

ARIS Manual

2024. 10. 28.

작성자 : 함종수

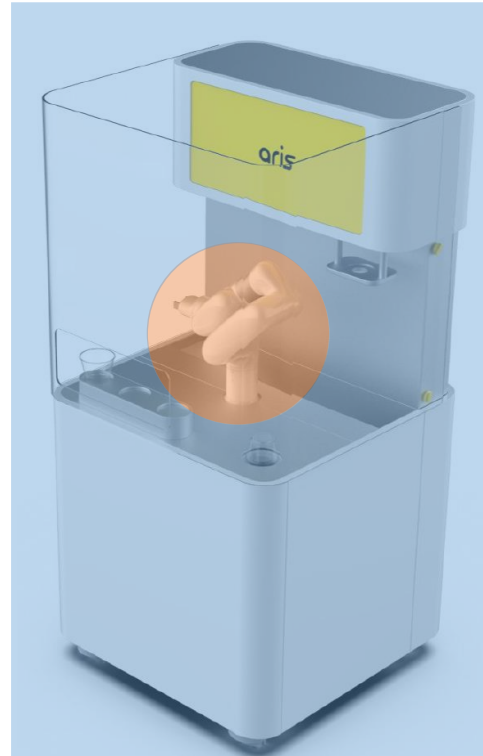
1. ARIS 소개
2. UFACTORY Studio 사용
3. Python SDK



1. ARIS 소개

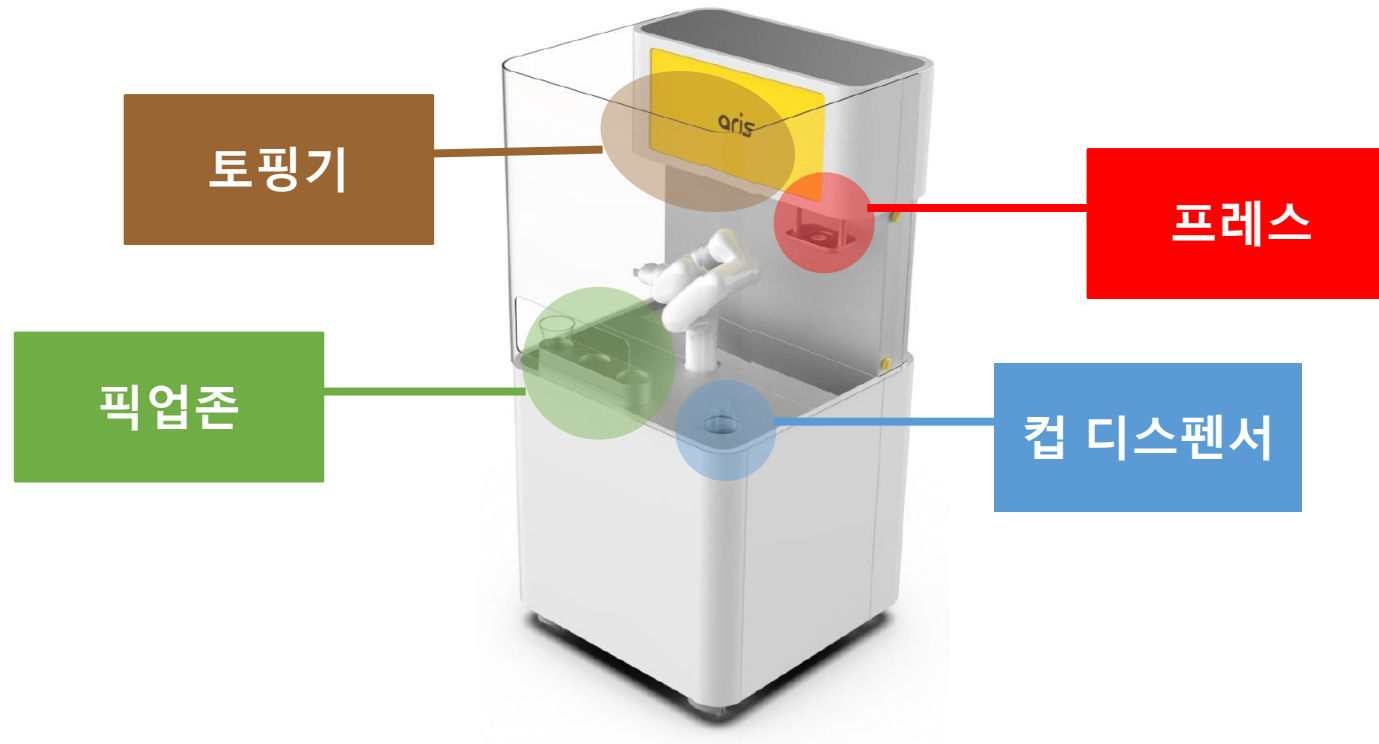
- ARIS 개요

6 DOF 로봇팔 (UFACTORY Lite 6) + 아이스크림 장비 (엑스와의지)



1. ARIS 소개

- 아이스크림 장비 구성



2. UFACTORY Studio 사용

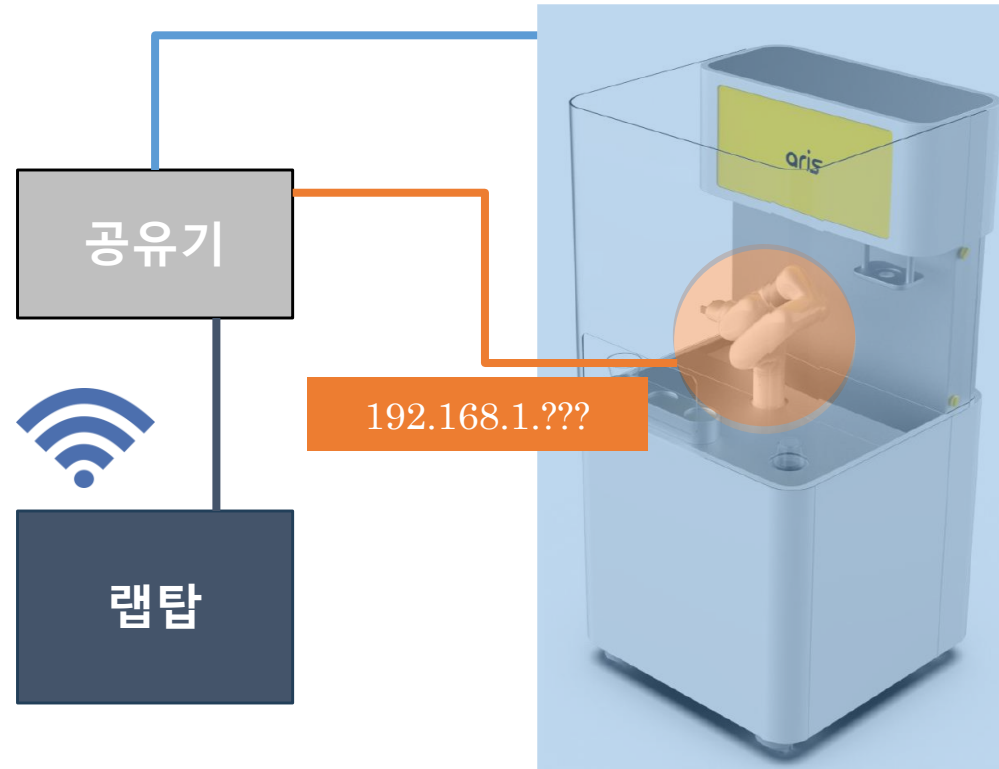
2. UFACTORY Studio 사용

- 연결

6 DOF 로봇팔 (UFACTORY Lite 6) + 아이스크림 장비 (엑스와의지)

Name : S/N

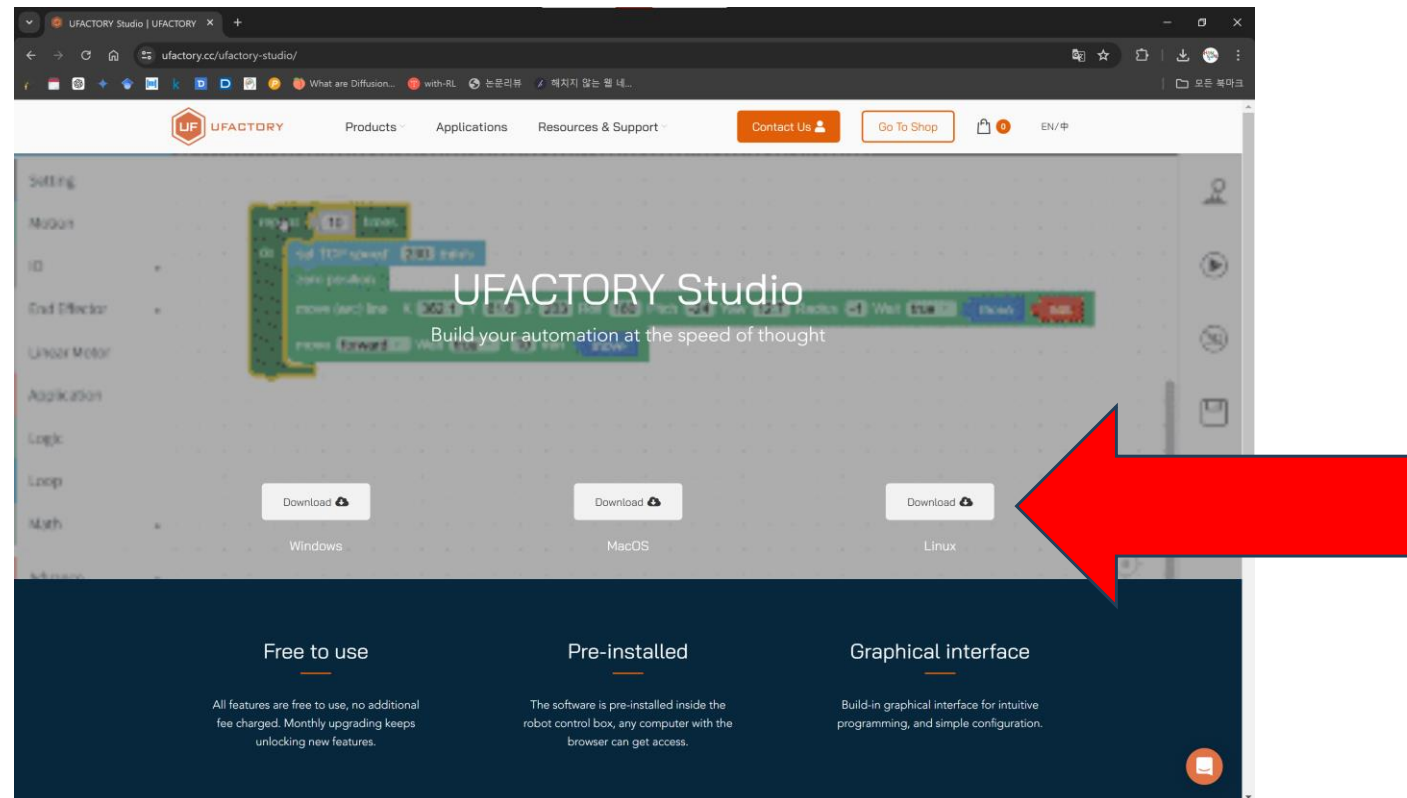
PW : 20190529!



2. UFACTORY Studio 사용

- UFACTORY Studio 설치

- <https://www.ufactory.cc/ufactory-studio/>



The screenshot displays the UFACTORY Studio interface, specifically the 'Live Control' tab. The top navigation bar includes 'Live Control', 'Blockly', and 'Settings', with a 'STOP' button on the right. The 'Gripper' section has 'OPEN', 'CLOSE', and 'OFF' buttons. The left sidebar shows robot status: IP: 192.168.1.192, Payload: 0.14KG, Status: Normal, Mode: Position, and joint coordinates (X, Y, Z, R, P, Y) in mm and degrees. A 3D model of a robotic arm is shown with coordinate axes. The main control area on the right includes: 'Position Control' (selected), 'Joint Control', 'Recording', and 'End Effector'. The 'Speed' slider is set to 50% (203.3). The 'Coord' section has 'Base' and 'Tool' buttons. The 'Adjust' section has 'Initial Position' and 'Align' buttons. The 'Control' section features 'Z-', 'Z+', 'Y-', 'Y+' buttons and two circular directional pads for 'XYZ' and 'RPY' control. The bottom bar includes 'Parameters' (toggle), 'Enable Robot' button, and 'Real'/'Simulated' mode selection.

UFACTORY Studio
Window Language Tool

Live Control Blockly Settings

STOP

Gripper OPEN CLOSE OFF

IP: 192.168.1.192
Payload: 0.14KG
Status: Normal
Mode: Position

X: -213.3 mm
Y: -155.7 mm
Z: 378 mm
R: 146.8 °
P: 76.7 °
Y: 63.9 °

Base 좌표계 표시
Tool 좌표계 표시

Position Control
Joint Control
Recording
End Effector

Speed 로봇 동작속도 조절
203.3 50%

Coord 조작시 기준좌표계
Base Tool

Adjust 기초 포즈 2가지
Initial Position Align

Control 좌표계를 사용한 로봇 조작
Z- Z+ Y- Y+
X+ X- Y+ Y- XYZ
P+ P- R- R+ RPY

Parameters Enable Robot Real Simulated

2. UFACTORY Studio 사용

UFACTORY Studio
Window Language Tool

Live Control

Blockly

Settings

STOP

Gripper

OPEN

CLOSE

OFF

IP: 192.168.1.192

Payload: 0.14KG

Status: Normal

Mode: Position

X: -213.3 mm

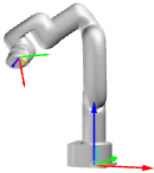
Y: -155.7 mm

Z: 378 mm

R: 146.8 °

P: 76.7 °

Y: 63.9 °



Position Control

Joint Control

Recording

End Effector

Manual Mode

Sensitivity

203.3

1

Manual Mode

수동 조작 모드 on/off

Joint Control

로봇 관절 조작

J1

-

+

203.4 °

J2

-

+

1 °

J3

-

+

57.4 °

J4

-

+

89.2 °

J5

-

+

71 °

J6

-

+

-294.6 °

Parameters

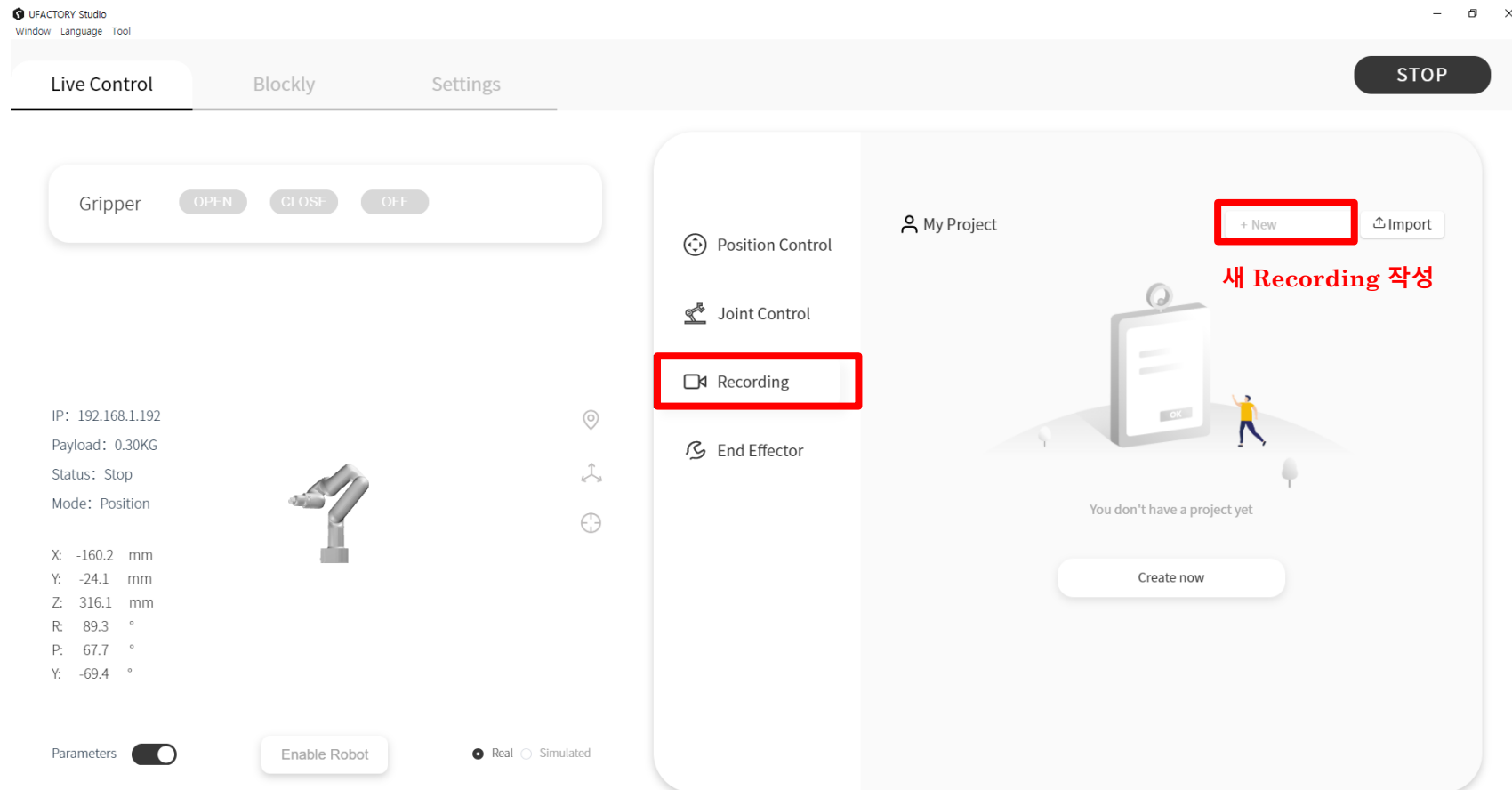
Enable Robot

Real Simulated

2. UFACTORY Studio 사용

- Recording

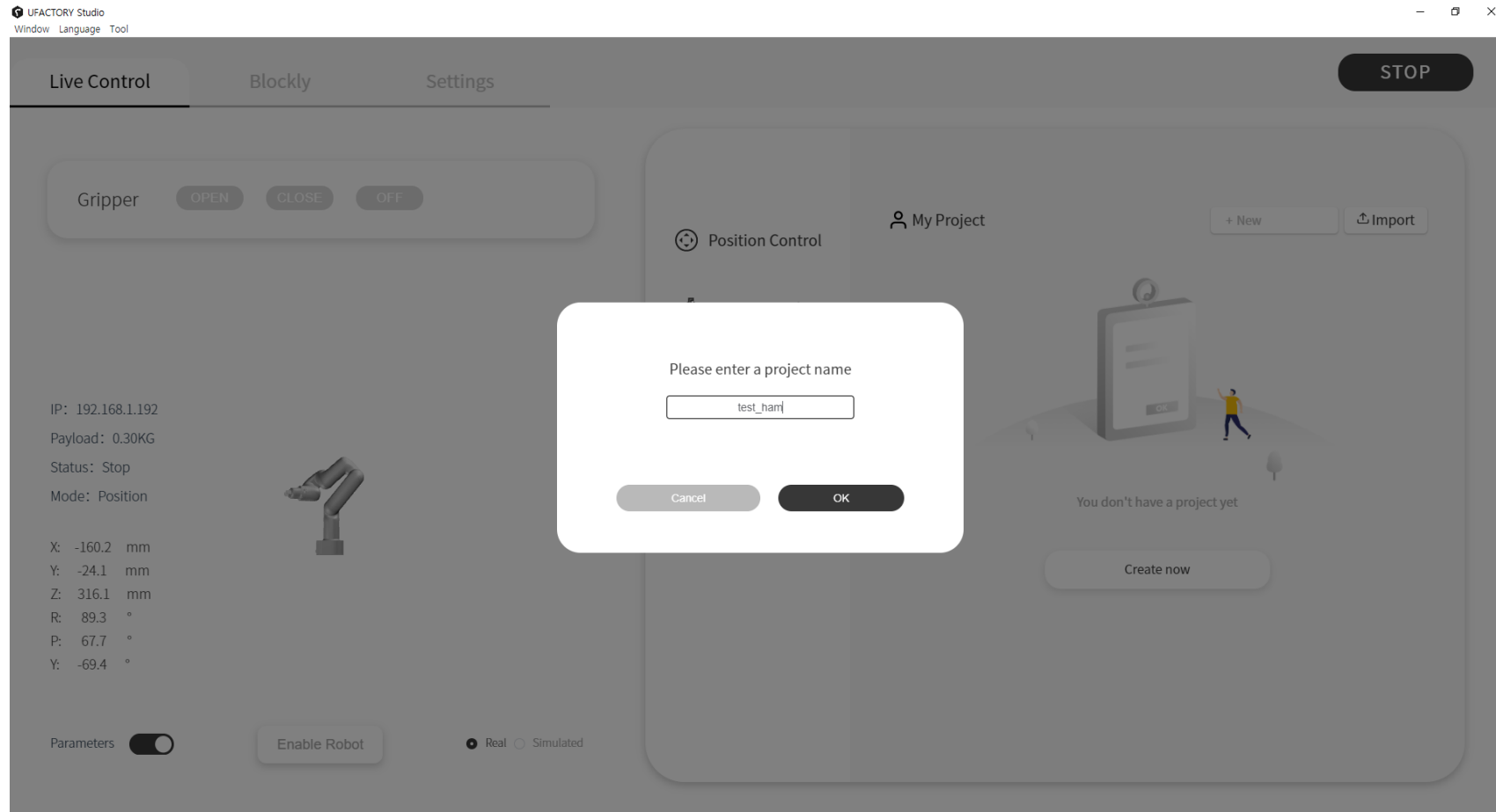
1. +New 버튼으로 새로운 Recording 작성



2. UFACTORY Studio 사용

- **Recording**

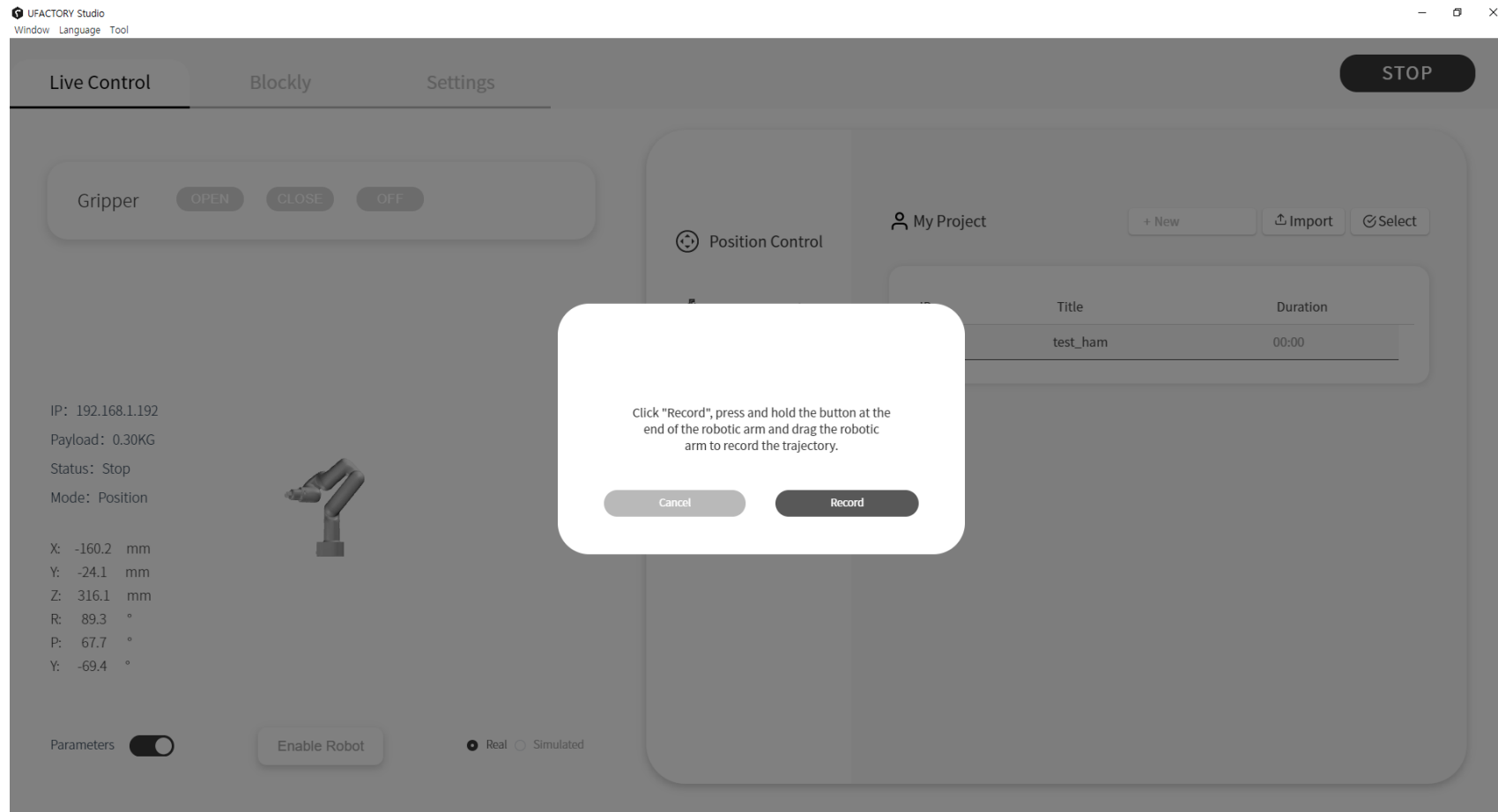
2. Recording 할 로봇 경로명 지정



2. UFACTORY Studio 사용

- **Recording**

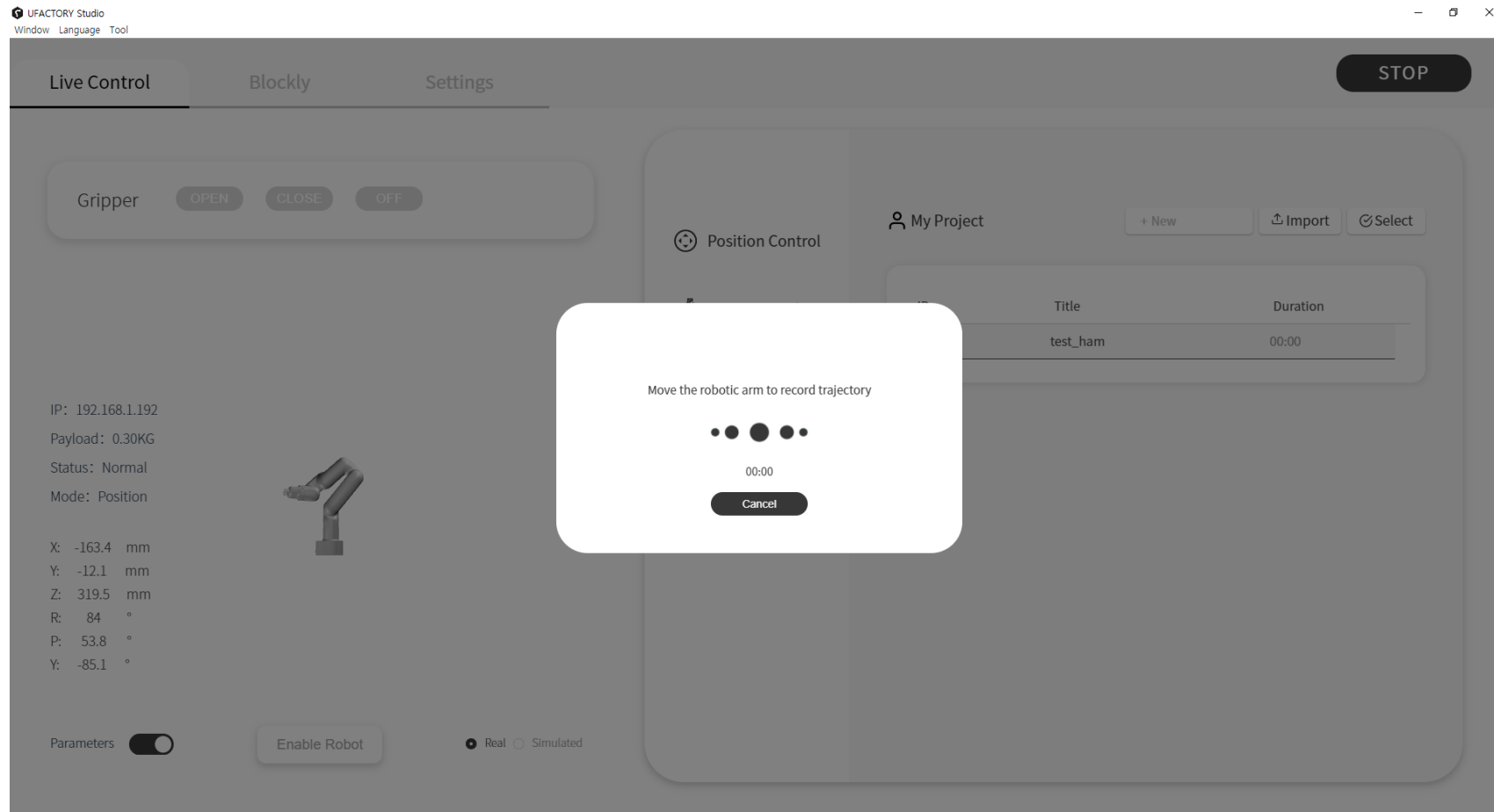
3. 기록할 준비가 끝나면 Record 버튼 눌러서 기록 시작



2. UFACTORY Studio 사용

- **Recording**

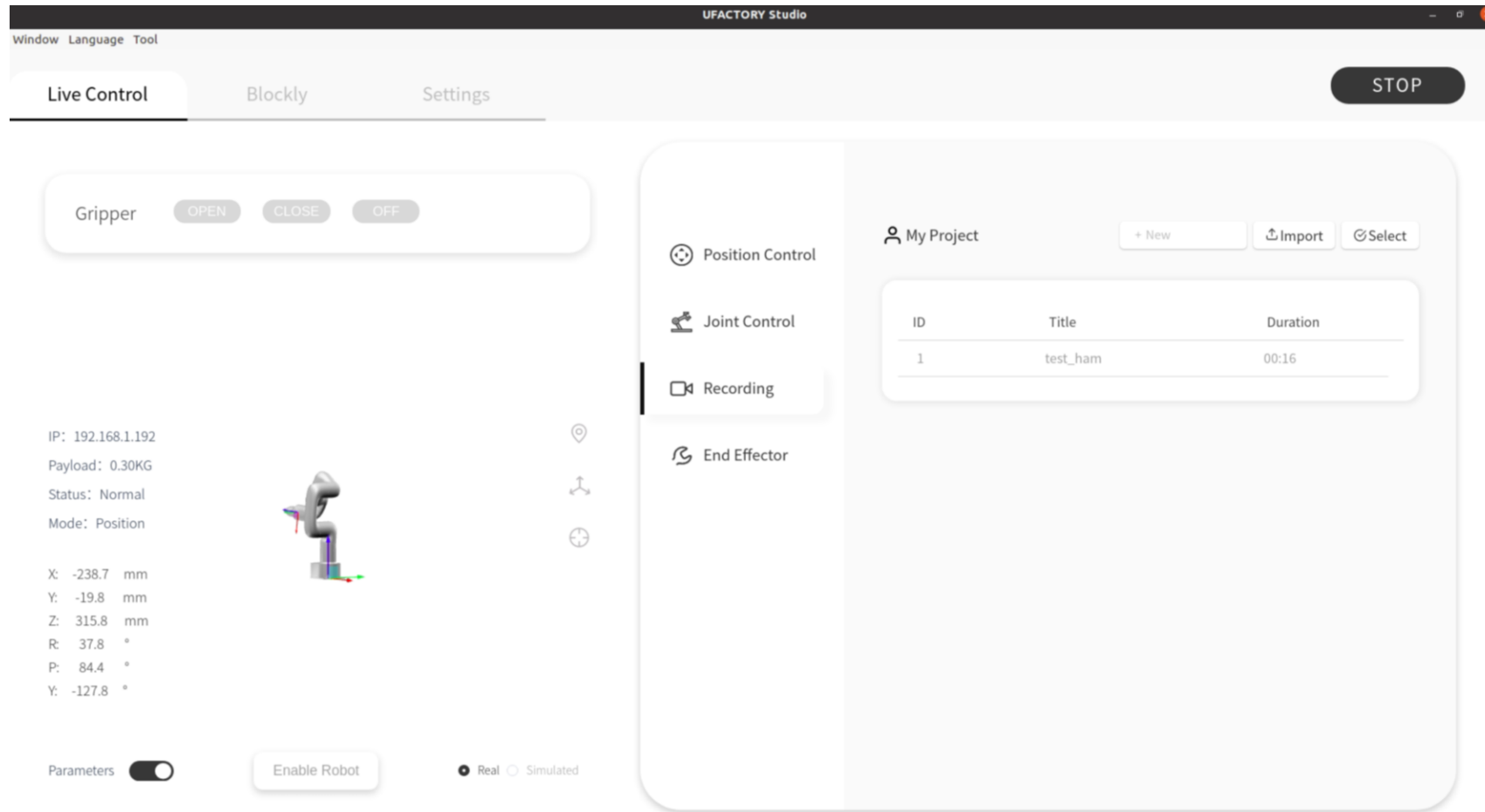
4. 아래와 같은 화면에서 로봇팔을 수동 조작하여 기록 진행



2. UFACTORY Studio 사용

- Recording

5. 기록이 완료되면 저장



2. UFACTORY Studio 사용

UFACTORY Studio

Window Language Tool

Live Control Blockly Settings

STOP

Gripper

OPEN CLOSE OFF

그리퍼 열기 그리퍼 닫기 그리퍼 멈춤 (컴프레서 off)

IP: 192.168.1.192
Payload: 0.30KG
Status: Normal
Mode: Position

X: -238.7 mm
Y: -19.8 mm
Z: 315.8 mm
R: 37.8 °
P: 84.4 °
Y: -127.8 °

Parameters ☒ Enable Robot ☒ Real ☐ Simulated

Position Control
Joint Control
Recording
End Effector

Gripper

No End Effector Vacuum Gripper

2. UFACTORY Studio 사용

The screenshot displays the UFACTORY Studio software interface. At the top, there is a menu bar with 'Window', 'Language', and 'Tool'. Below this is a tabbed interface with 'Live Control', 'Blockly' (highlighted with a red box), and 'Settings'. On the left side, there is a 'Gripper' control panel with 'OPEN', 'CLOSE', and 'OFF' buttons. Below this, a 3D model of a robotic gripper is shown. To the right of the 3D model, there is a list of project files under 'UF_APPS' and 'USER_APPS'. The main area on the right is the Blockly programming environment, showing a sequence of blocks for linear motion and a loop structure. The 'Blockly' tab is active, and the 'Project' and 'Program' tabs are visible. The 'Blockly' tab contains a 'Gripper' control panel with 'OPEN', 'CLOSE', and 'OFF' buttons. Below the control panel, there is a 3D model of a robotic gripper. To the right of the 3D model, there is a list of project files under 'UF_APPS' and 'USER_APPS'. The main area on the right is the Blockly programming environment, showing a sequence of blocks for linear motion and a loop structure.

UFACTORY Studio

Window Language Tool

Live Control **Blockly** Settings

STOP

Gripper OPEN CLOSE OFF

IP: 192.168.1.192
Payload: 0.30KG
Status: Normal
Mode: Position

X: -238.7 mm
Y: -19.8 mm
Z: 315.8 mm
R: 37.8 °
P: 84.4 °
Y: -127.8 °

Parameters ☒ Enable Robot ☒ Real ☐ Simulated

Project Program

+New Folder

UF_APPS

- [UF]-1001_Joint...
- [UF]-1002_Contin...
- [UF]-1003_Linear...
- [UF]-1004_Contin...
- [UF]-1005_DrawCr...
- [UF]-1006_Lite6_G...
- [UF]-1007_Lite6_V...
- [UF]-1008_Digital_IO
- [UF]-1009_Multipl...

USER_APPS

- j5
- test

Blockly code blocks:

- to motion1
- linear motion X: 200 Y: 200 Z: 300 Roll: 180 Pitch: 0 Yaw: 0 Radius: 0 Wait: true move edit
- move up Wait: true 50 mm move
- move down Wait: true 30 mm move
- change var_ham by 5
- repeat var_ham times
- do
- to motion2
- linear motion X: 200 Y: 200 Z: 300 Roll: 180 Pitch: 0 Yaw: 0 Radius: 0 Wait: true move edit
- move up Wait: true 50 mm move
- move down Wait: true 30 mm move
- set TCP speed: 200 mm/s
- set TCP acceleration: 2000 mm/s²
- linear motion X: 200 Y: 0 Z: 300 Roll: 180 Pitch: 0 Yaw: 0 Radius: 0 Wait: true move edit
- forever loop
- set FLAG to 0
- if CIO - C17 are LOW HIGH HIGH HIGH HIGH HIGH HIGH HIGH timeout: 0.02
- do set FLAG to 1
- else if CIO - C17 are HIGH LOW HIGH HIGH HIGH HIGH HIGH HIGH timeout: 0.02
- do set FLAG to 2
- else set FLAG to 0
- if FLAG = 1
- do motion1
- set FLAG to 0
- else if FLAG = 2
- do motion2
- set FLAG to 0

2. UFACTORY Studio 사용

UFACTORY Studio

Window Language Tool

Live Control Blockly Settings

STOP

Project Program

Setting

Motion

IO

End Effector

Application

Logic

Loop

Math

Advance

IP: 192.168.1.192
Payload: 0.30KG
Status: Normal
Mode: Position

X: -189 mm
Y: -69.5 mm
Z: 304.7 mm
R: 33.1 °
P: 82.1 °
Y: -99.6 °

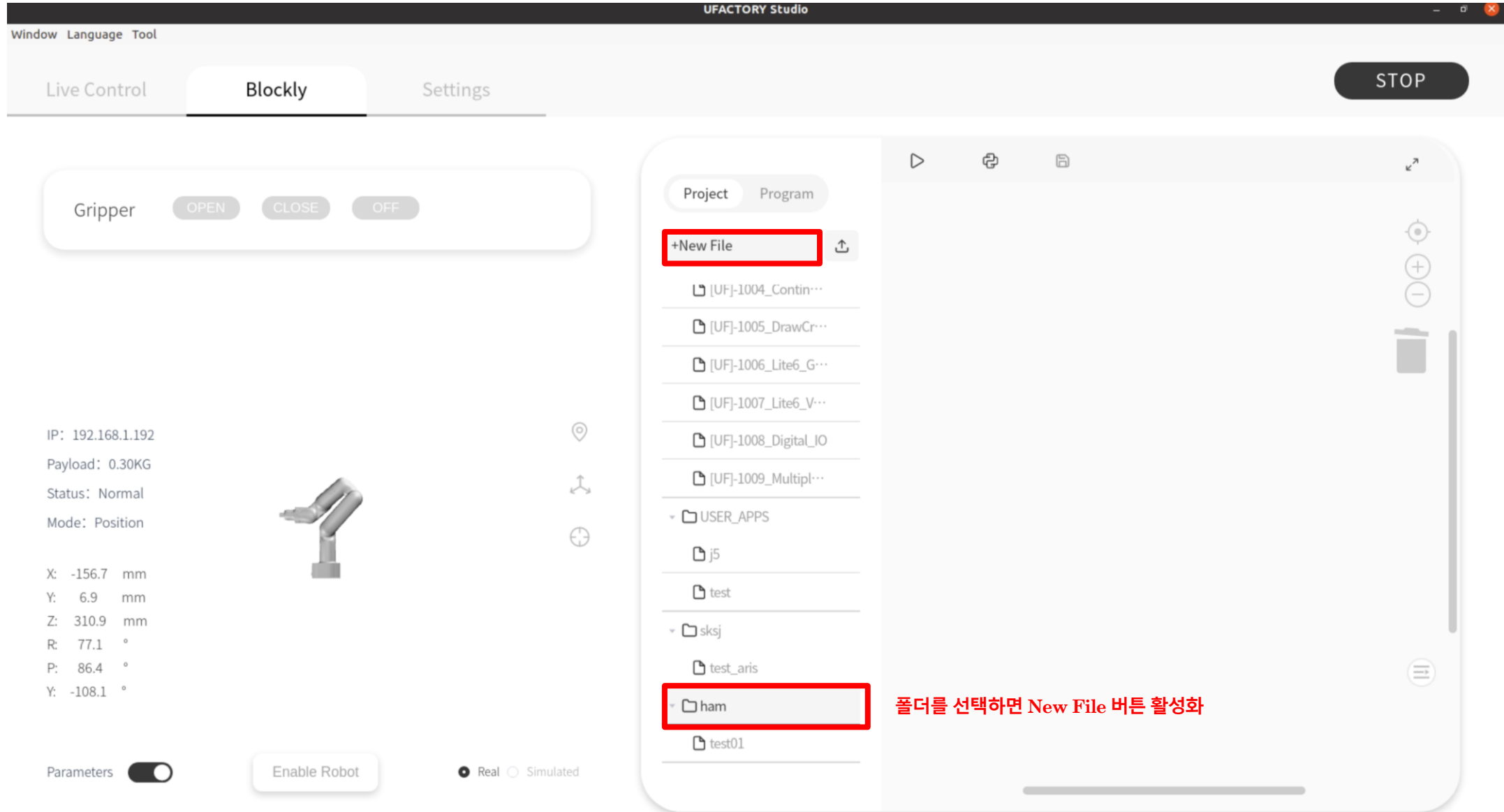
Parameters ☒ Enable Robot ☐ Real ☒ Simulated

Joint motion 등의 블록을 드래그해서 사용하면 현재 포즈 추출 가능

motion resume
emergency stop
zero position
joint motion J1 0 J2 0 J3 0 J4 0 J5 0 J6 0 Radius 0 Wait false move edit
linear motion X 201.5 Y 0 Z 140.5 Roll -180 Pitch 0 Yaw 0 Radius 0 Wait false move edit
move forward Wait false 10 mm move
remark Continuous Joint Motion
move tool line X 0 Y 0 Z 0 Roll 0 Pitch 0 Yaw 0 Wait false
move circle
Pose1 cartesian X 201.5 Y 0 Z 140.5 Roll -180 Pitch 0 Yaw 0 move edit
Pose2 cartesian X 201.5 Y 0 Z 140.5 Roll -180 Pitch 0 Yaw 0 move edit
Center angle(*) 360 -18.4 36.4 69.6 0 33.2 -18.4 Radius 50 Wait false move edit
Wait false move
joint motion [variable] J1 0 J2 0 J3 0 J4 0 J5 0 J6 0 Radius 0 Wait false
linear motion [variable] X 201.5 Y 0 Z 140.5 Roll 180 Pitch 0 Yaw 0 Radius 0 Wait false

[2024-06-29 16:11:47][151] xArm-Python-SDK Version: 1.12.1

2. UFACTORY Studio 사용



UFACTORY Studio

Window Language Tool

Live Control Blockly Settings

STOP

Gripper OPEN CLOSE OFF

IP: 192.168.1.192
Payload: 0.30KG
Status: Normal
Mode: Position

X: -156.7 mm
Y: 6.9 mm
Z: 310.9 mm
R: 77.1 °
P: 86.4 °
Y: -108.1 °

Parameters ☒ Enable Robot ☒ Real ☐ Simulated

Project Program

+New File

[UF]-1004_Contin...

[UF]-1005_DrawCr...

[UF]-1006_Lite6_G...

[UF]-1007_Lite6_V...

[UF]-1008_Digital_IO

[UF]-1009_Multipl...

USER_APPS

j5

test

sksj

test_aris

ham

test01

폴더를 선택하면 New File 버튼 활성화

2. UFACTORY Studio 사용

The screenshot displays the UFACTORY Studio web interface. At the top, there's a header bar with 'UFACTORY Studio' and window controls. Below it, a navigation bar includes 'Live Control', 'Blockly' (selected), and 'Settings'. A 'STOP' button is on the right. The main area is divided into three sections. On the left, a 'Gripper' control panel has 'OPEN', 'CLOSE', and 'OFF' buttons. Below it, robot status information is shown: IP: 192.168.1.192, Payload: 0.30KG, Status: Normal, Mode: Position, and joint coordinates (X, Y, Z, R, P, Y). A 3D robot arm model is in the center. On the right, a file explorer panel shows a list of files and folders. The '+New Folder' button at the top of the list is highlighted with a red box. The file 'test01' at the bottom of the list is also highlighted with a red box. A red text annotation points to 'test01'.

UFACTORY Studio

Window Language Tool

Live Control **Blockly** Settings

STOP

Gripper OPEN CLOSE OFF

IP: 192.168.1.192
Payload: 0.30KG
Status: Normal
Mode: Position

X: -156.7 mm
Y: 6.9 mm
Z: 310.9 mm
R: 77.1 °
P: 86.4 °
Y: -108.1 °

Parameters ☒ Enable Robot ☒ Real ☐ Simulated

Project Program

+New Folder

- [UF]-1004_Contin...
- [UF]-1005_DrawCr...
- [UF]-1006_Lite6_G...
- [UF]-1007_Lite6_V...
- [UF]-1008_Digital_IO
- [UF]-1009_Multipl...
- USER_APPS
 - j5
 - test
- sksj
 - test_aris
- ham
 - test01

파일을 선택하면 New Folder 버튼 활성화

2. UFACTORY Studio 사용

The screenshot shows the UFACTORY Studio interface. At the top, there's a menu bar with 'Window', 'Language', and 'Tool'. Below it, there are tabs for 'Live Control', 'Blockly', and 'Settings'. A 'STOP' button is in the top right corner. On the left, there's a 'Gripper' control section with 'OPEN', 'CLOSE', and 'OFF' buttons. Below that, there's a status section showing IP: 192.168.1.192, Payload: 0.30KG, Status: Normal, and Mode: Position. A 3D model of a robotic arm is in the center. To the right of the model are three icons: a location pin, a share icon, and a plus icon. At the bottom left, there's a 'Parameters' toggle switch and an 'Enable Robot' button. At the bottom right, there are radio buttons for 'Real' and 'Simulated'. On the right side, there's a 'Project' and 'Program' tab. Below the 'Project' tab, there's a list of files and folders. A red box highlights the upload icon (a square with an upward arrow) next to the '+New Folder' button. A red text label points to this icon: 'PC의 블록리 파일을 가져오는 버튼'.

UFACTORY Studio

Window Language Tool

Live Control Blockly Settings

STOP


Gripper OPEN CLOSE OFF

IP: 192.168.1.192
Payload: 0.30KG
Status: Normal
Mode: Position

X: -156.7 mm
Y: 6.9 mm
Z: 310.9 mm
R: 77.1 °
P: 86.4 °
Y: -108.1 °

Parameters ☒ Enable Robot ☒ Real ☐ Simulated

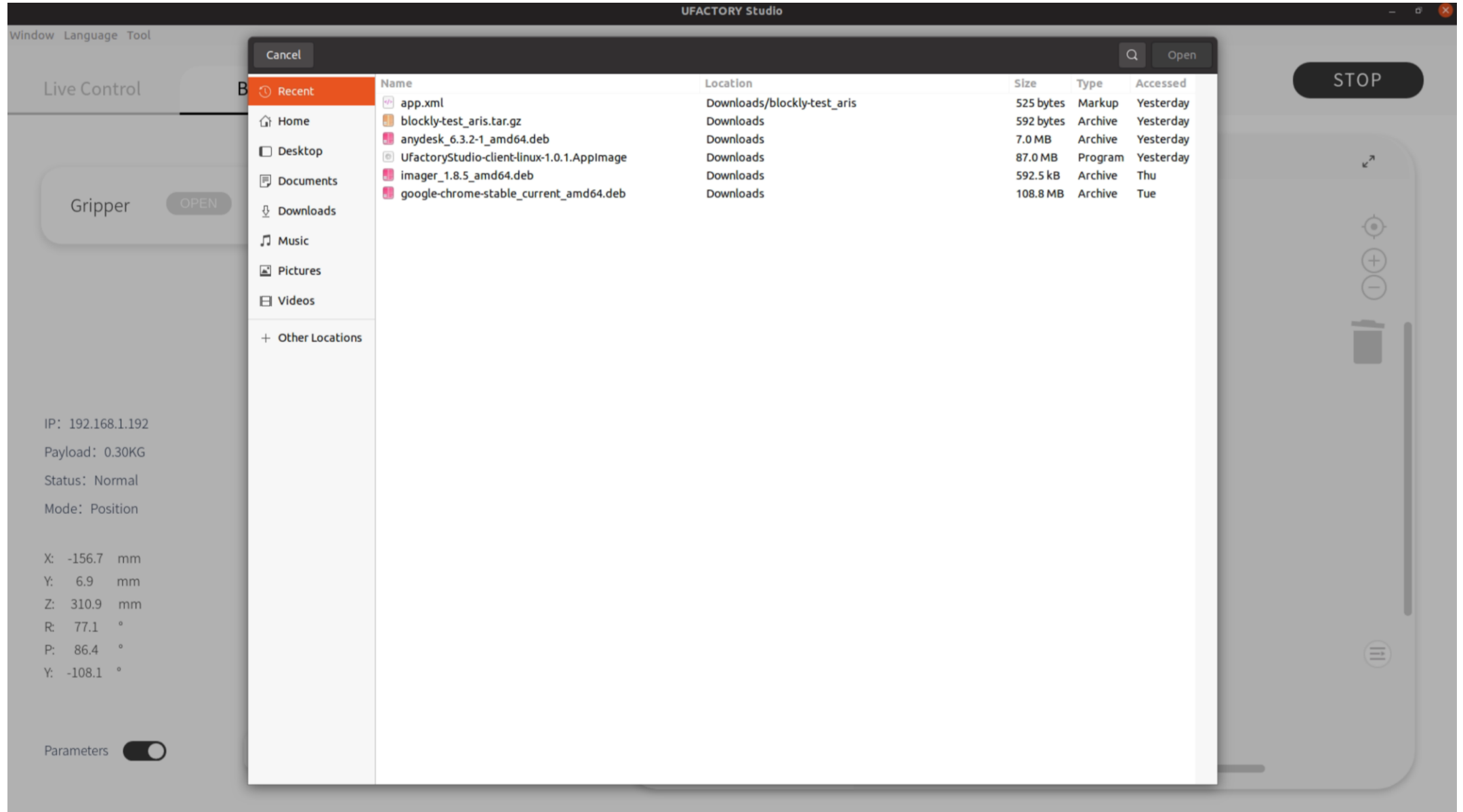
Project Program

+New Folder 

[UF]-1004_Contin...
[UF]-1005_DrawCr...
[UF]-1006_Lite6_G...
[UF]-1007_Lite6_V...
[UF]-1008_Digital_IO
[UF]-1009_Multipl...
USER_APPS
j5
test
sksj
test_aris
ham
test01

PC의 블록리 파일을 가져오는 버튼

2. UFACTORY Studio 사용



2. UFACTORY Studio 사용

The screenshot displays the UFACTORY Studio interface. At the top, there are tabs for 'Live Control', 'Blockly', and 'Settings', with a 'STOP' button on the right. The 'Blockly' tab is active, showing a workspace with a sequence of motion blocks: 'joint motion', 'linear motion', 'linear motion', and 'linear motion'. Each block contains numerical values for joint positions, linear coordinates, and other parameters. A red arrow points to the 'test' file in the 'USER_APPS' folder of the file list on the left. A context menu is open over the 'test' file, showing options: 'Download', 'Rename', and 'Delete'. To the left of the workspace, there is a 'Gripper' control section with 'OPEN', 'CLOSE', and 'OFF' buttons, and a status section showing IP, Payload, Status, and Mode. At the bottom, there is a 'Parameters' toggle and an 'Enable Robot' button.

Window Language Tool

Live Control Blockly Settings

STOP

Gripper OPEN CLOSE OFF

IP: 192.168.1.192
Payload: 0.30KG
Status: Normal
Mode: Position

X: -156.7 mm
Y: 6.9 mm
Z: 310.9 mm
R: 77.1 °
P: 86.4 °
Y: -108.1 °

Parameters ☒ Enable Robot ☒ Real ☐ Simulated

Project Program

+New Folder

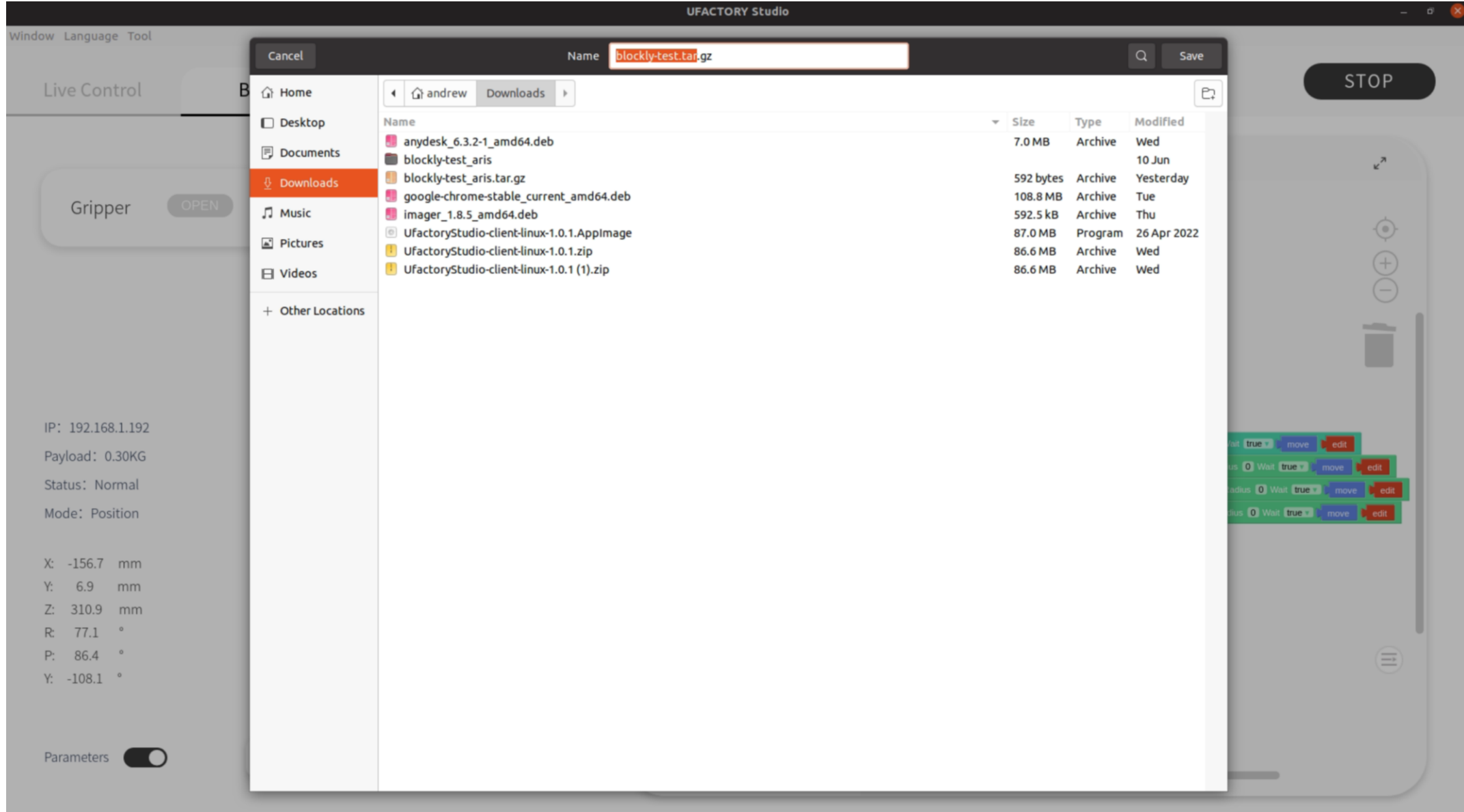
[UF]-1004_Contin...
[UF]-1005_DrawCr...
[UF]-1006_Lite6_G...
[UF]-1007_Lite6_V...
[UF]-1008_Di...
[UF]-1009_Mu...
USER_APPS
j5
test
sksj
test_aris
ham
test01

Download
Rename
Delete

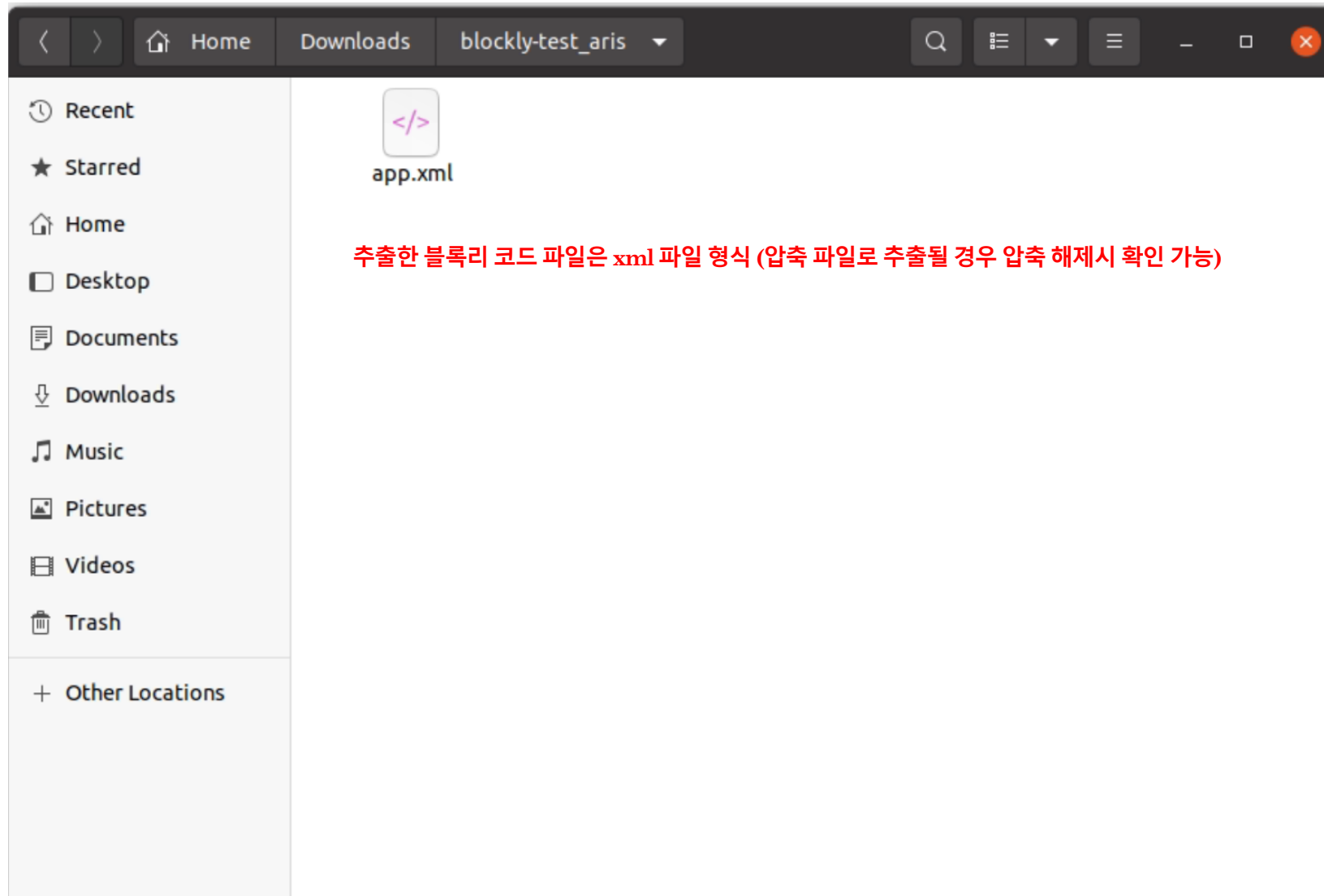
joint motion J1 -10.2 J2 50 J3 49.6 J4 99.6 J5 -91.3 J6 1.1 Radius 0 Wait true move edit
linear motion X 214 Y -100.2 Z 145 Roll -25.6 Pitch -88.5 Yaw 95.8 Radius 0 Wait true move edit
linear motion X -78.5 Y -132.8 Z 203.6 Roll -176.8 Pitch 76.1 Yaw 123 Radius 0 Wait true move edit
linear motion X -93 Y -107.5 Z 205.5 Roll -176.8 Pitch 76.1 Yaw 123 Radius 0 Wait true move edit

: 작성한 블록리 파일을 PC로 추출
: 작성한 블록리 파일명 변경
: 작성한 블록리 파일 삭제

2. UFACTORY Studio 사용



2. UFACTORY Studio 사용



2. UFACTORY Studio 사용

The screenshot displays the UFACTORY Studio interface with the 'Settings' tab selected. The 'IO Debug' section is active, showing a list of IO functions. The 'Externals' menu is highlighted with a red box, and the 'Controller IO' sub-menu is also highlighted with a red box. The 'IO Debug' section lists several functions, including 'C00: General Output', 'C01: General Output', 'C02: General Output', and 'C03: General Output', which are grouped together with a red box. Red arrows point from these outputs to the labels 'Topping' and 'Press motor'. The 'Gripper' section shows 'OPEN', 'CLOSE', and 'OFF' buttons. The 'Status' section shows 'Normal' and 'Mode: Position'. The 'Parameters' section shows a toggle switch and an 'Enable Robot' button. The 'Real' and 'Simulated' modes are also visible.

Live Control Blockly **Settings** STOP

Gripper OPEN CLOSE OFF

IP: 192.168.1.162
Payload: 0.00KG
Status: Normal
Mode: Position

X: -156.7 mm
Y: 6.9 mm
Z: 310.9 mm
R: 77 °
P: 86.4 °
Y: -108.2 °

Parameters ☐ Enable Robot Real ☒ Simulated ☐

Externals Controller IO Modbus RTU Safety General

IO Debug

- C00: General Output
- C01: General Output
- C02: General Output
- C03: General Output
- C04: Robot Enabled
- C05: Offline Task Runnir
- C06: Error
- C07: Manual Mode

Topping

Press motor

2. UFACTORY Studio 사용

로봇팔 조인트 각도로 움직이기

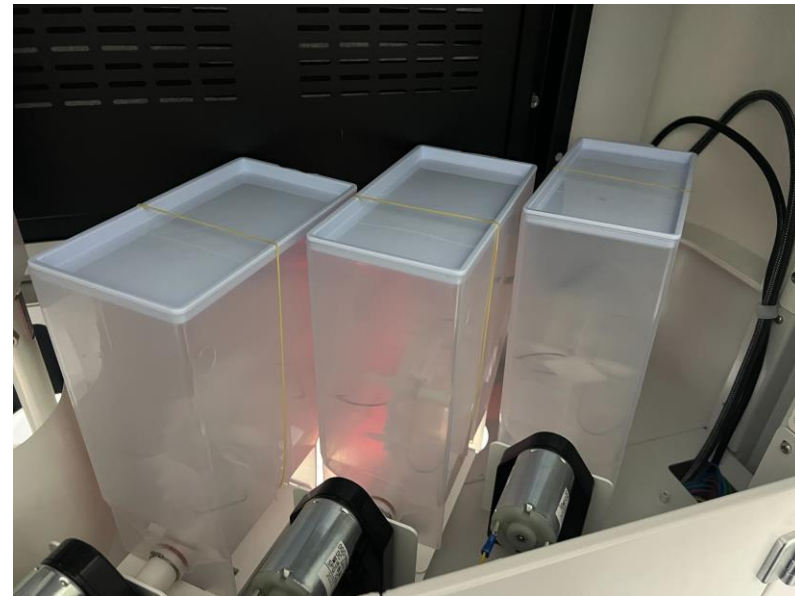
```
code = self._arm.set_servo_angle(angle=[179.0, -17.7, 29.0, 177.8, 43.8, -1.4], speed=self._angle_speed,
                                   mvacc=self._angle_acc, wait=True, radius=0.0)
if not self._check_code(code, 'set_servo_angle'):
    return
```

DIGITAL PIN 사용하기 (토팅 기계 + 프레스)

```
code = self._arm.set_cgpio_digital(0, 0, delay_sec=0)
if not self._check_code(code, 'set_cgpio_digital'):
    return
```



3 (프레스)



2 1 0 (토팅)

2. UFACTORY Studio 사용

ANALOG PIN 사용하기 (컵 디스펜서)

```
code = self._arm.set_cgpio_analog(0, 5)
if not self._check_code(code, 'set_cgpio_analog'):
    return
code = self._arm.set_cgpio_analog(1, 5)
if not self._check_code(code, 'set_cgpio_analog'):
    return
time.sleep(3)
code = self._arm.set_cgpio_analog(0, 0)
if not self._check_code(code, 'set_cgpio_analog'):
    return
time.sleep(3)
code = self._arm.set_cgpio_analog(1, 0)
if not self._check_code(code, 'set_cgpio_analog'):
    return
```

전원 off

Analog Output(C-AO)

Output	Value (V)	Output
AO0	<input type="text" value="0"/>	<input type="button" value="Set"/>
AO1	<input type="text" value="0"/>	<input type="button" value="Set"/>

좌로 이동

Analog Output(C-AO)

Output	Value (V)	Output
AO0	<input type="text" value="0"/>	<input type="button" value="Set"/>
AO1	<input type="text" value="5.00"/>	<input type="button" value="Set"/>

우로 이동

Analog Output(C-AO)

Output	Value (V)	Output
AO0	<input type="text" value="5.00"/>	<input type="button" value="Set"/>
AO1	<input type="text" value="5.00"/>	<input type="button" value="Set"/>

3. Python SDK

3. Python SDK

- SDK 사용 환경 구축
 - <https://github.com/xArm-Developer/xArm-Python-SDK>

```
python3 -m venv xarm
source xarm/bin/activate
git clone https://github.com/xArm-Developer/xArm-Python-SDK.git
python setup.py install
```

3. Python SDK

- SDK 기본 사용 방법

- 작성한 로봇팔 시나리오 코드를 sdk 디렉토리에 위치 시킨 후 인터프리터로 실행하면 동작

