Documentation for the calibration machine of MagikEye

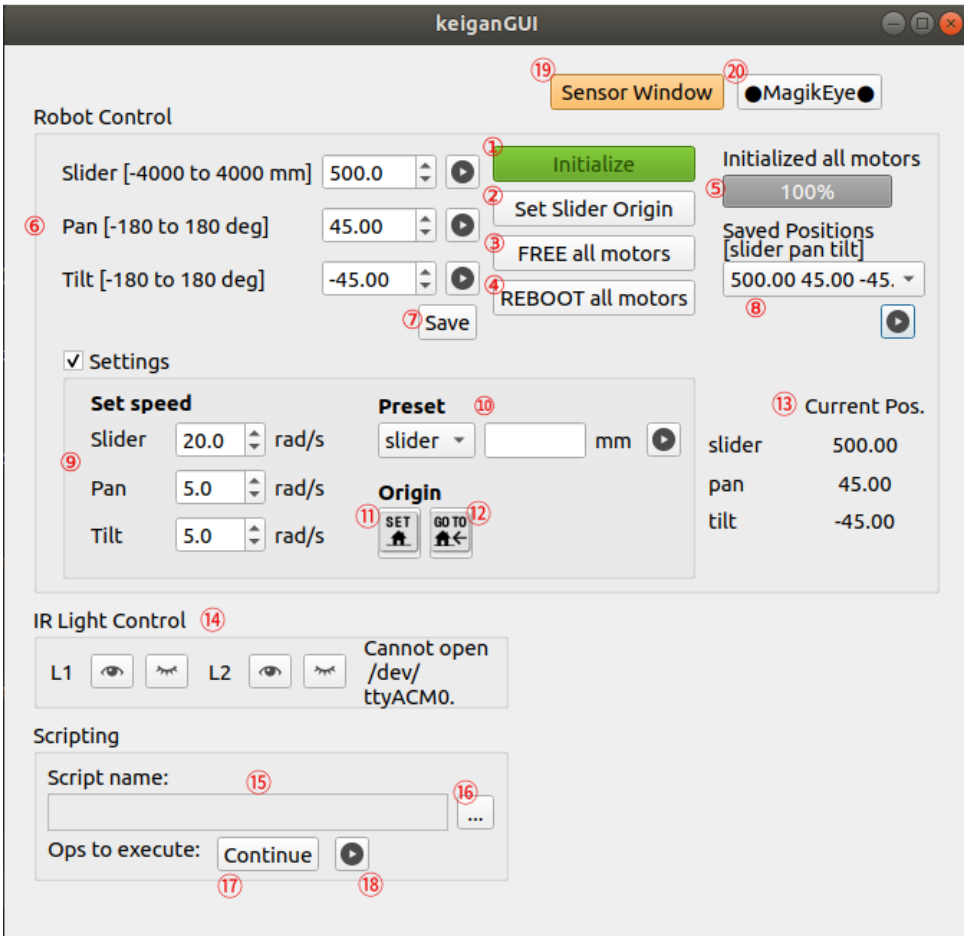
Operating environment

- Ubuntu xxx
- Python 3.6.9 or newer

First, check if the project `keiganGUI` exists at `\home\bin` then go to terminal and you can run this command: `python3 bin/keiganGUI/keiganGUI.py`

Then, you will see the main window like the image below.

Main Window ("KeiganGUI")

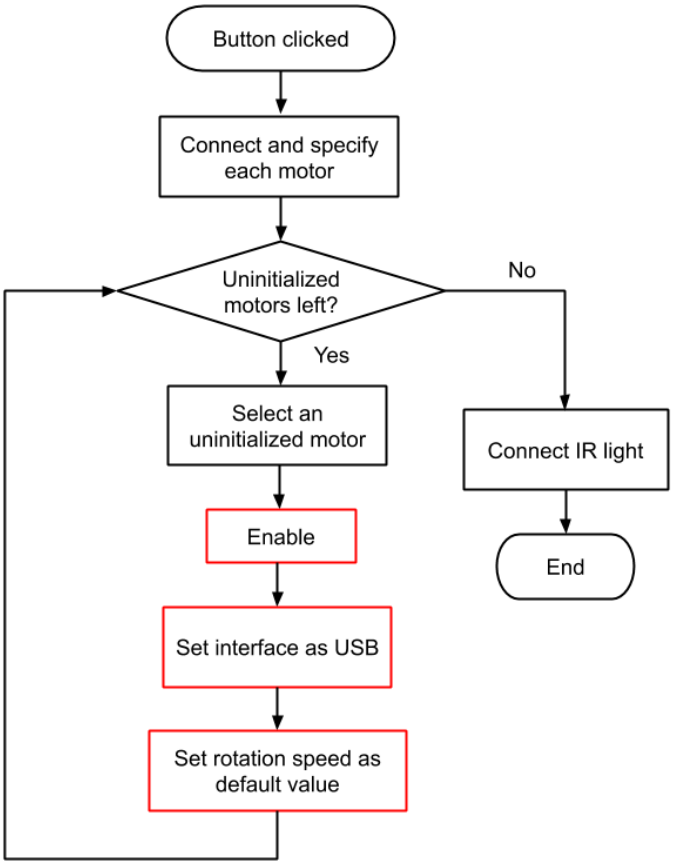


This window mainly consists of 3 parts, **Robot Control**, **IR Light Control**, and **Scripting**.

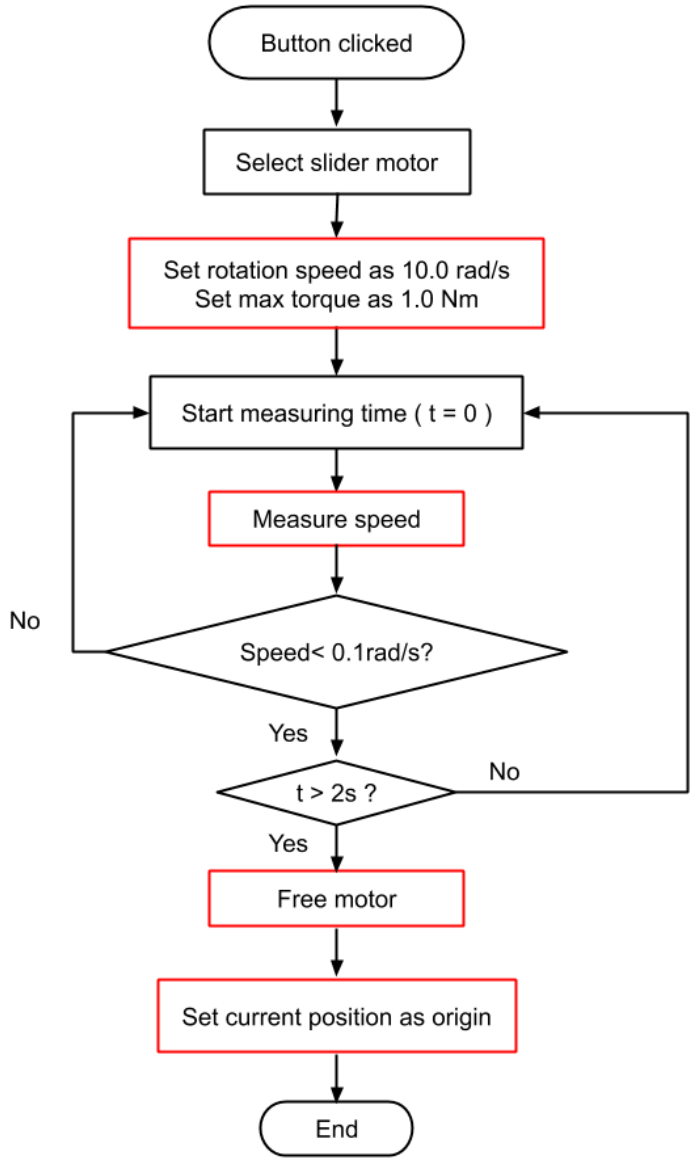
Robot Control

In this part, you can configure and move the motors. There are three motors in the calibration robot: **Slider**, **Pan**, and **Tilt**. The function of each numbered widgets in the GUI is as follows:

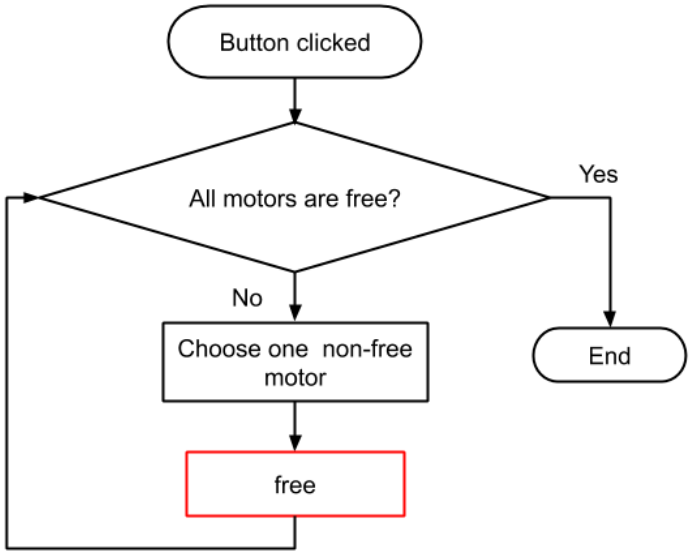
1. `Initialize button` initializes all of the three motors and open the port of IR lights. This button will be disabled after finishing initialization.



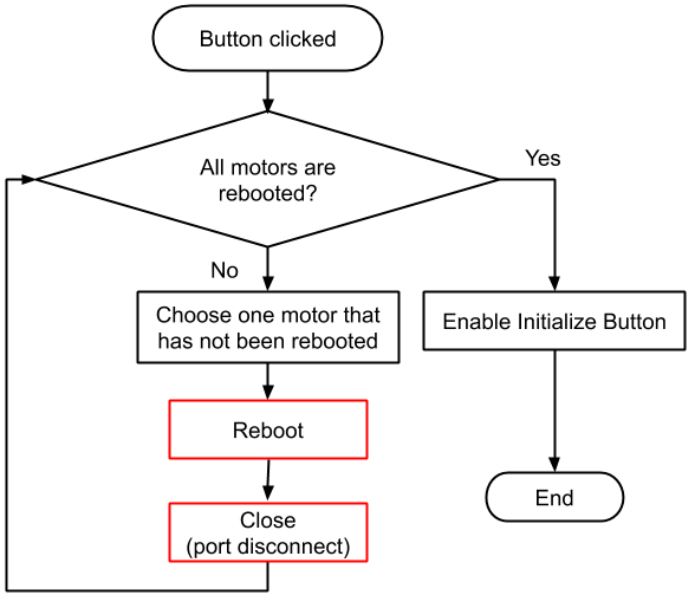
2. `Set Slider Origin button` can set the origin point of the slider motor. When finished, information message will be popped up so be patient until then.



3. `FREE all motors button` releases the restrain states of all motors. Holding torque will be reduced whereas the configuration of motors will be maintained.



4. `REBOOT all motors button`, on the other hand, turns off all motors and the configuration will not be maintained. If you want to use motors again, you should click `Initialize button`.

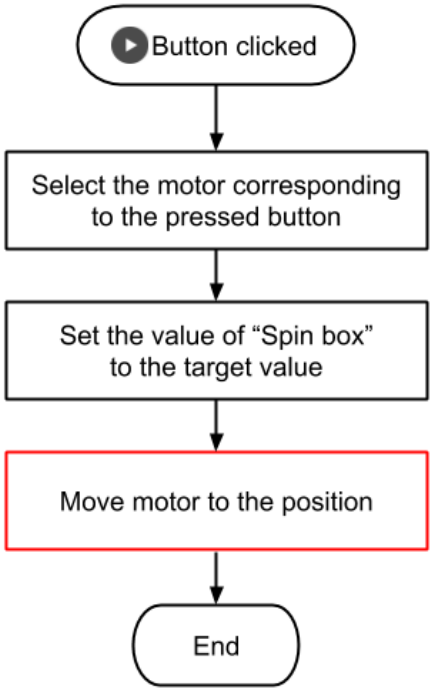


5. This `Progress Bar` can be used when you want to check the progress of

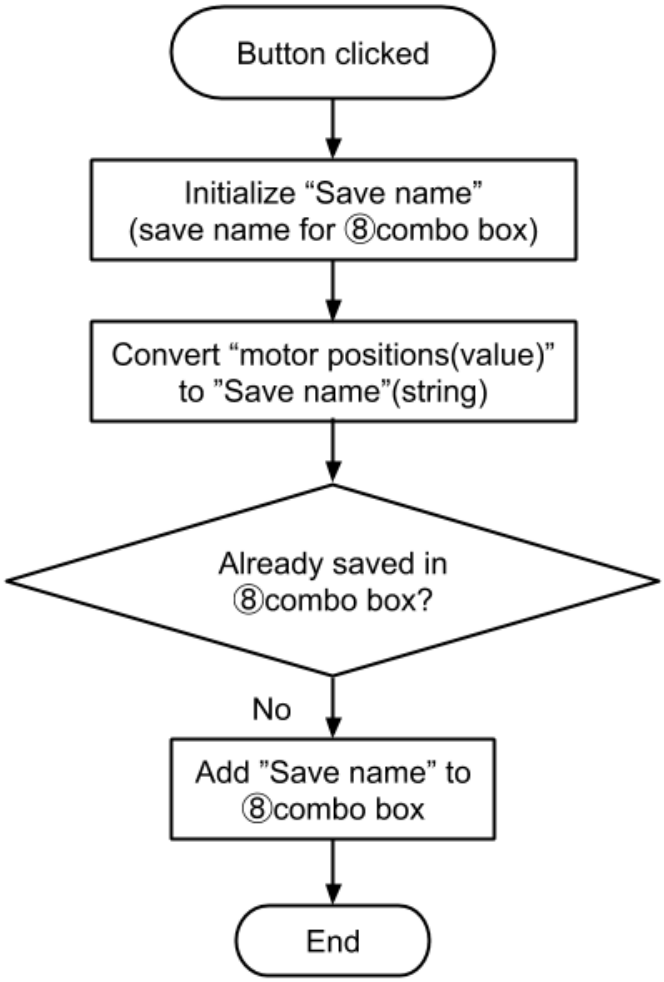
- motor initialization (when clicked ①)
- going to origin (when clicked ⑫)

6. In this part (`Motor Positions`), you can specify the position of each motor in the spin box. Notice that the unit of value for Slider, Pan, and Tilt are mm, deg, and deg respectively. If you click ▶ buttons, you can send a command to each motor and the robot will change the posture by moving

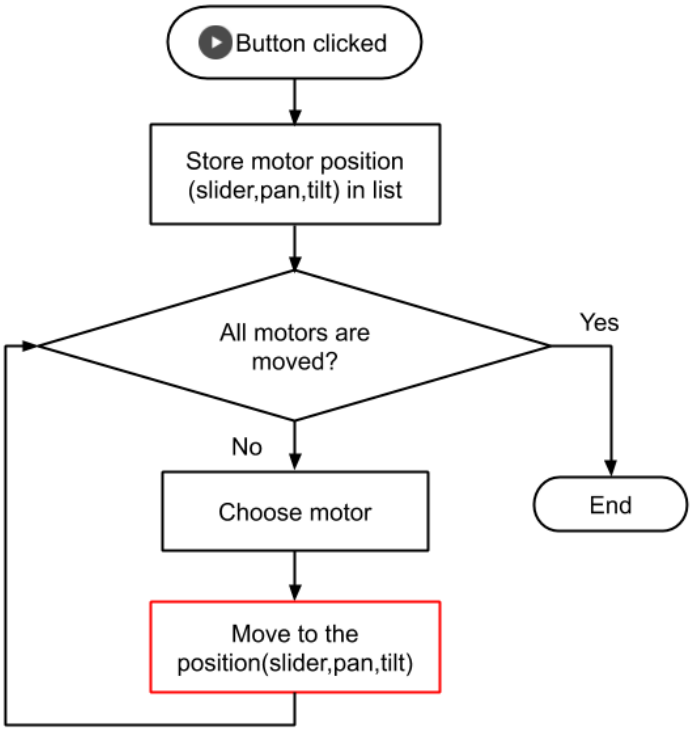
the motor.



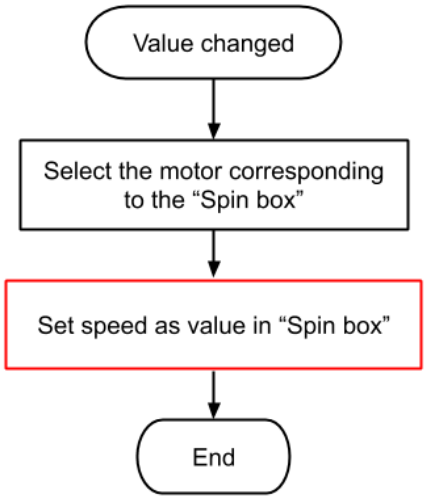
7. `Save button` allows you to save motor positions as specified at the spin boxes in `Motor Positions`. Sets of motor positions will be stored in the combo box ⑧.



8. `Saved Positions` stores motor positions which you saves. You can choose a set of motor positions from the combo box, and move motors by clicking ▶ button.

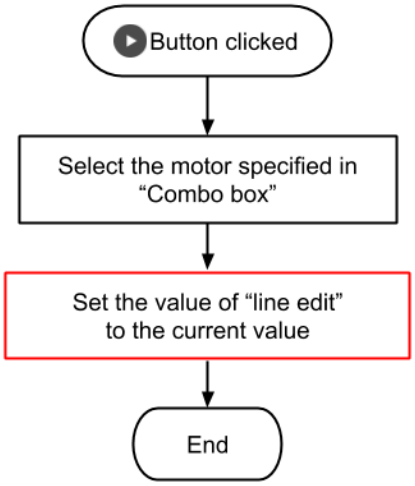


9. `Set speed` allows you to change the rotation speed of each motor.

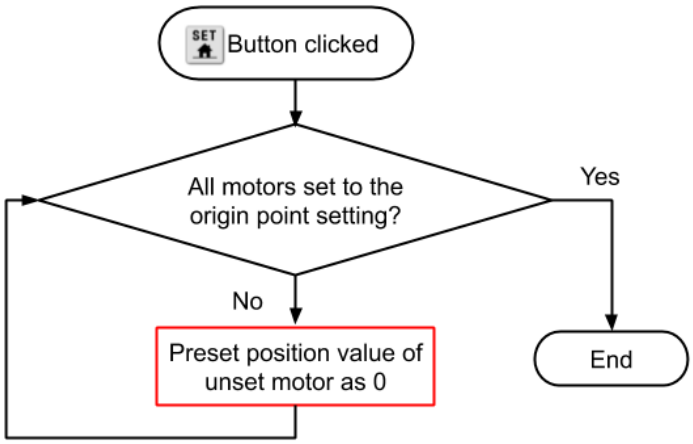


10. In `Preset`, firstly choose a motor ID from the combo box and type a value which you want to set as the motor's current position. The text of the label indicating the unit will be changed depending on

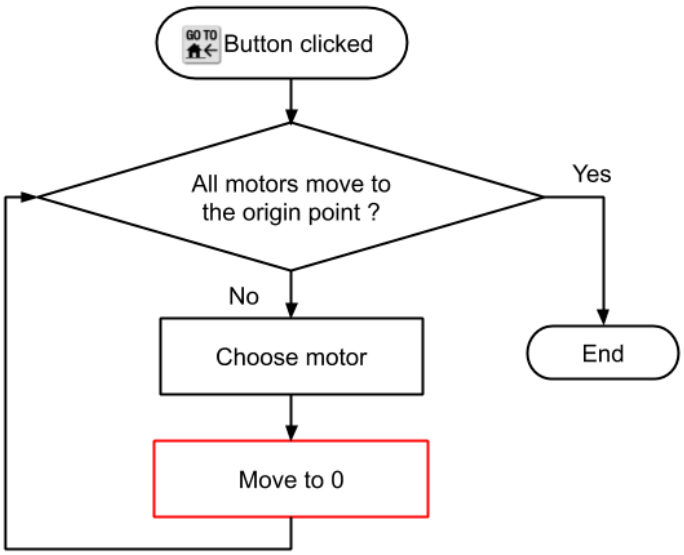
the motor ID.



11. `SET Origin button` sets the current positions of all motors origin (0, 0, 0).



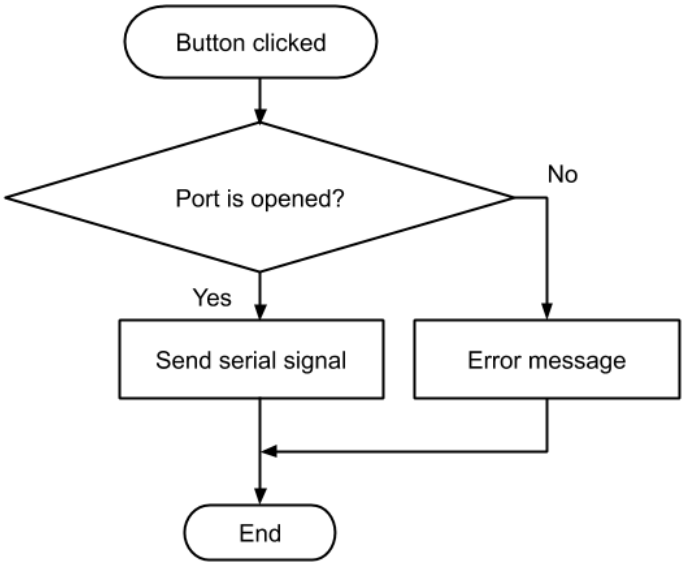
12. `GO TO Origin button` moves all motors to the point of origin.



13. In `Current Pos.`, you can check the current positions of all motors.

IR Light Control

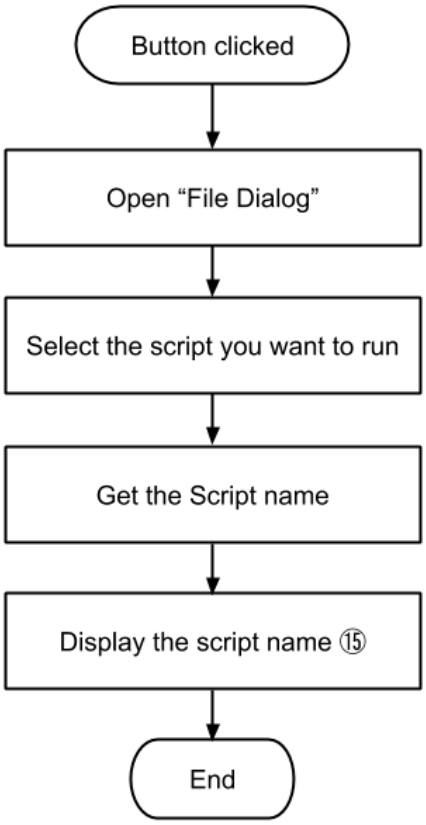
14. You can control lights (L1 and L2) respectively. By clicking 👁, the light will be turned on. On the other hand, 👁‍🗨 button allows you to turn off the light.



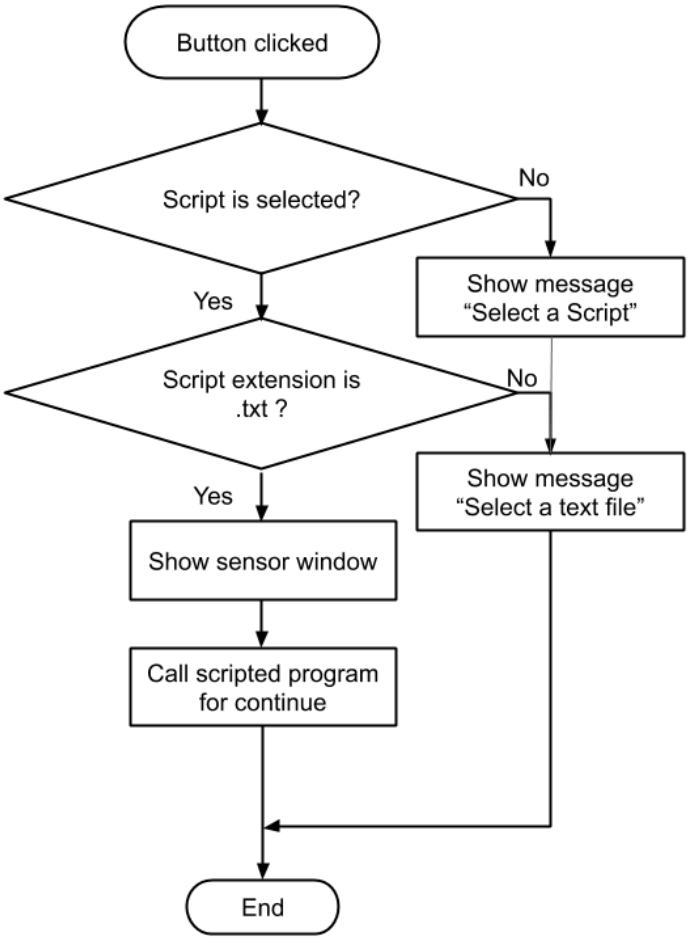
Scripting

15. The name of a script you chose will be shown here.

16. If you click `Select Script tool button`, file dialog will be opened and you can select a script. Choose a file with extension .txt.

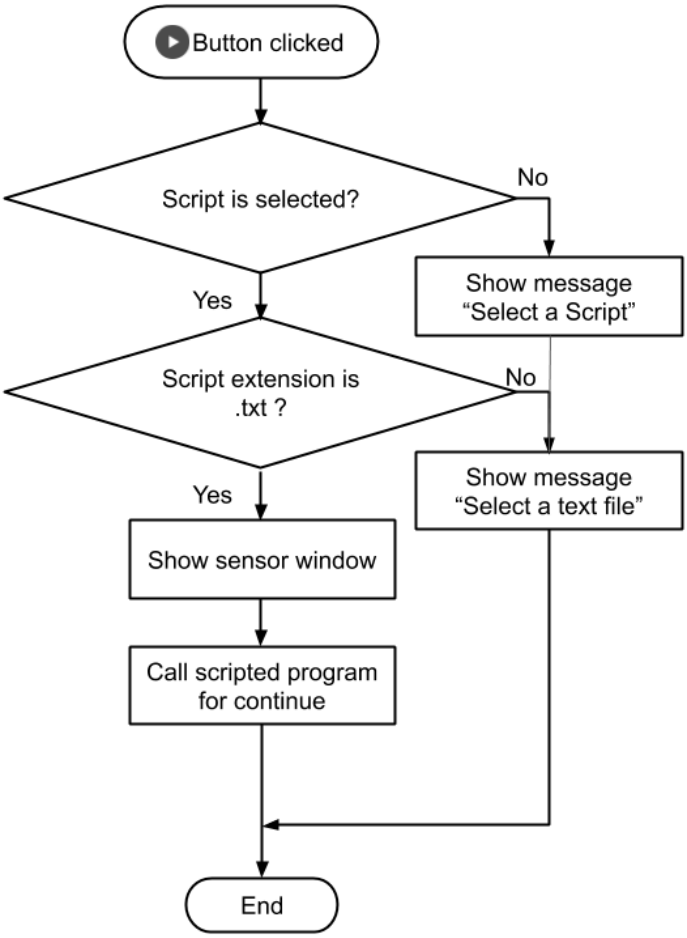


17. If `Continue Script button` is clicked, scripting will be resumed where you left off last session. If you haven't clicked ⑱, this button has the same role as ⑱.



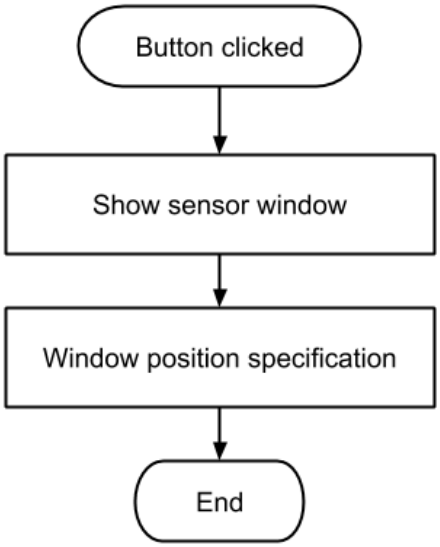
18. If `Execute Script button` is clicked, the selected script will be executed from the beginning. Acquired data while scripting will be saved in a different folder so as not to overwrite the existing

data.

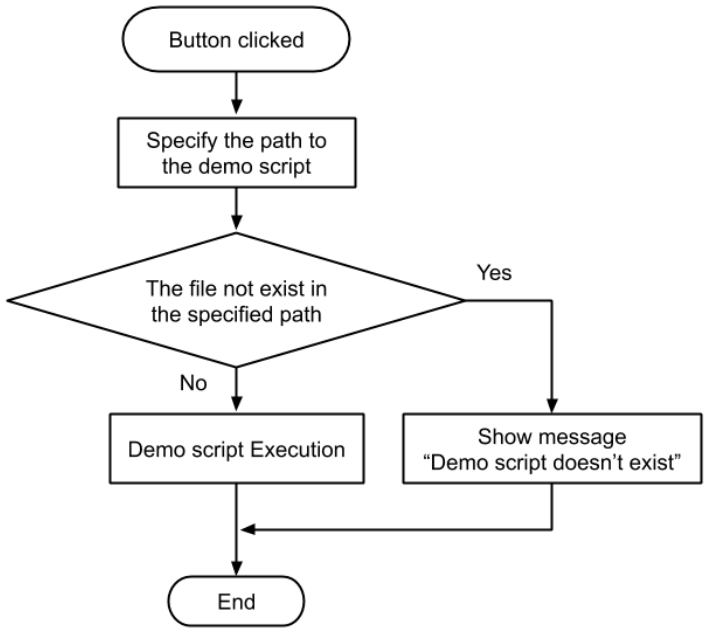


Other

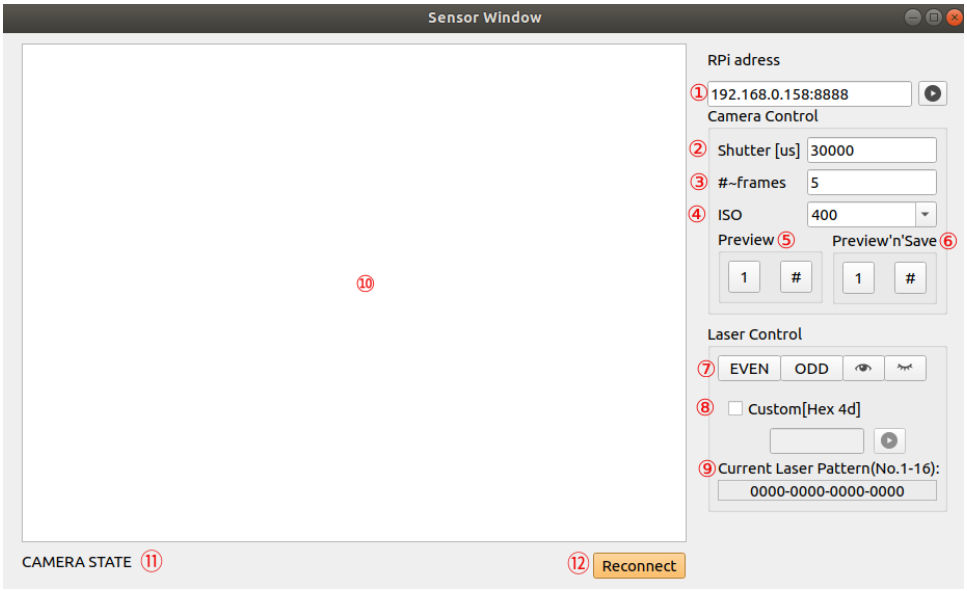
19. By clicking `Sensor Window button`, the sensor window will appear.



20. `MagikEye button` is a button for performing a demonstration of the calibration machine. The robot will move along a demo-script.



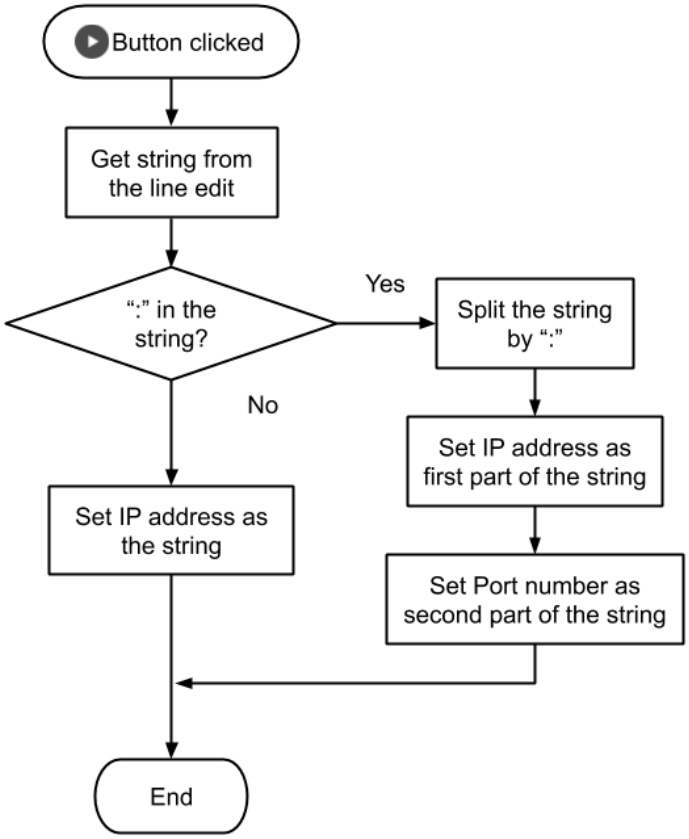
Sub Window ("Sensor Window")



You can directly control the state of sensor devices through this window. It mainly consists of 3 parts, **RPi address**, **Camera Control**, and **Laser Control**.

RPi address

1. Before connecting sensors, specify the IP address and port number here. The format is (IP address):(port number).You can also specify only IP address. In that case, port number will be set as

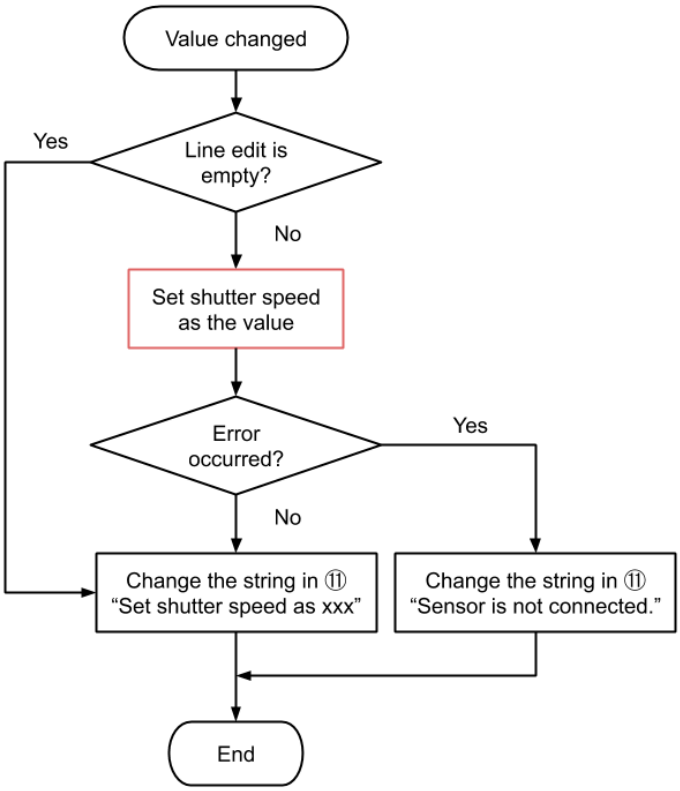


default(8888).

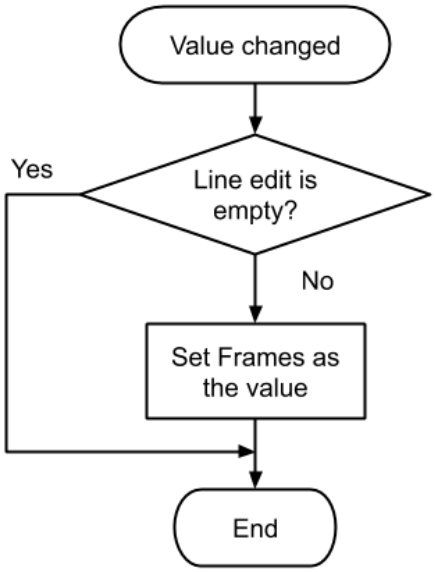
Camera Control

In this part, you can change parameters of a camera and get images.

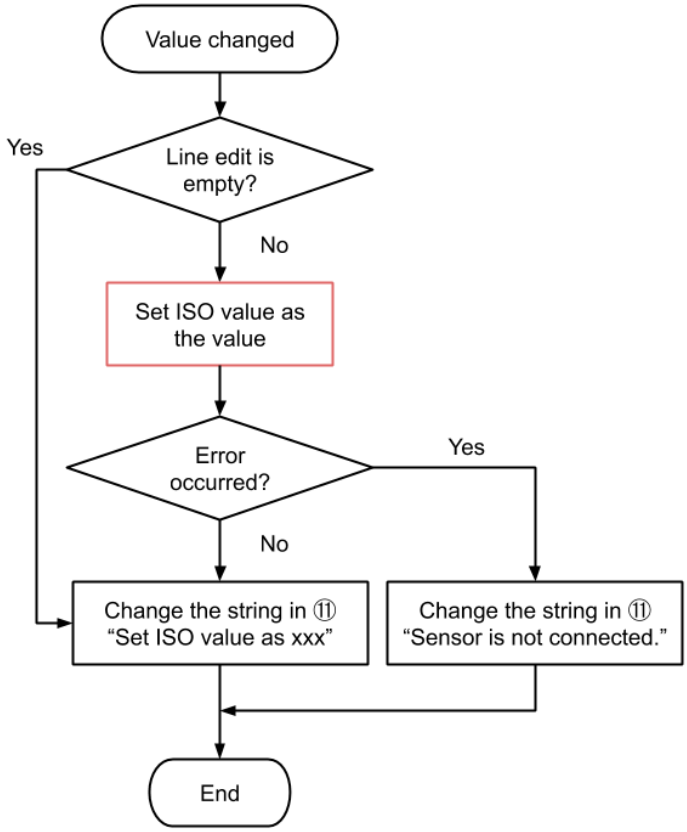
2. You can change `Shutter Speed` of the camera. Notice that the unit of the value is μs.



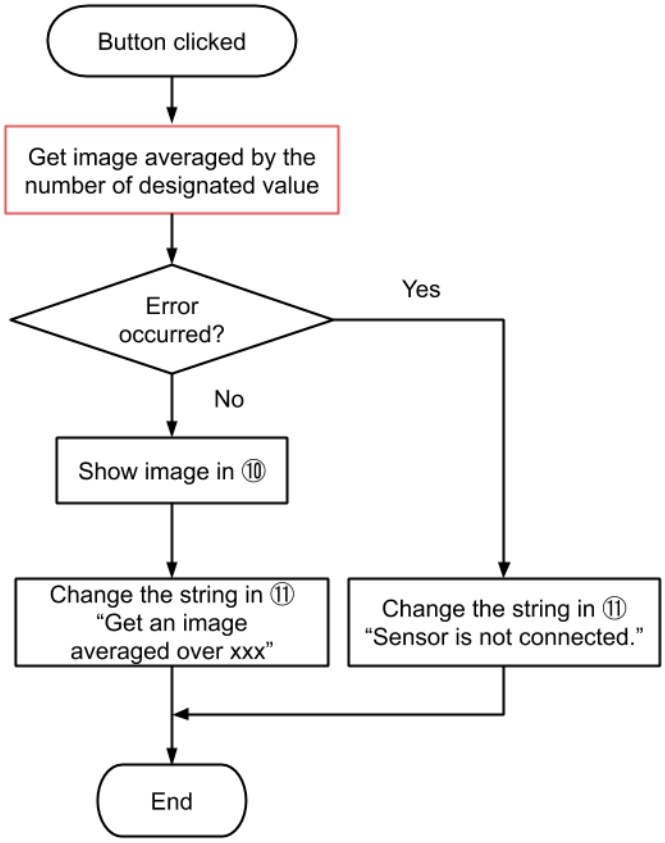
3. You can specify the `number of frames` for averaging images.



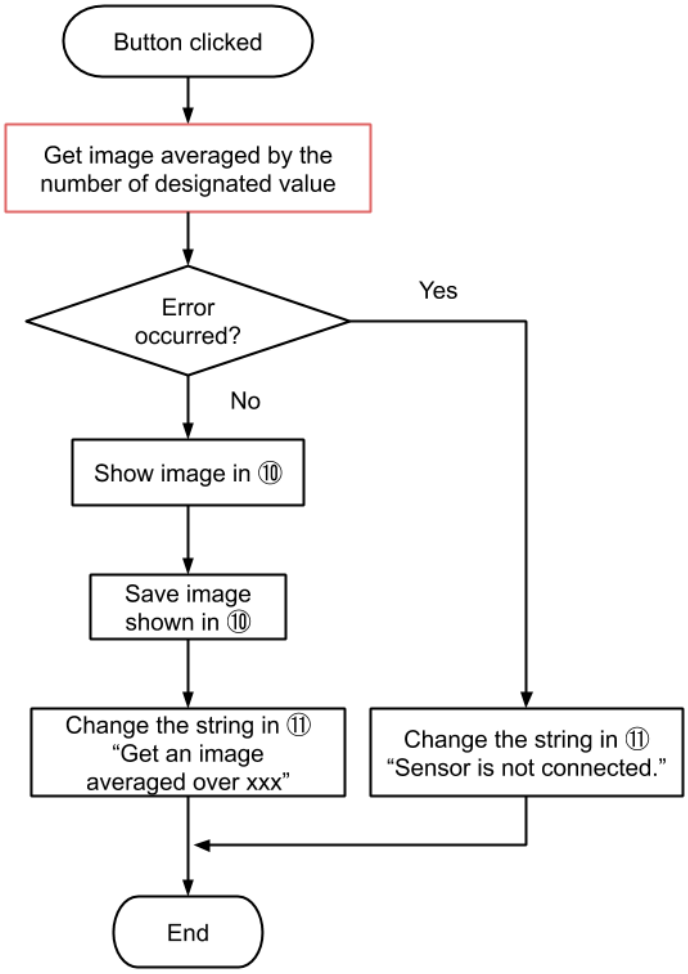
4. You can change `ISO value` by both selecting from the combo box and typing a number.



5. You can `preview` an image from the camera. `1` button is for a normal image, and `#` button is for an averaged image.


Button clicked
Get image averaged by the number of designated value
Error occurred?
Yes
No
Show image in ⑩
Change the string in ⑪ "Get an image averaged over xxx"
Change the string in ⑪ "Sensor is not connected."
End

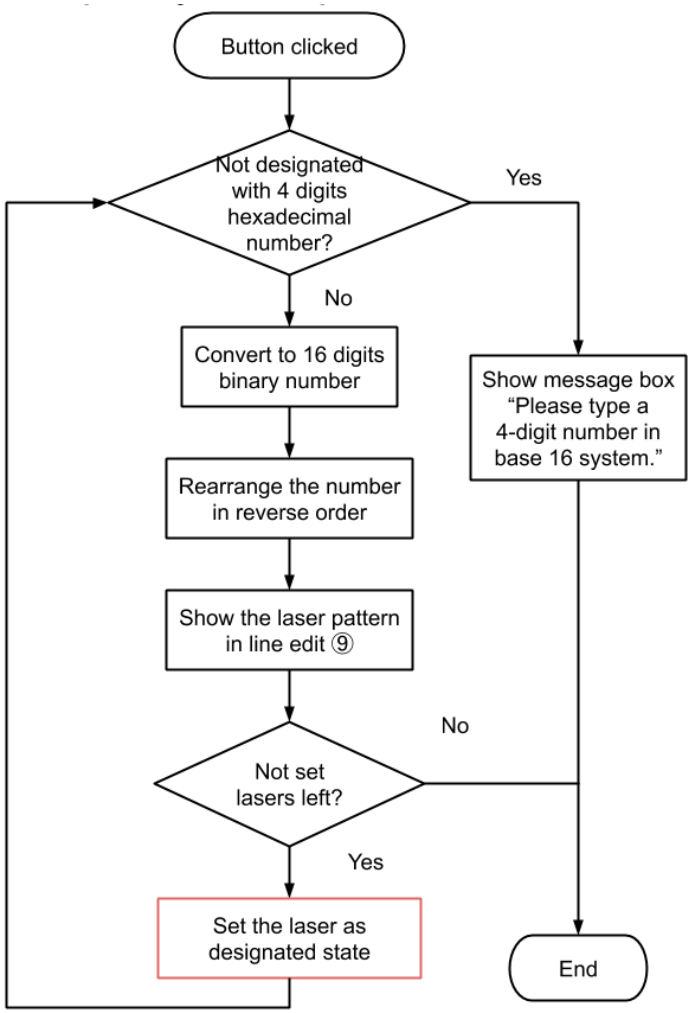
6. You can `preview and save` an image from the camera. Function of each button is same as ⑤.



Laser Control

In this part, you can control lasers and check the state.

7. You can set a laser pattern by clicking buttons. `EVEN` button is for turning on only even-numbered lasers, `ODD` for odd-numbered, 👁 for all lasers, and 👁‍🗨 for turning off all lasers.



8. You can set a laser pattern by specifying with a 4-digit hexadecimal number. The flowchart is same as ⑦.

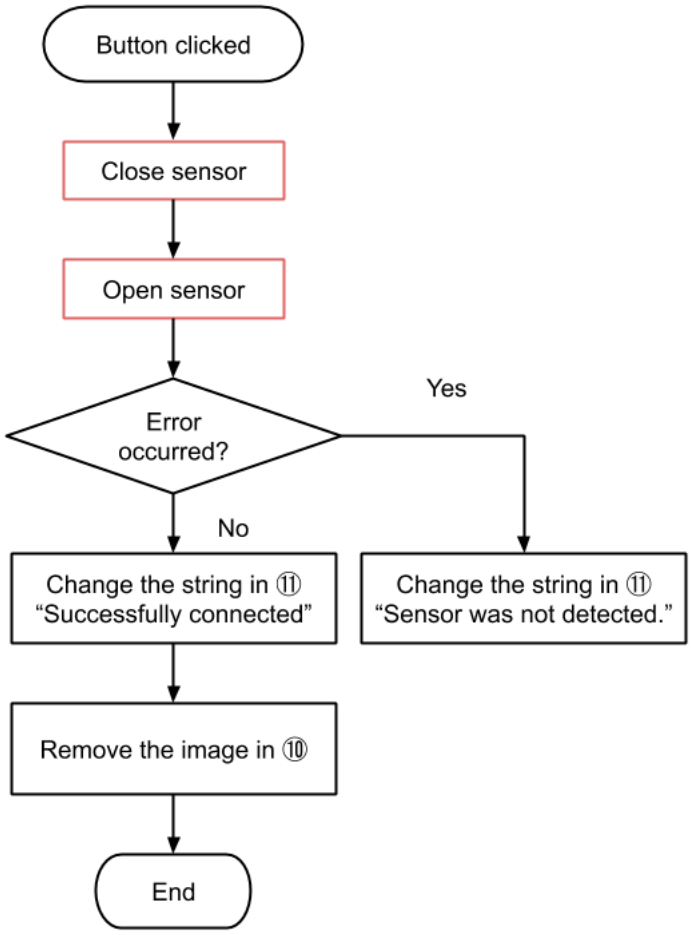
9. You can check the current laser patten. Lasers are from No.1 to No.16.

Other

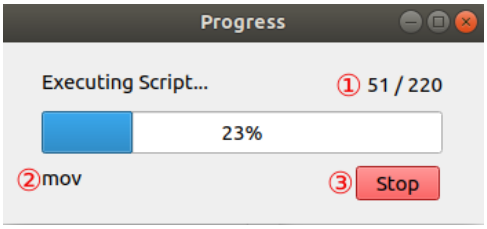
10. Here, you will see `Sensor Image` by clicking buttons in ⑤ or ⑥.

11. You can check the status of the camera. A message will be shown if there is a trial to connect to sensors, or parameters are changed.

12. By clicking `Reconnect button`, you can reconnect to sensors.



Scripting Window ("Progress")



While scripting, this window will appear.

1. You can check the progress in detail. The number of (processed lines) / (total lines) in the script is indicated. The progress percentage is also indicated in the progress bar at the center of this window.
2. This is a `command name` being processed.
3. By clicking `Stop button`, this window will be closed and the process of scripting will be interrupted.