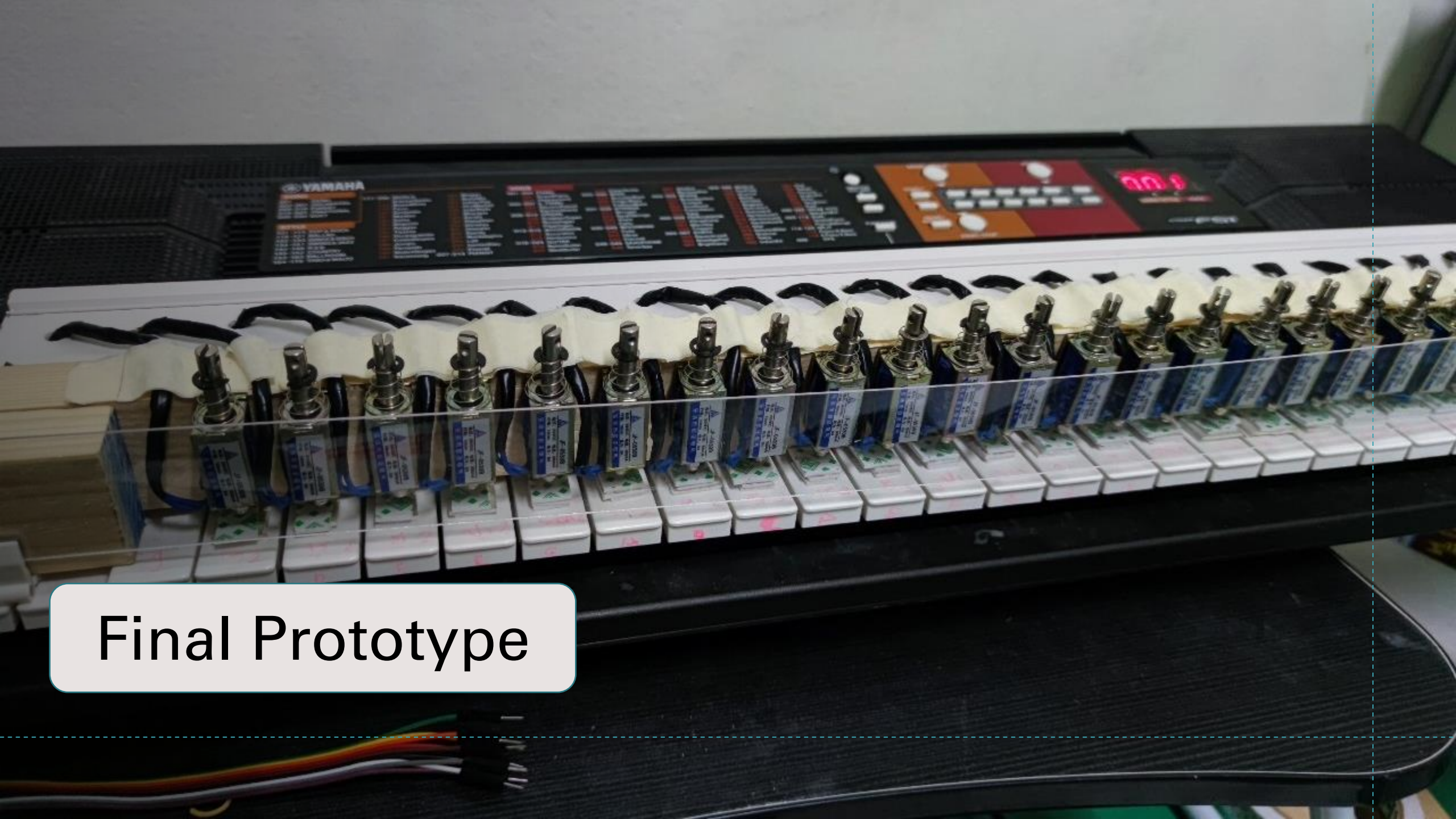






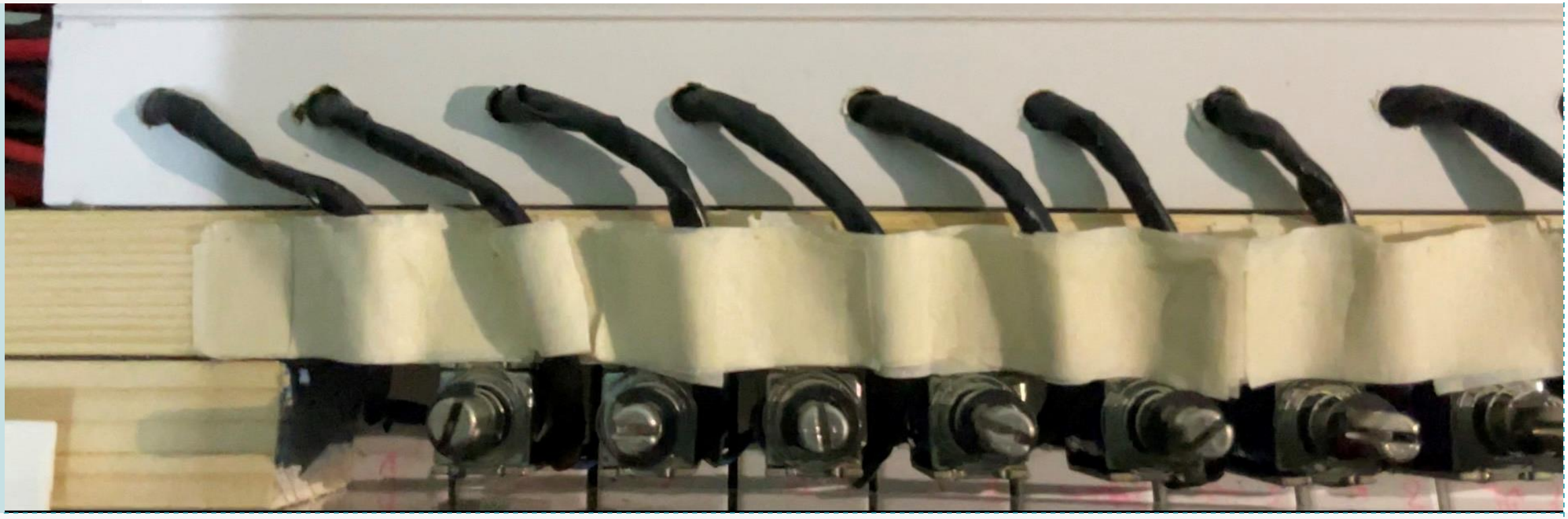
First Prototype




YAMAHA
Final Prototype

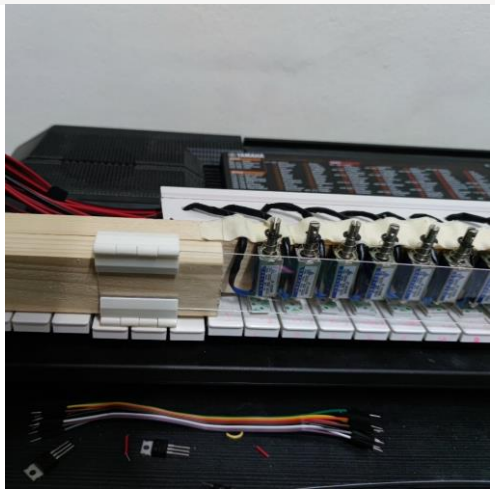
Orderliness

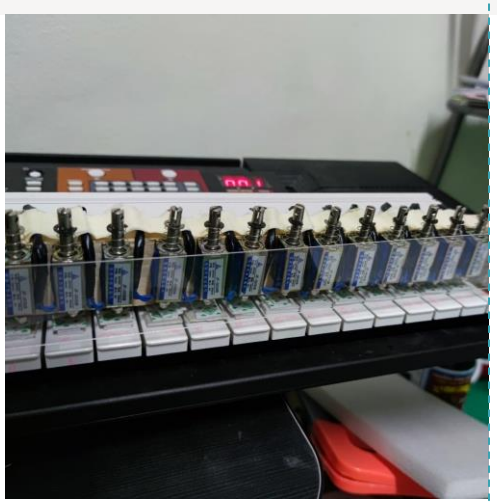
- We put the wire inside the rail to make the it more safety.
- To maintenance easier.

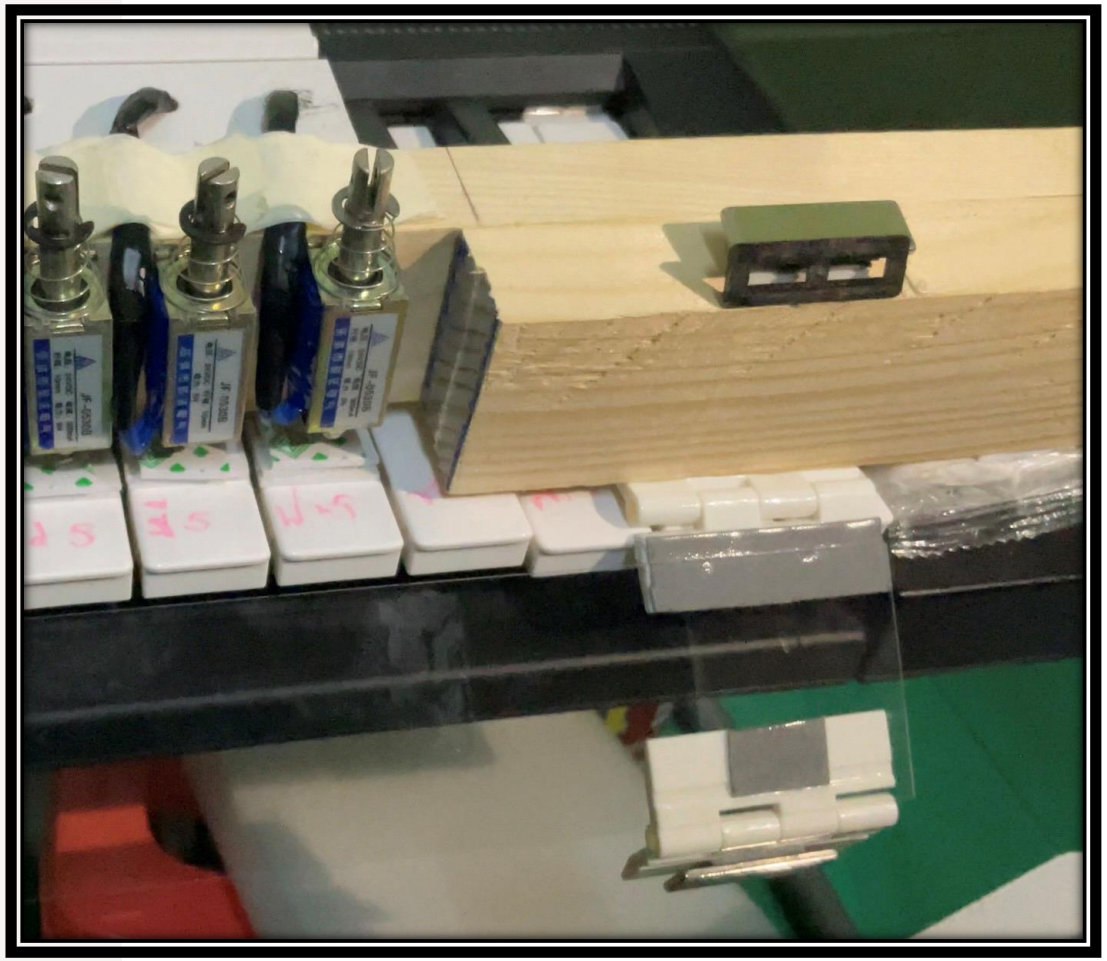


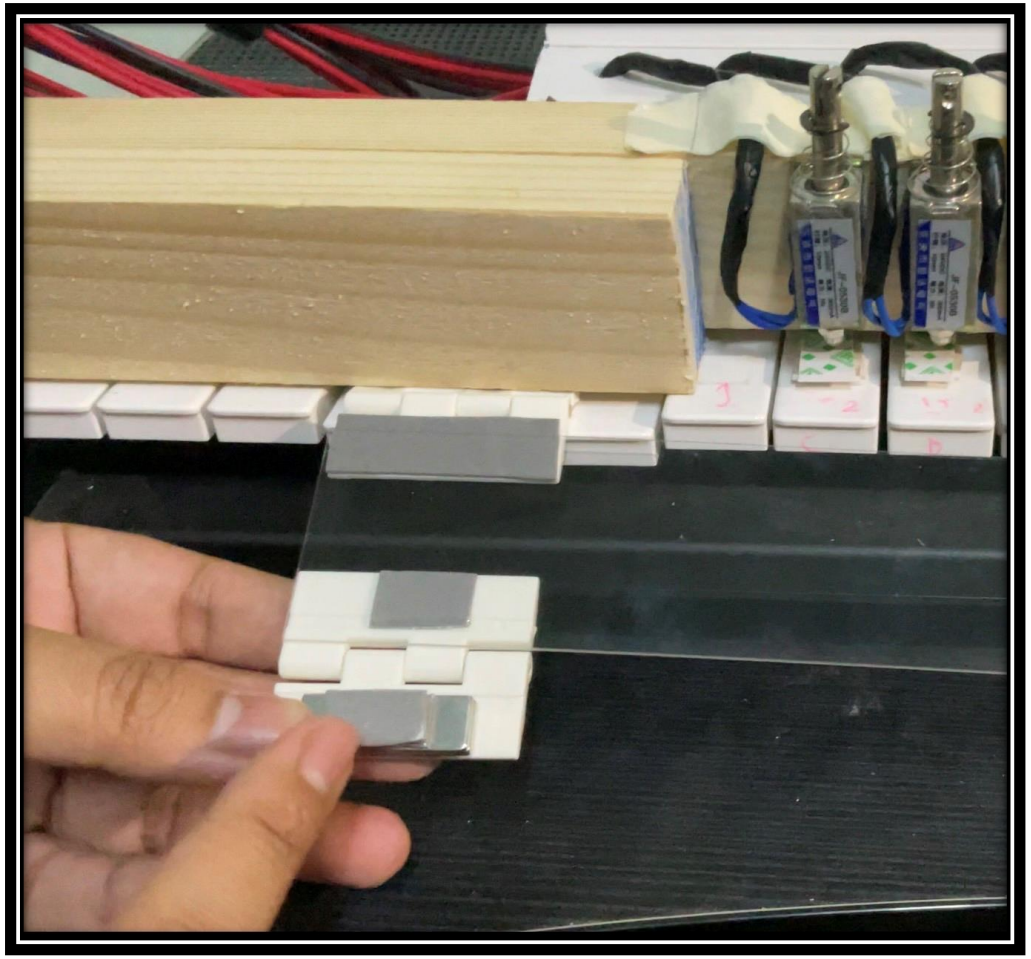
Safety

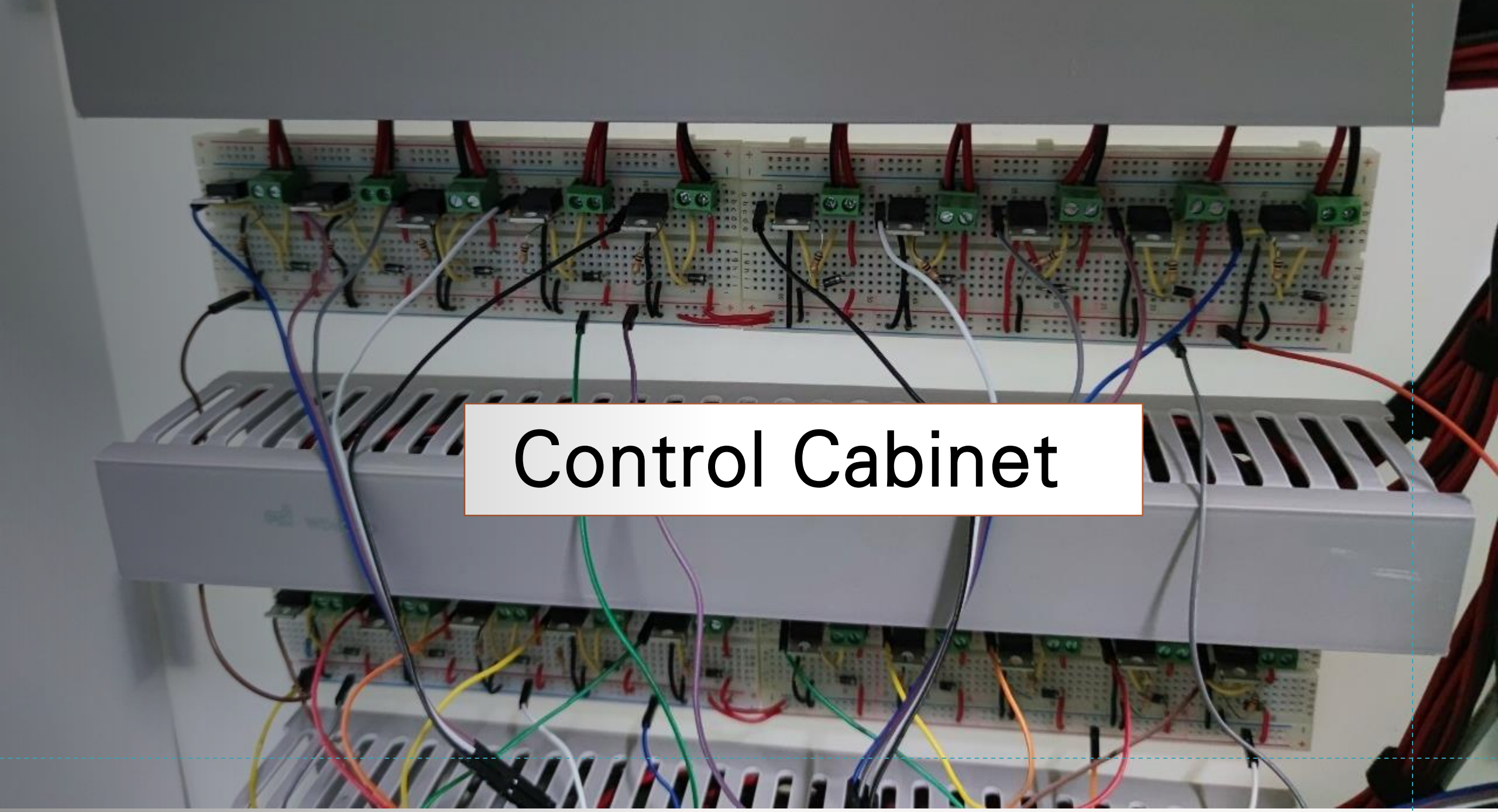
- ✓We use the acrylic to protect the Kid from heat.
- ✓ Easy for maintenance.





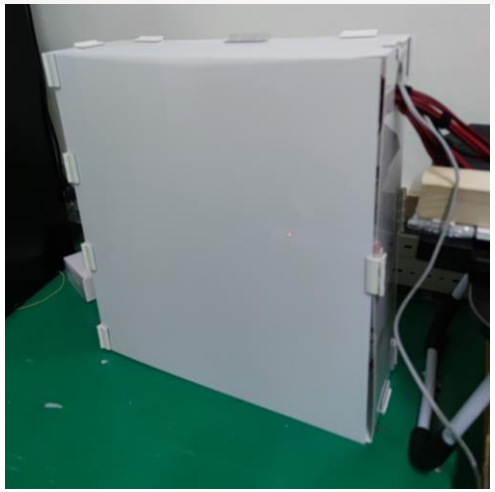


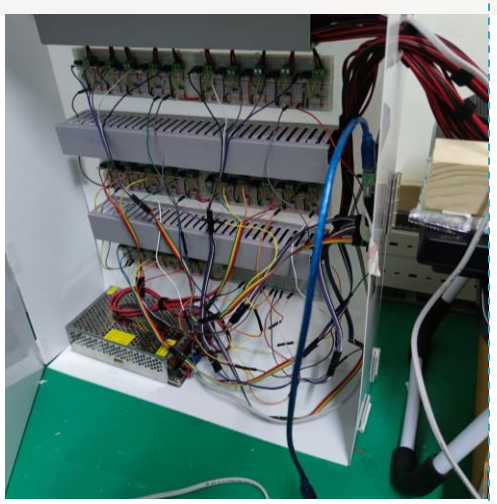


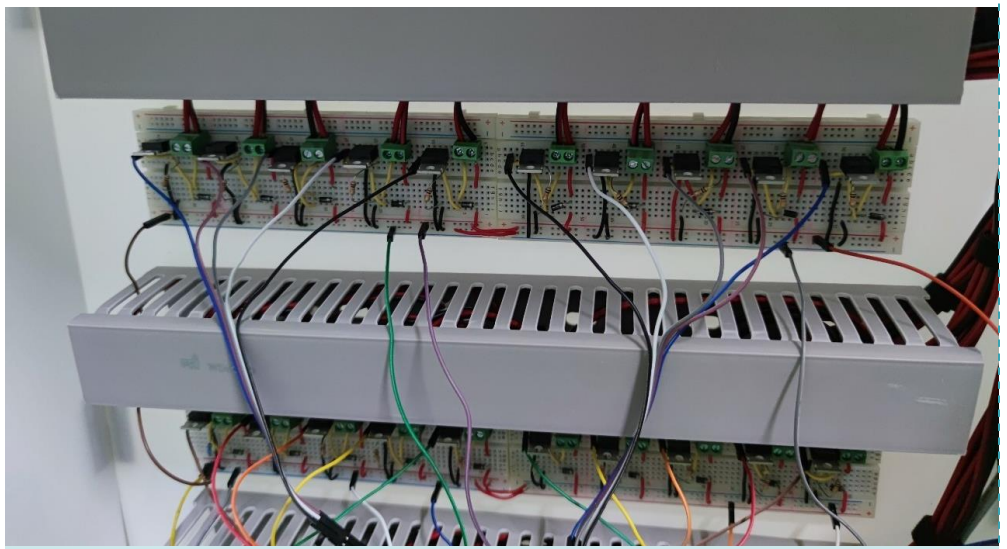

Control Cabinet

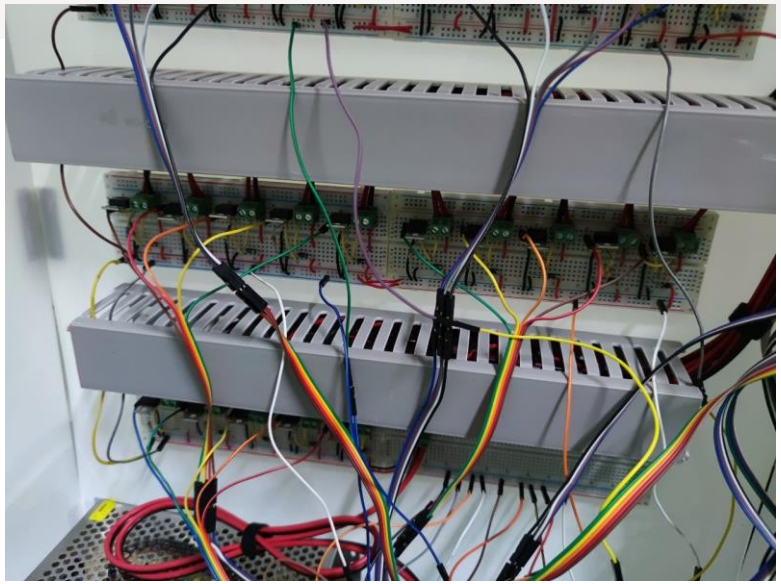
Orderliness

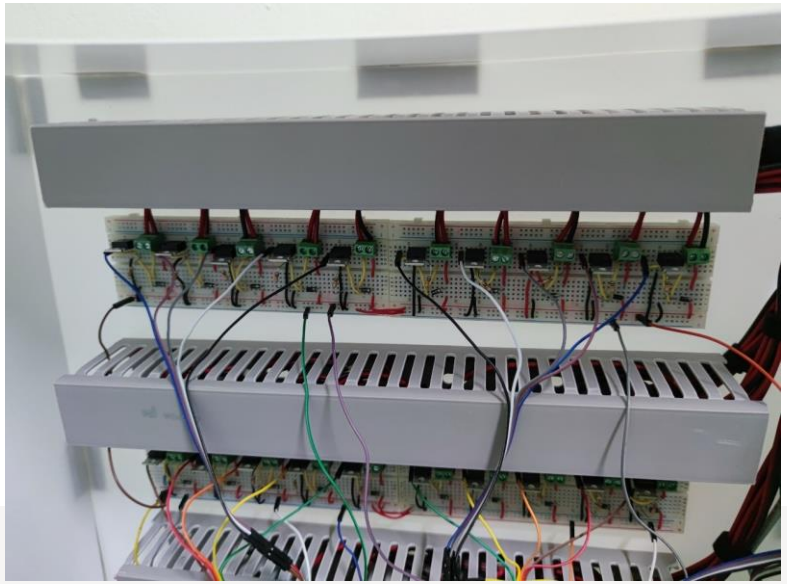
- We install the breadboard to the control box.
- Wiring through the rail to make it more orderly.

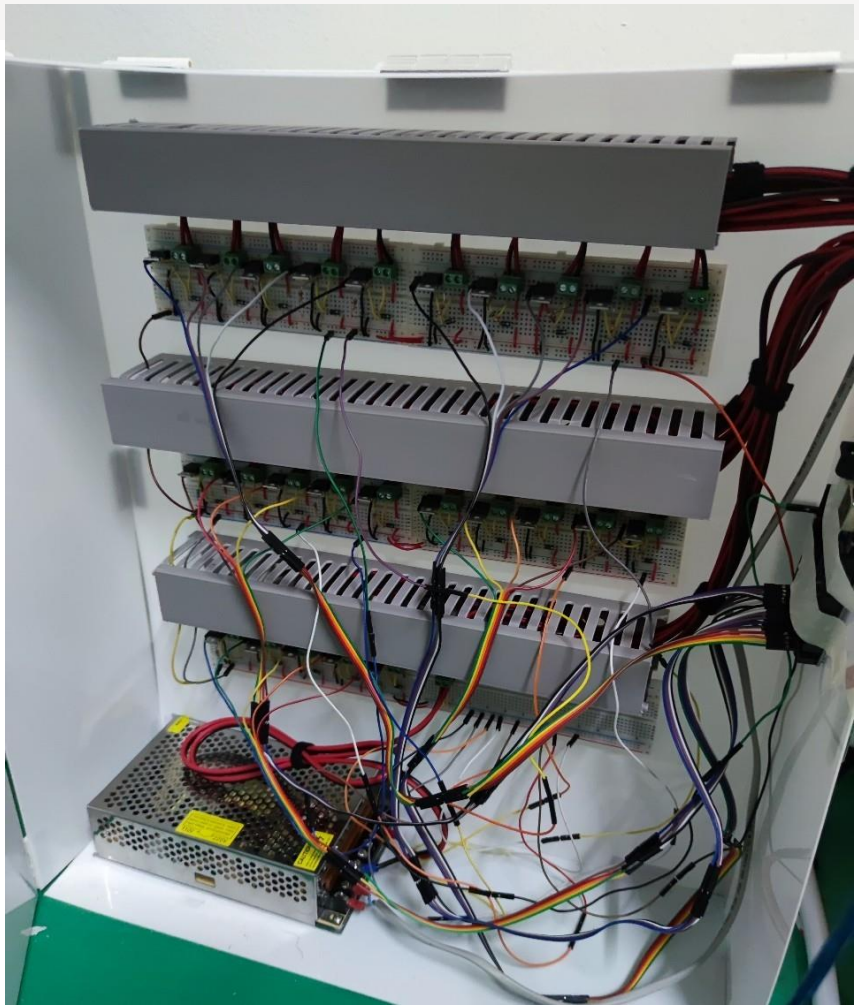






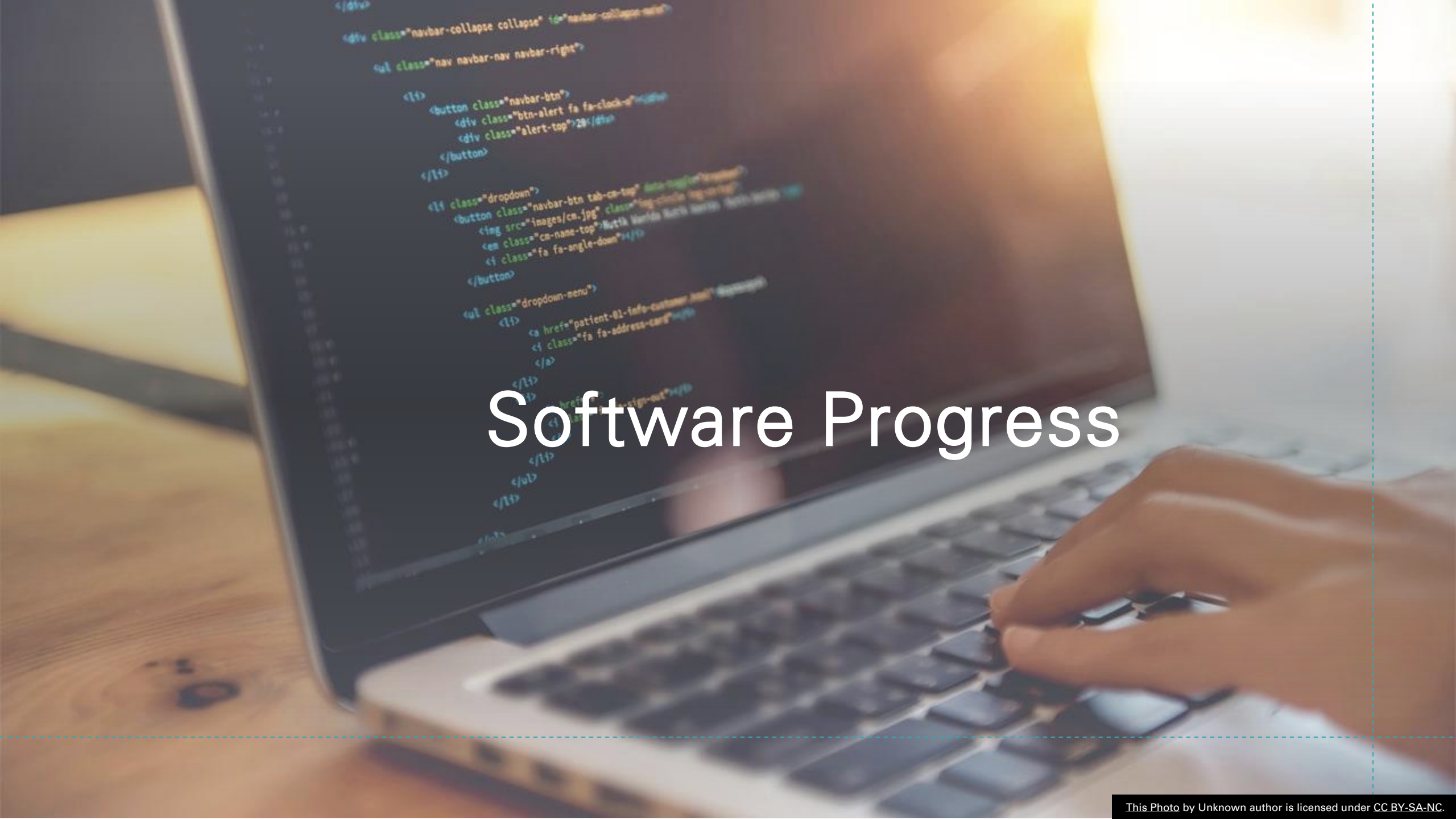






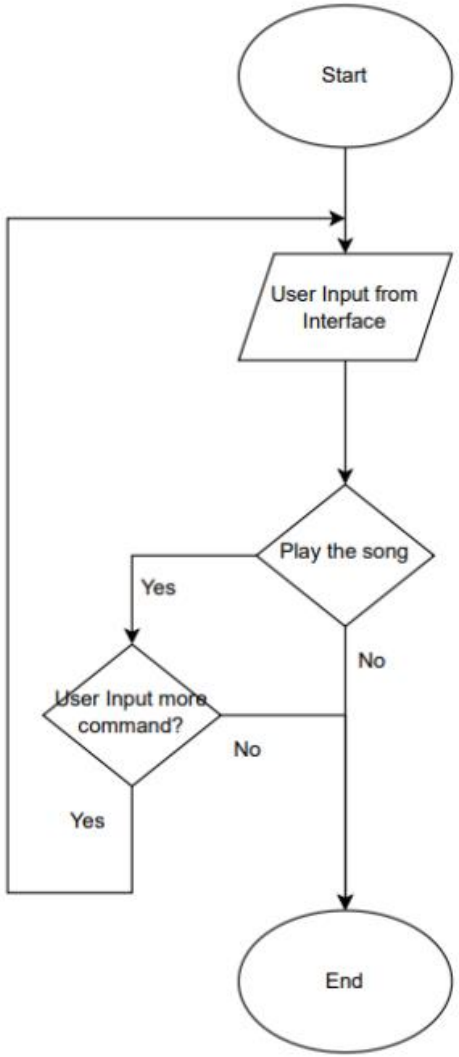
Limitation of Hardware

- Limitation of Hardware are solenoid cannot be on more than 1 minute or it will be overheated.
- if we use solenoid hit directly to piano keys. It can damage both solenoids and piano keys.
- ✓ to avoid that accident, we are using two-side tapes to help reduce force from solenoids to be hitting piano keys and reduce noise that may disturb the user when listening to our piano robot.



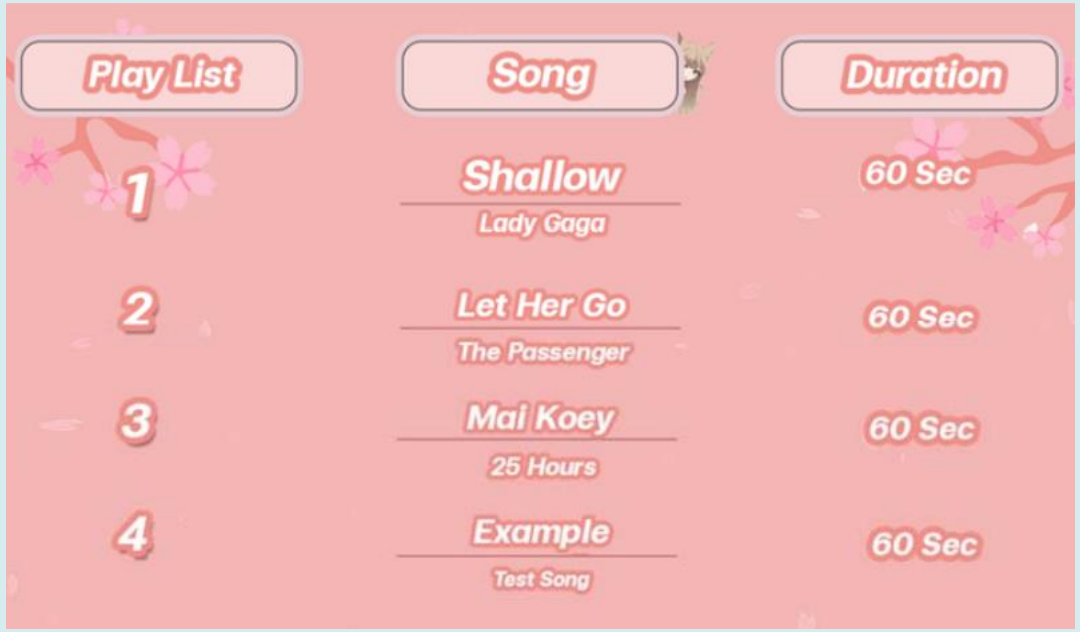
Software Progress

Flowchart of Piano Robot



Why we select this song?

- Shallow song showing challenge that solenoids put on 5 of them (On Right hand 2 and Left hand 3) in same time. That make it similar like human hand
- Let her go Showing playing the same note but rhythm will be both slow and fast at the same time
- Mai Koey Showing playing chords as karaoke and can sing along with it. And can play 3 notes at the same note.
- Vila La Vida is an example song. Using for testing

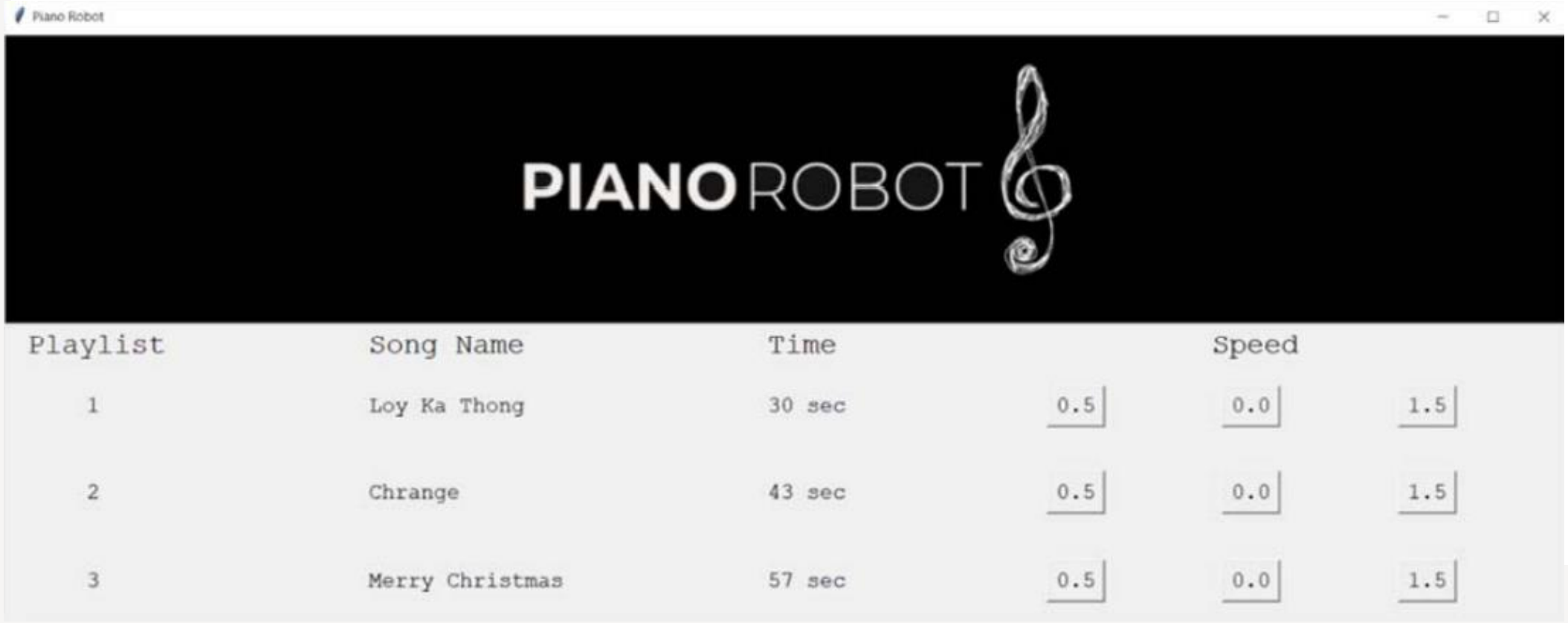


Library Extension in VS Code

Library Name	Function
TKinter	Tkinter is a Python binding to the Tk GUI toolkit. It is the standard Python interface to the Tk GUI toolkit and is Python's de facto standard GUI.
Pygame	Pygame is a cross-platform set of Python modules designed for writing video games. It includes computer graphics and sound libraries designed to be used with the Python programming language.
Serial	Serial is used for communication between the Arduino board and a computer or other devices. All Arduino boards have at least one serial port (also known as a UART or USART): Serial. It communicates on digital pins 0 (RX) and 1 (TX) as well as with the computer via USB.

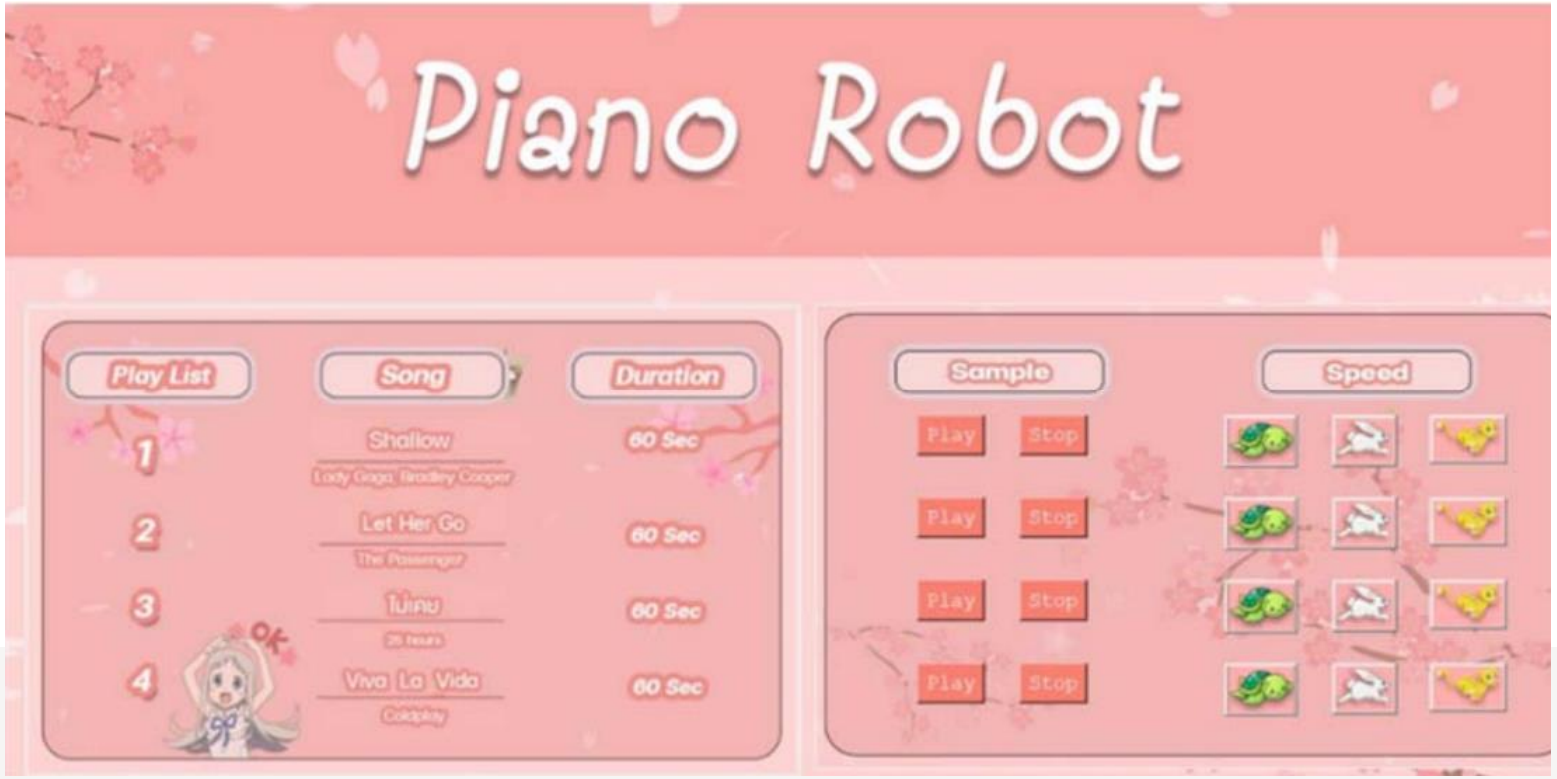
First Prototype

- Not user-friendly
- “0.5 0.0 1.5” it makes user cannot understand
- Design too boring
- Basic song



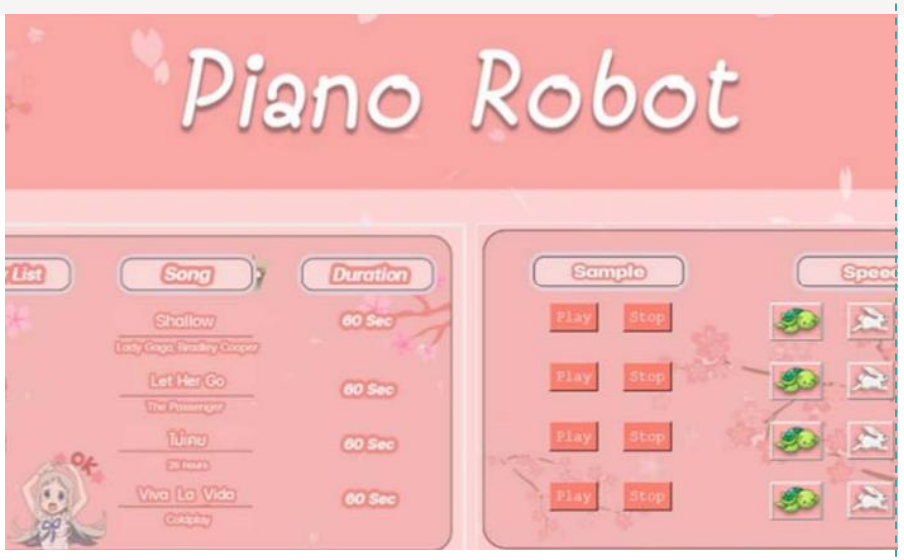
Final Prototype

- ❖ Font make it white and pink effect to make font easy to readable
- ❖ Each song show efficiency of solenoids
- ❖ Sample we make it in pink theme with white fonts for user can be easy to see and to make it more clearly, we are using pinker color for user can see it.



Limitation of Software

- for the user-interface using python to write all everything.
- if we are using basic command of Tkinter the result of user-interface will look not user-friendly
- ✓ So, to make sure it can be easy to understand. we use another command to move it by using the x and y-axis.




```
bs1.place(x=1200 , y = 410)
bs2.place(x=1305 , y = 410)
bs3.place(x=1400 , y = 410)
bs4.place(x=1200 , y = 490)
bs5.place(x=1305 , y = 490)
bs6.place(x=1400 , y = 490)
bs7.place(x=1200 , y = 570)
bs8.place(x=1305 , y = 570)
bs9.place(x=1400 , y = 570)
```

Conclusion

Our project will be separated into big 4 parts
1. TKinter
2. Arduino IDE
3. Microcontroller
4. Mechanic.

TKinter is for the user interface, it will receive the command directly from the user, Then send the signal to Arduino to process the coding and send the command to the microcontroller to work.

In the microcontroller after receiving the command, it will control the mechanic according to the song and sequence.

Conclusion

For the programming part, we will use Tkinter to produce the GUI interface because TKinter when they work with the python, they will perform the fast interface interact.

for the Note keeping we will be using Arduino to store note with manually sequence to produce the rhythm.

Conclusion

For the mechanic design, we will use wood as a bar for the mounting above the piano and keep all the wires connected in the cabinet to make it look good and easy to move.

protect the piano by using a quilt on the piano to absorb the force that can harm the piano and acrylic plates to protect the user from heated solenoids.

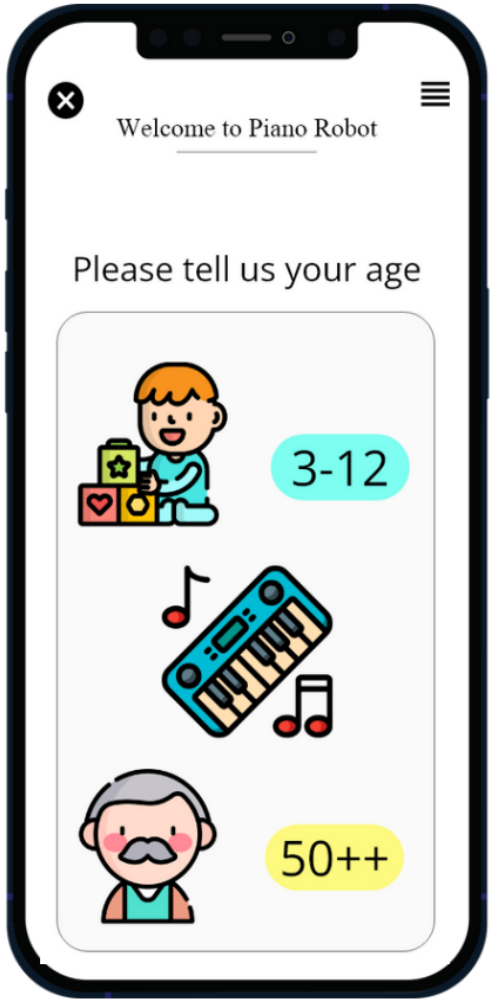
Recommended Future work.

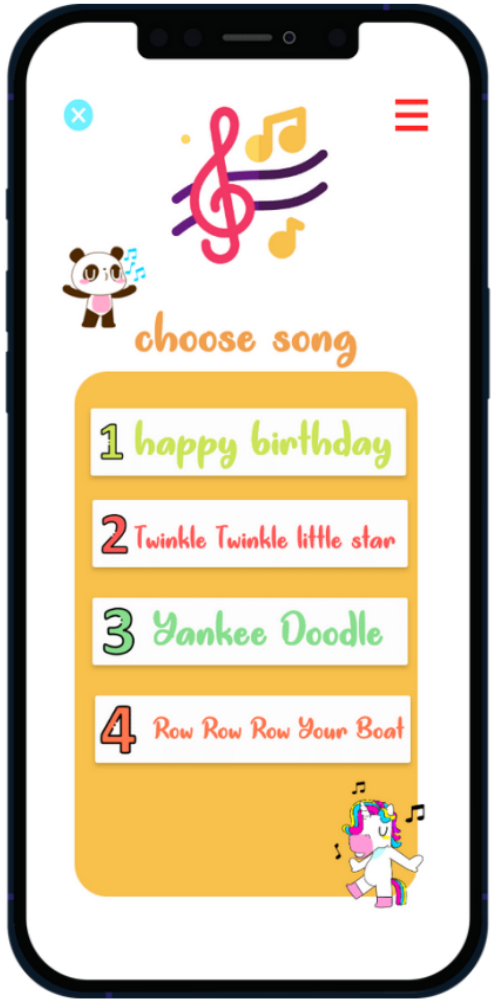
Kindergarten & Elementary School

Elderly department hospital
(dementia patients)

Music school

Recommended Future work.





INTERFACE FOR KID

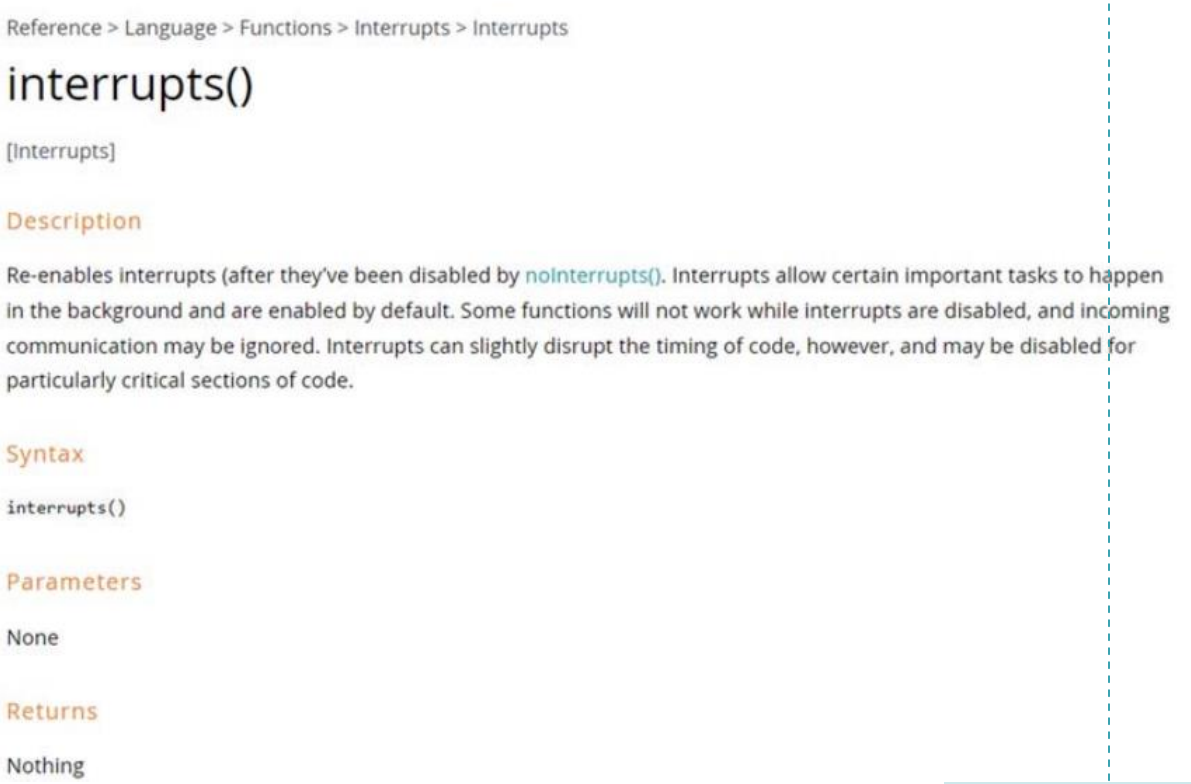
Recommended Future work.


Thank you

Answer

- Why cannot we do stop/pause button?

Because if we using interrupt command (for making Stop or pause) to avoid solenoids being overheated we need to make it return to the reset stage but from the interrupts () command it returns nothing as Arduino reference below. So as result it will make the solenoid overheated from the command.



Reference > Language > Functions > Interrupts > Interrupts

interrupts()

[Interrupts]

Description

Re-enables interrupts (after they've been disabled by noInterrupts(). Interrupts allow certain important tasks to happen in the background and are enabled by default. Some functions will not work while interrupts are disabled, and incoming communication may be ignored. Interrupts can slightly disrupt the timing of code, however, and may be disabled for particularly critical sections of code.

Syntax

```
interrupts()
```

Parameters

None

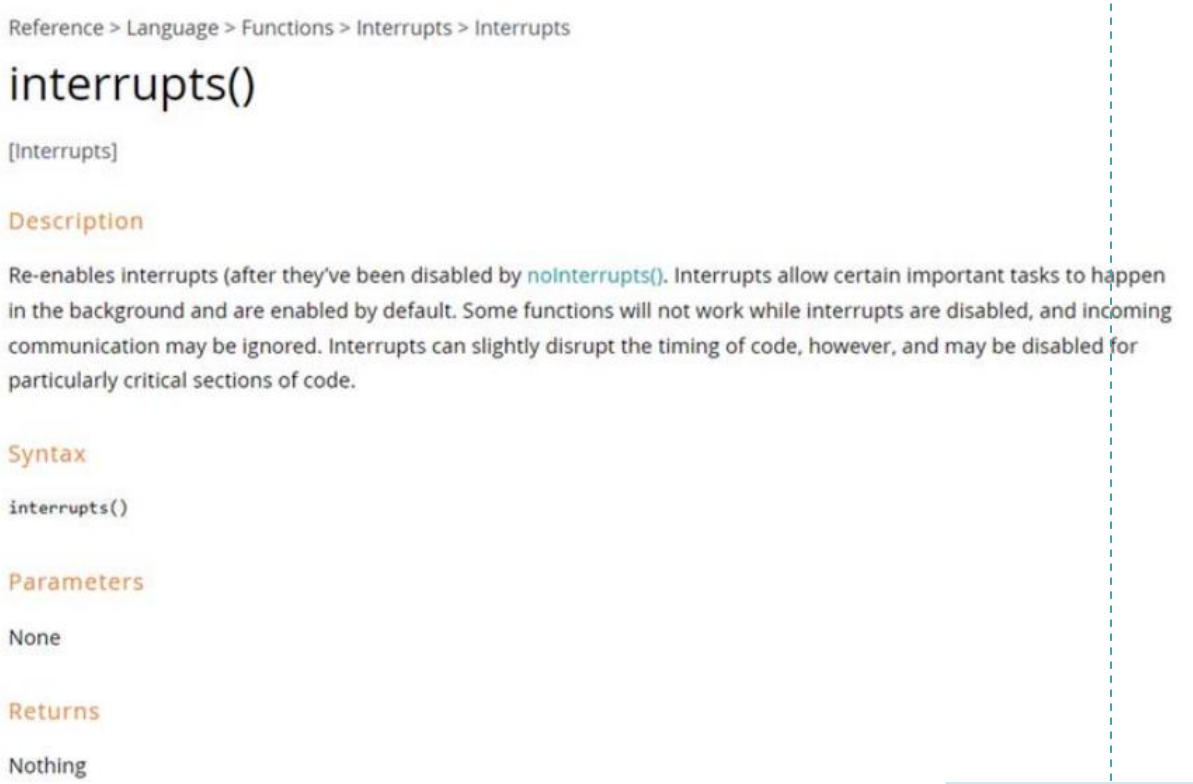
Returns

Nothing

Answer

- Why cannot we do stop/pause button?

Also, when we try to add command to interrupts it can't because command need to start until end of the command before take another command cannot be interrupt.



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