



Schneider
Electric



Intelligent Manufacturing
Using industry 4.0

Intelligent Manufacturing Using Industry 4.0



Otafy
Team leader
Motion
&
SCADA



Kareem
image
processing
&
Code review



Ahmed
HMI
&
Leakage test



Amr
Mobil
application
&
Packing
system



**Abd-El
rheem**
Filling system,
Motion
&
panel wiring



Mo'men
PLC
programming
&
Node-red



Abdo
Rejection,
Dashboard
&
Documentation

Why Control Department ?

"Controls Engineer" vacancy

Responsibilities:

- Design PLC programs according to the system description& functionality including safety programming, communication with the upper level SCADA system. Also, configuration of/ communication with the following: drives, scanners, barcode readers, weighing systems
- HMI programming; using Allen Bradley factory talk view or WinCC flexible or Vijeo Designer to monitor& control different system components
- Commissioning and Startup includes:
 - Download PLC& HMI programs
 - Perform signal check from field to control panels
 - Check Emergency Zones/ESTOP functionality
 - Startup the system& check the product flow for Stand-alone PLC controlled areas and the fully integrated system

Qualifications:

- 2 years of experience
- Very Good knowledge of PLC Siemens or Allen Bradley, Schneider is a plus.
- knowledge of PLC programing languages (STL, FBD, LAD), Siemens SCL
- knowledge of industrial networks: Ethernet/IP,

- knowledge of PLC programing languages (STL, FBD, LAD), Siemens SCL
- knowledge of industrial networks: **Ethernet/IP**, Profinet, Profibus, Device Net, CAN and ASi
- Very good knowledge of Motor control techniques: Using soft-starters or variable drives (VFD)
- Very Good knowledge of HMI software packages [AB factory talk view, Siemens WinCC flexible]

Interested candidates, please send your CV to careers@advansys-esc.com, vacancy name in the title

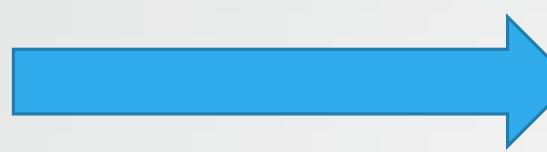
We're Hiring!

WORK FOR US

Advansys ESC
Engineering Services & Consultancy
Submit your application on www.advansys-esc.com

Project ILOS

PLC programing



EcoStruxure Machine Expert

HMI programing



Vijeo Designer Basic

SCADA system design



EcoStruxure Machine SCADA Expert

Industrial communication



Modbus Serial & Modbus TCP/IP

Variable speed drives



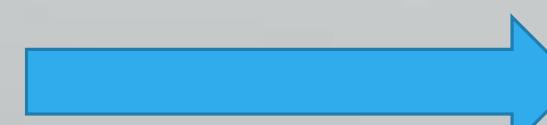
Altivar ATV320

Image processing



Using python

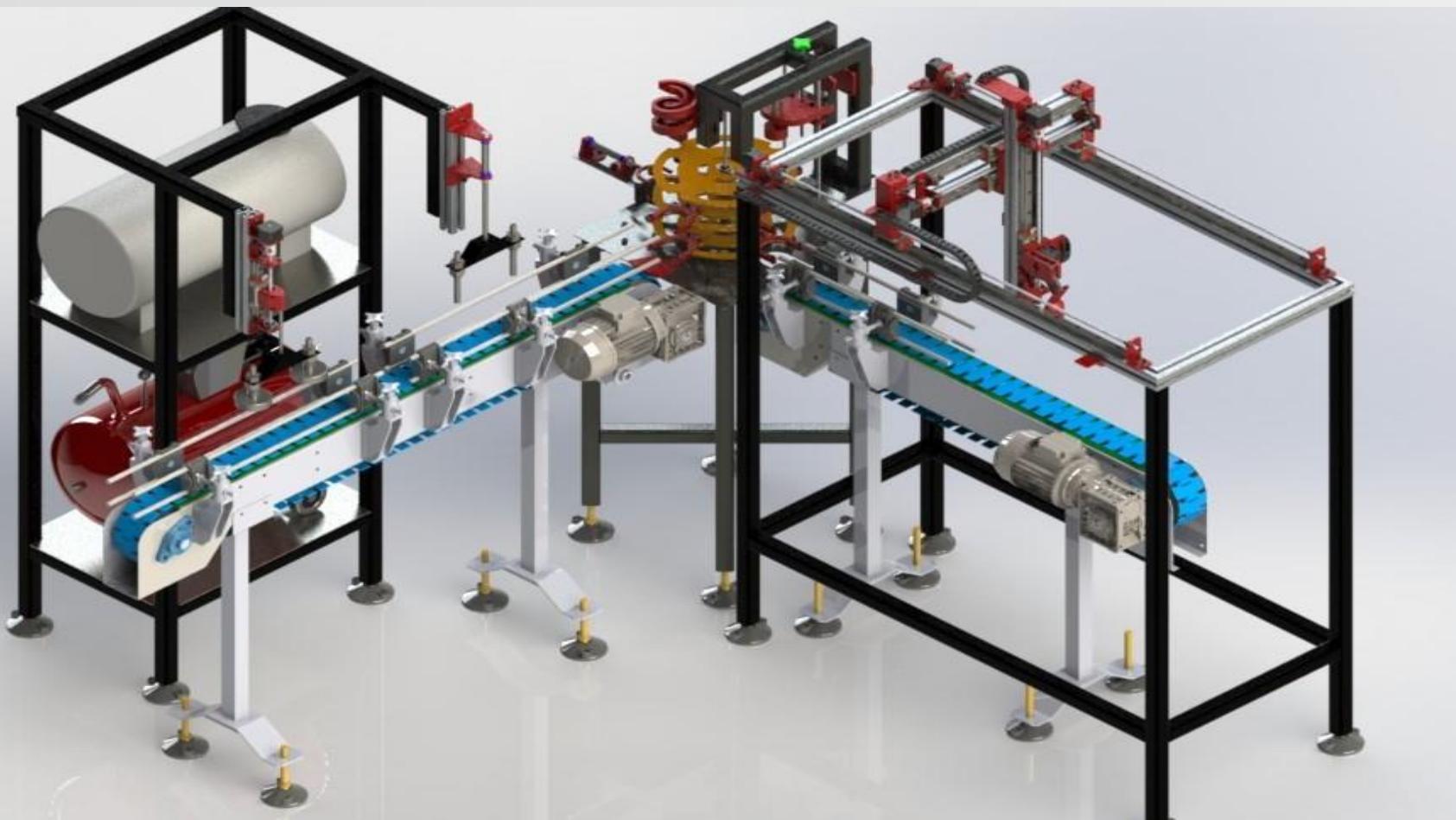
Visualization on mobile



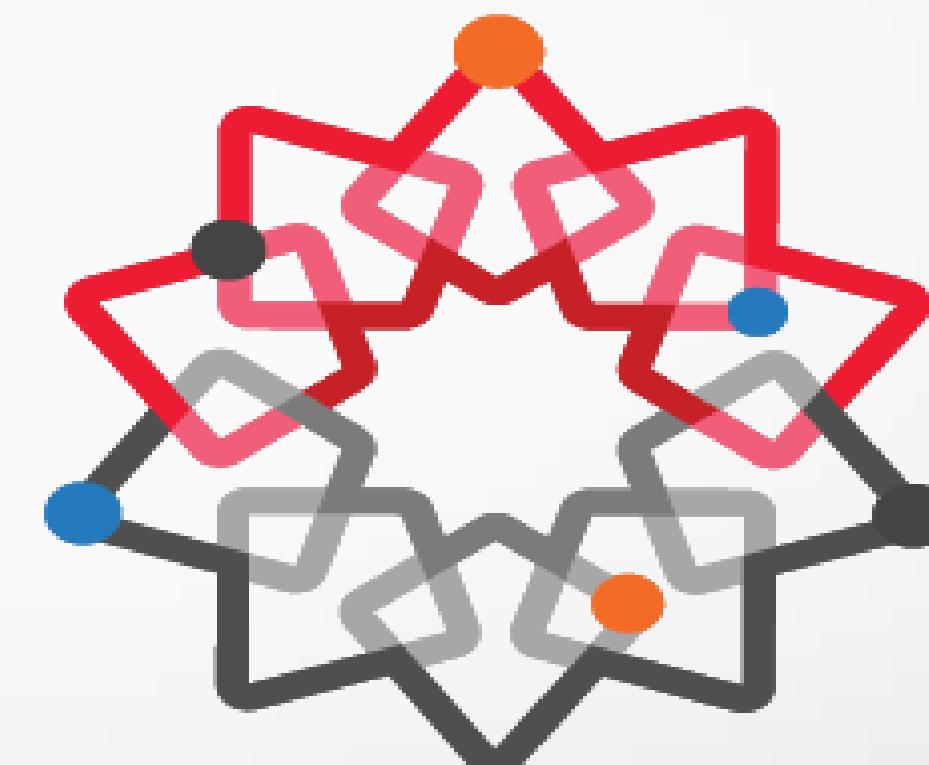
Remote red App & Our mobile App

Our sponsors

For Hardware



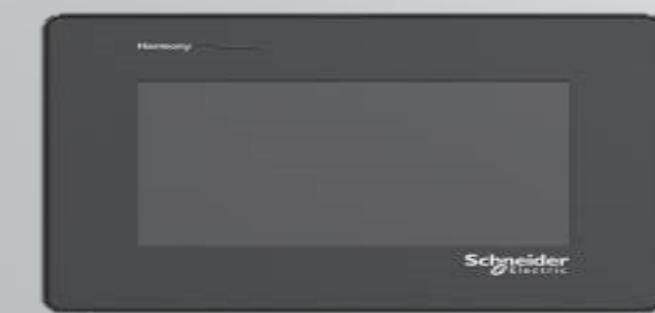
AI & IOT



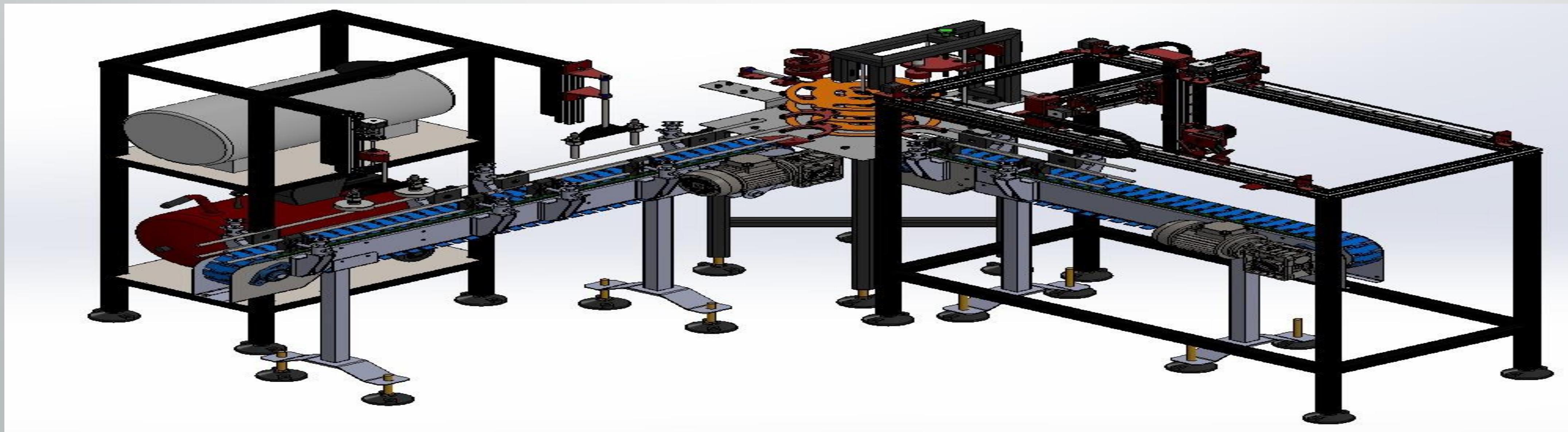
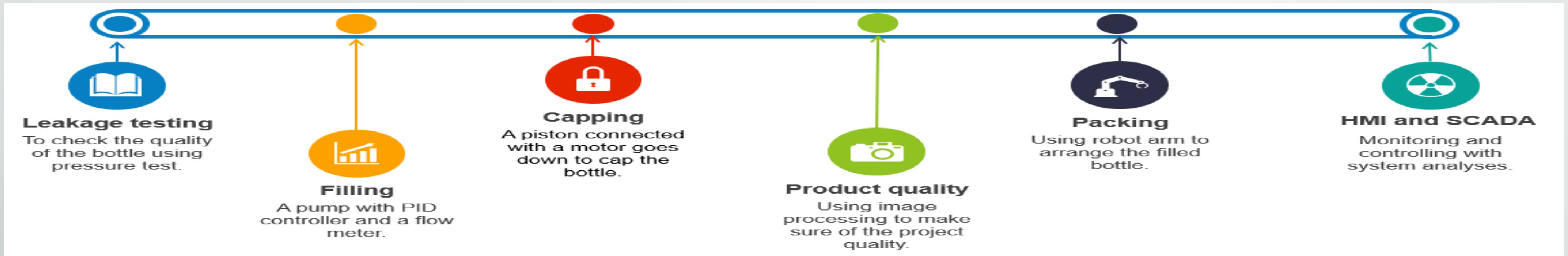
Egypt
IOT&AI
CHALLENGE

Control components

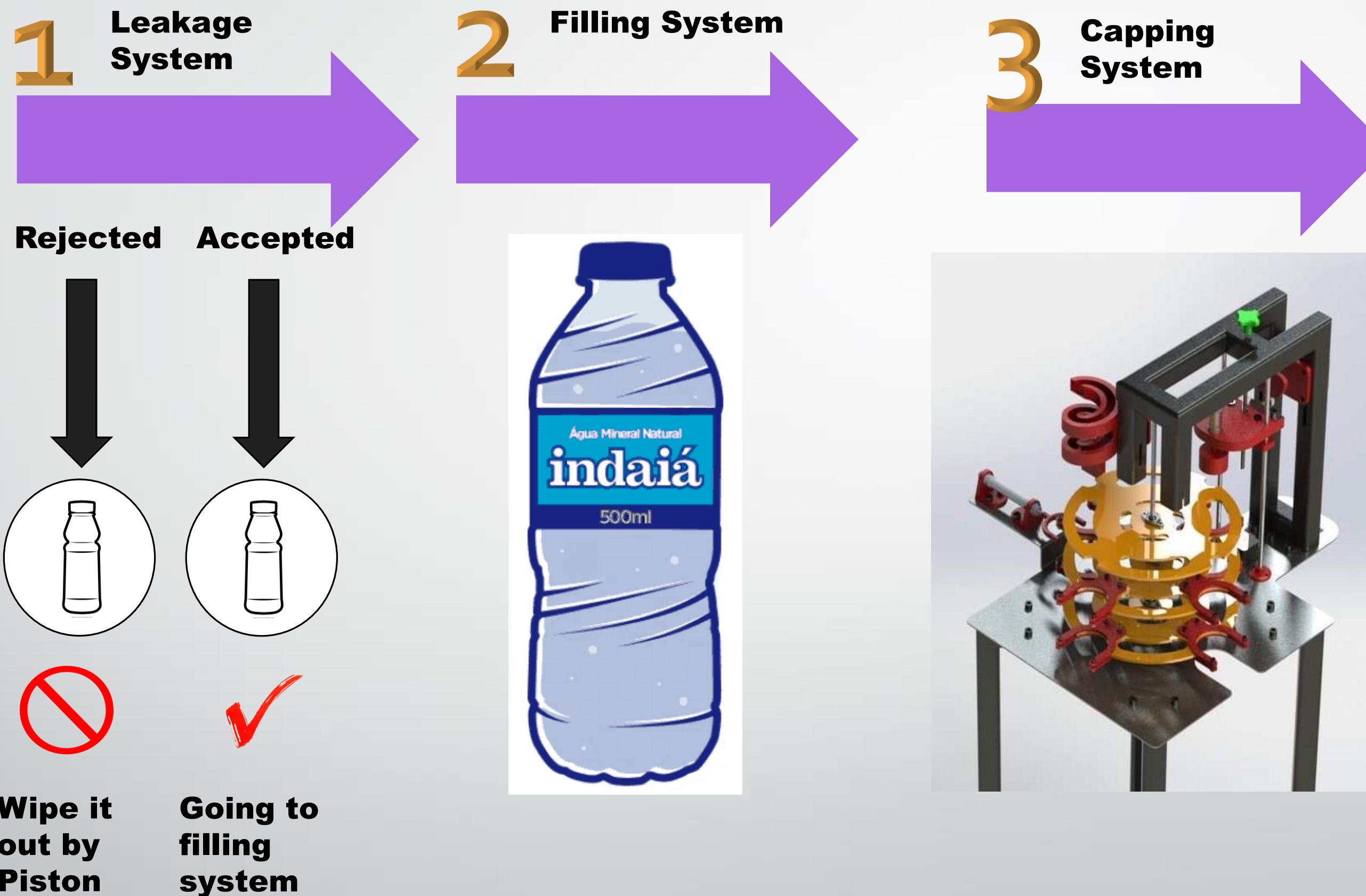
Schneider
Electric



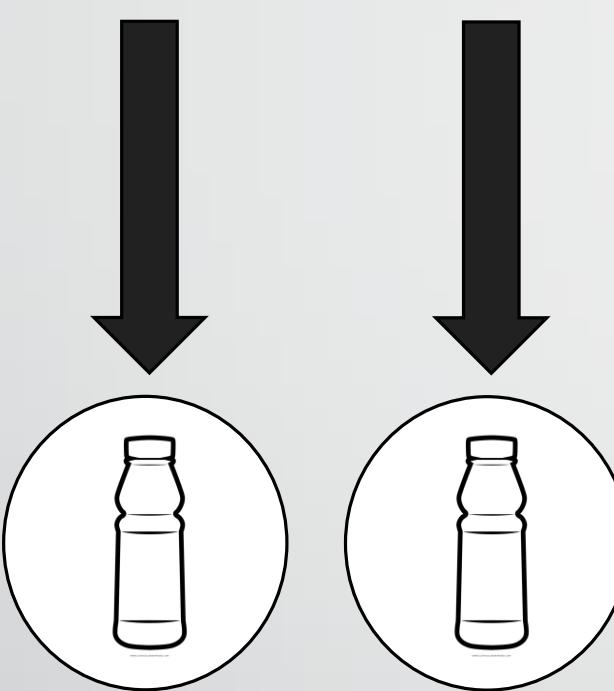
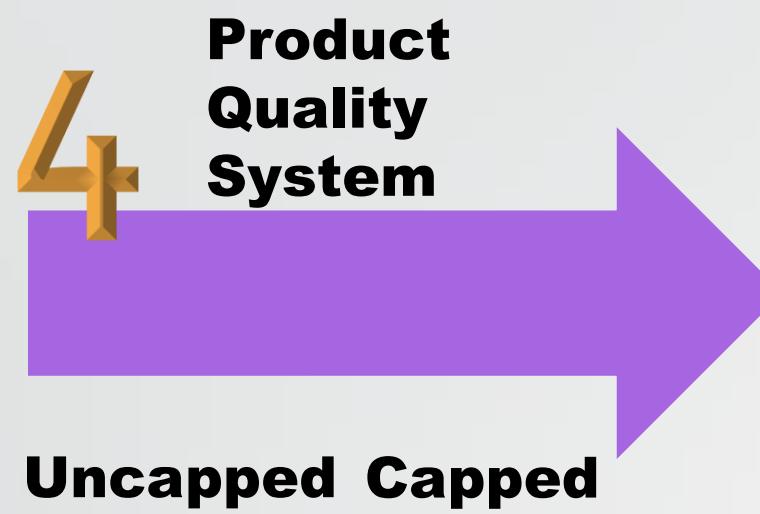
Project Explanation



Process Flow



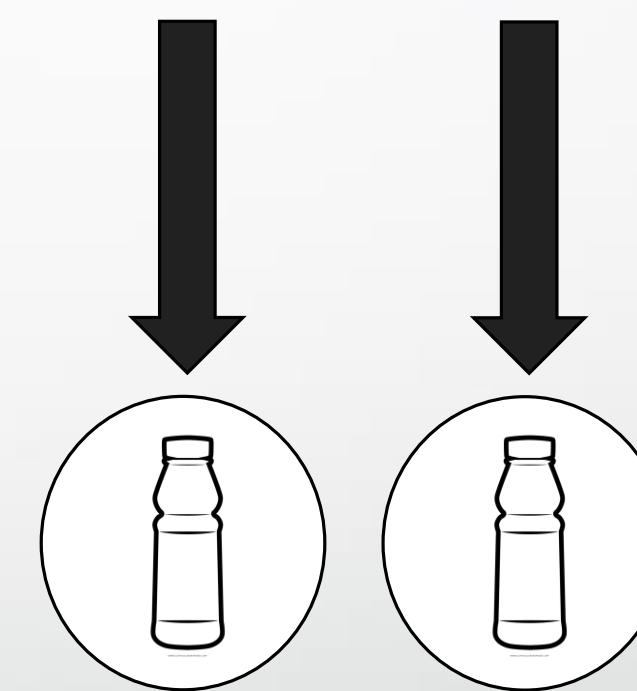
Process Flow



It sends to robot arm to go to unpacked side



It sends to robot arm to go to packed side



Goes to Rejected bottle box

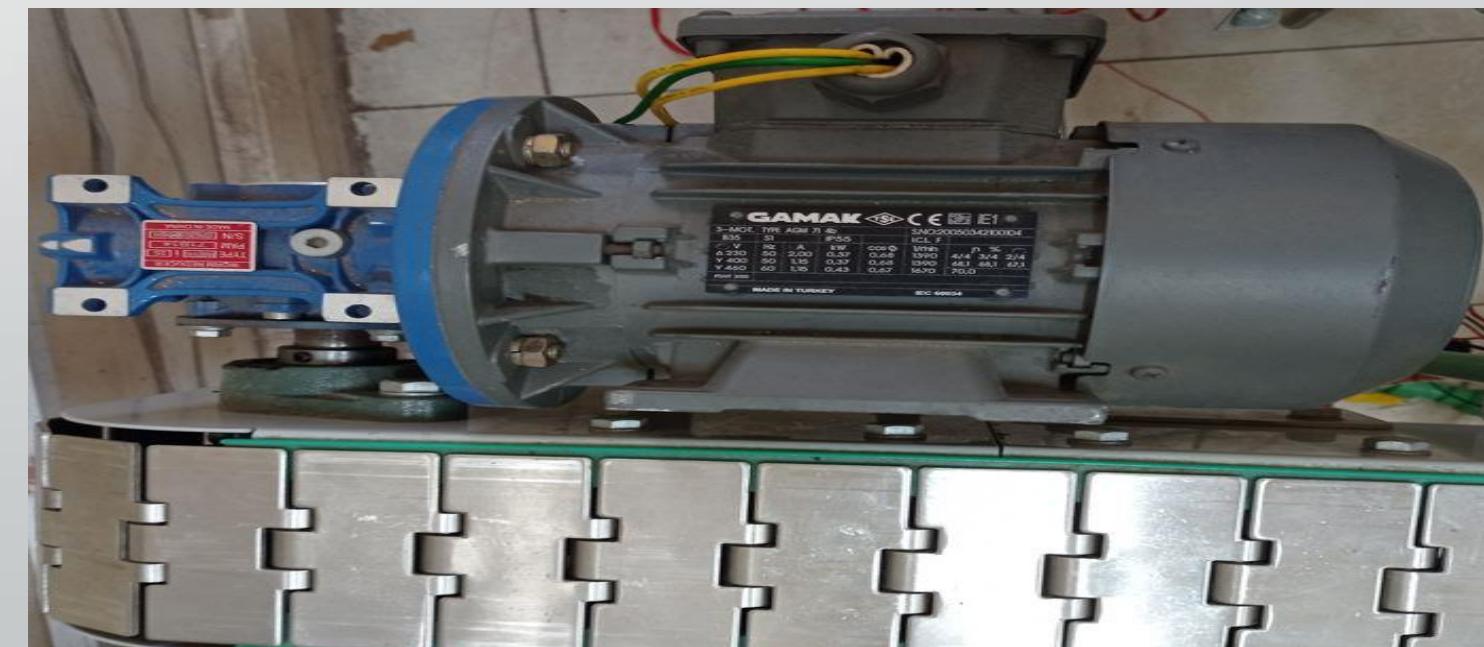


Goes to Packed bottle box (packing)

Project Processes

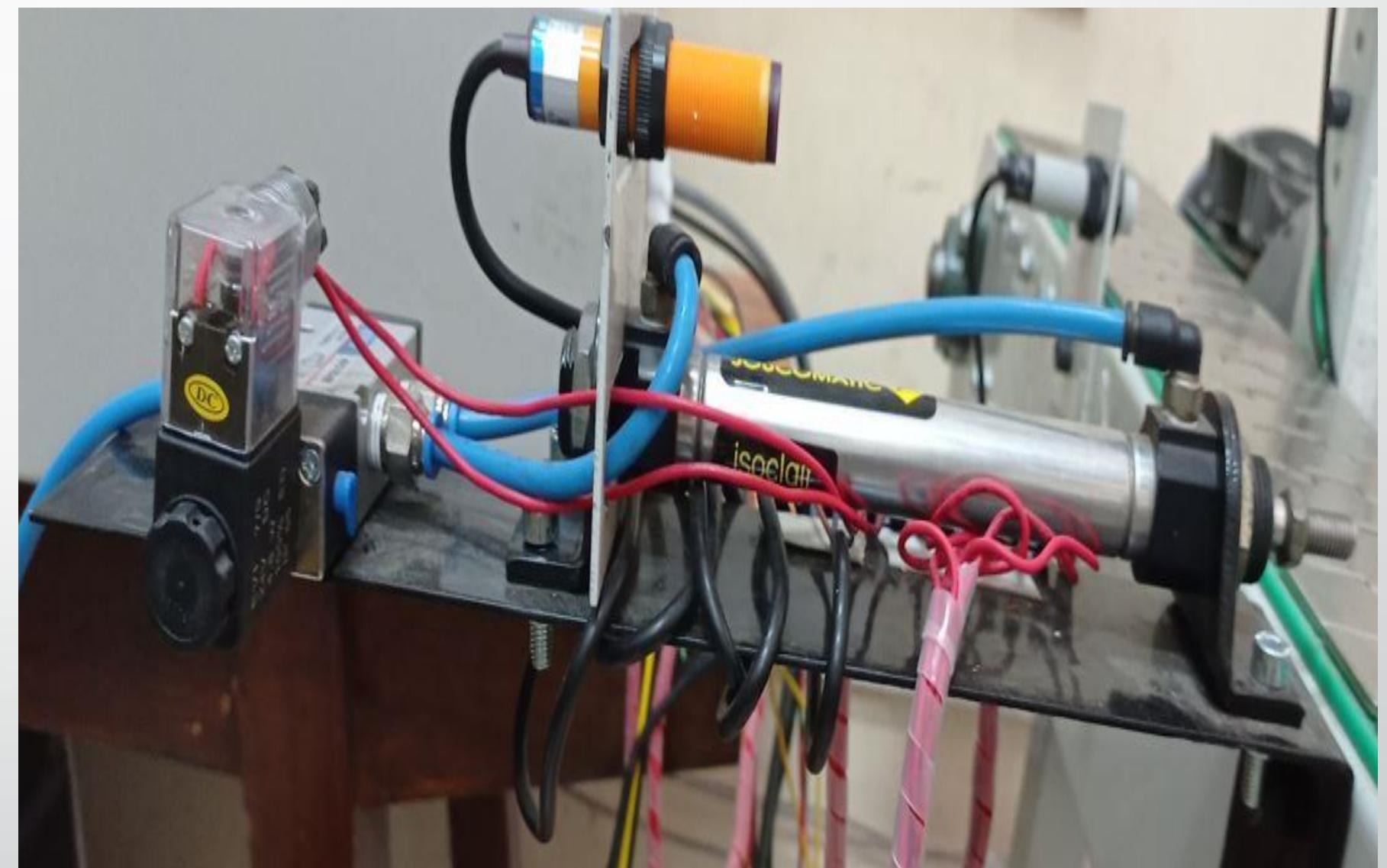
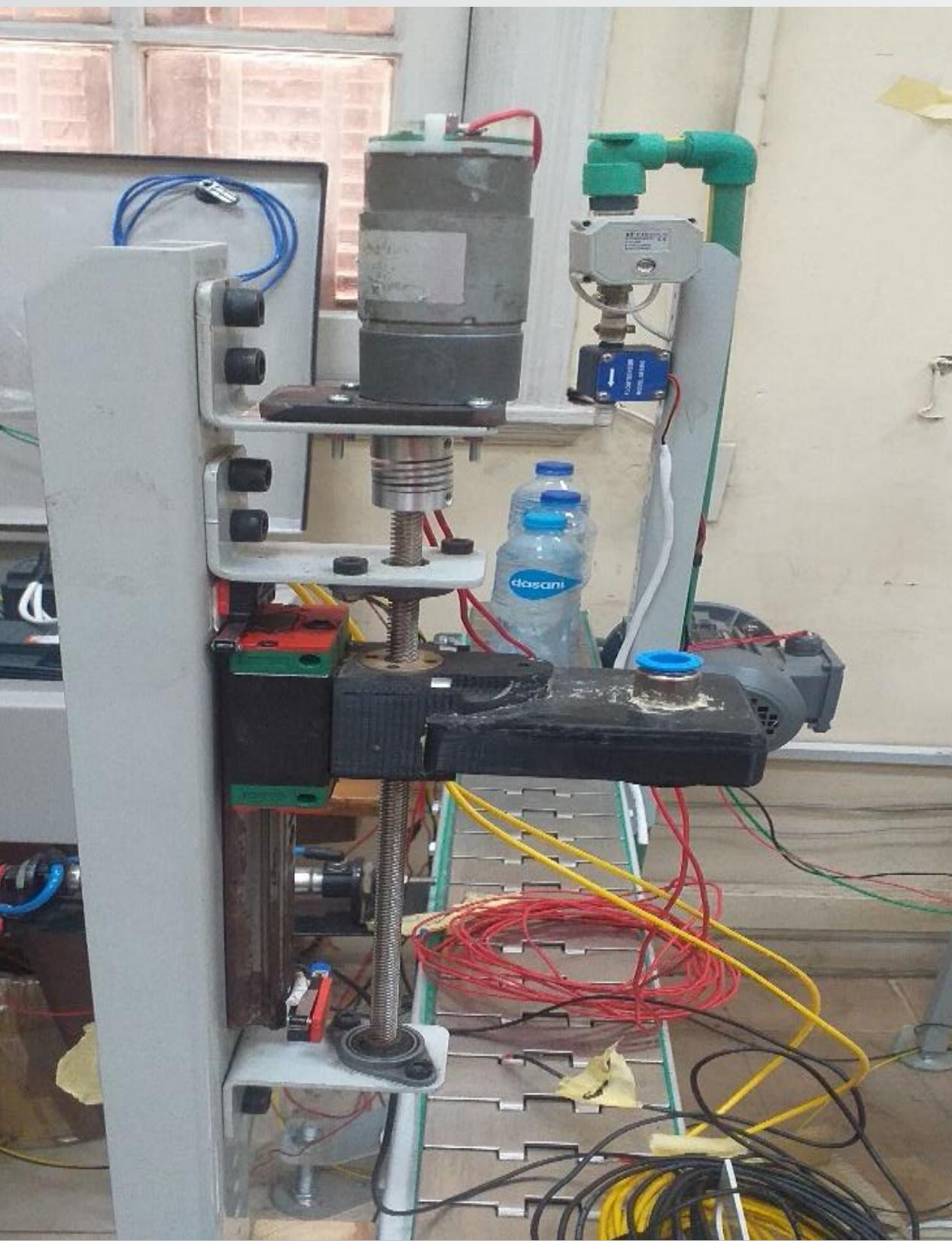
1. Motion System

This system consists of two 3-phase induction motors driven by variable speed drive (ATV320)



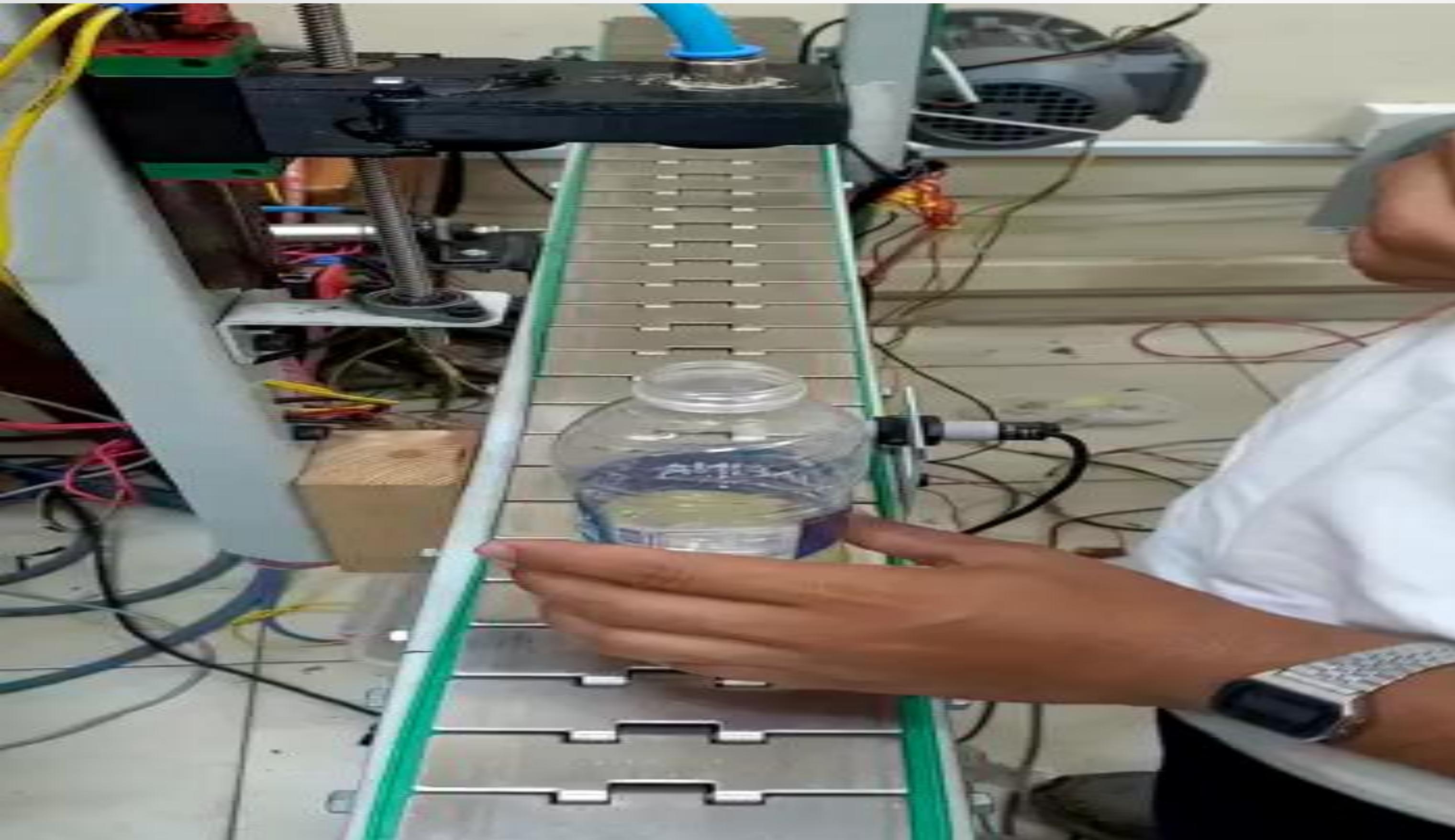
Project Processes

2. Leakage test System & Rejection



Project Processes

Rejected Bottle



Project Processes

3. Filling System

Process description

- ★ If the bottle reached the proximity sensor, stop the conveyor.
- ★ Energize the water pump & motorized valve for 6 sec.
- ★ Start the conveyor again.



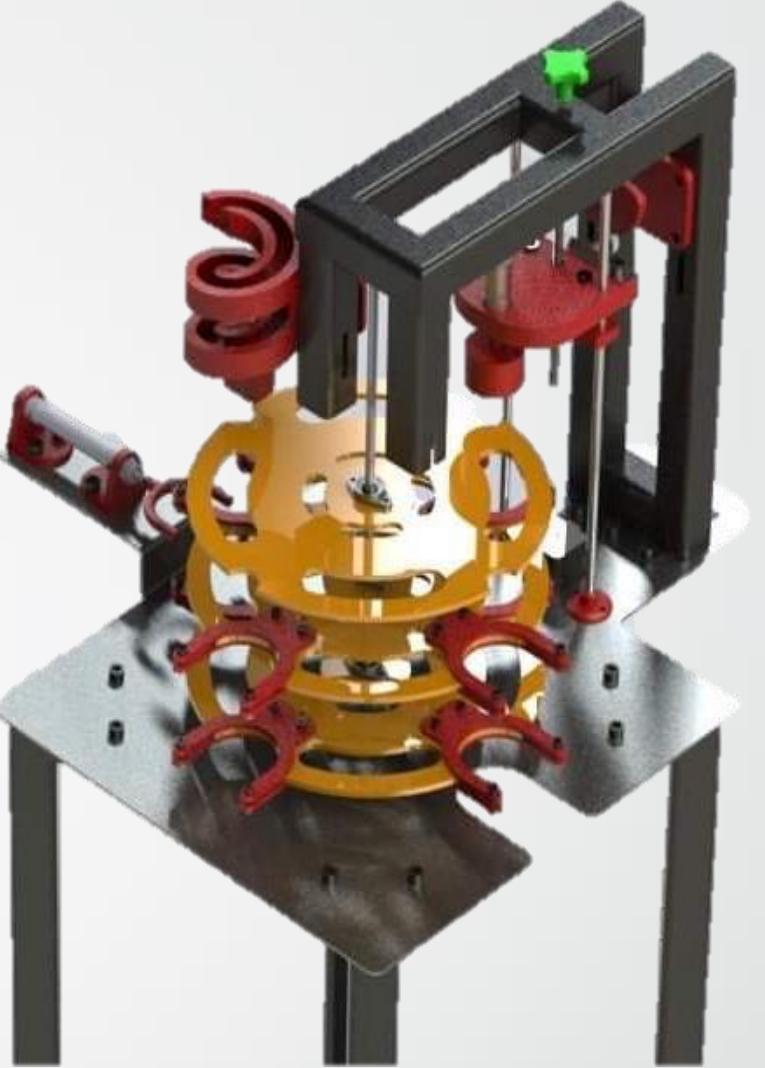
Project Processes

3. Capping system

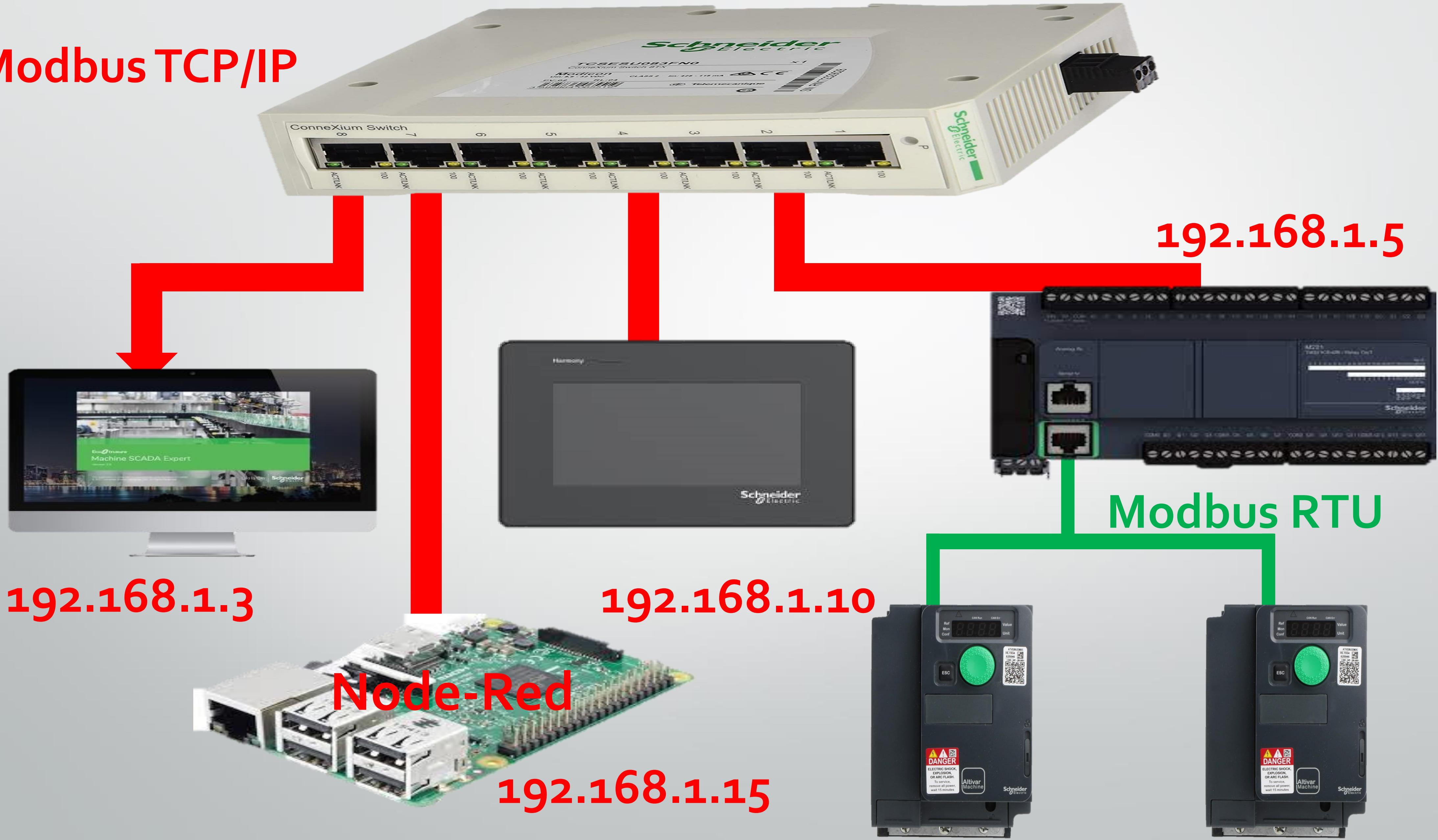
This system has 3 main functions:

1. Transfer the bottle from the first conveyor to the second conveyor.
2. put the cap on the bottle.
3. capping it.

this system has mechanical problems and needs to be designed again from scratch to overcome the high inertia of the moving parts.



Modbus TCP/IP

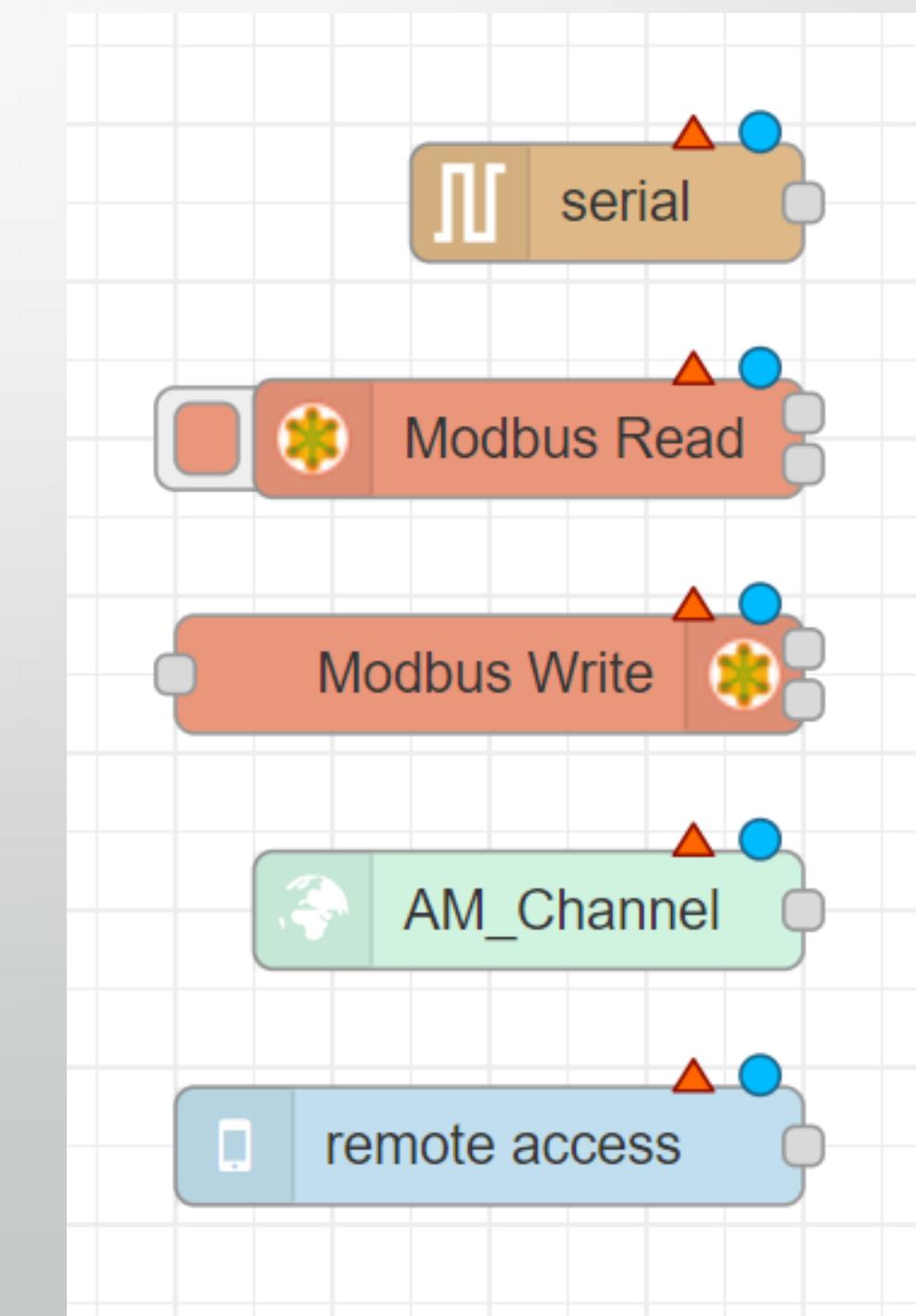


Node-Red

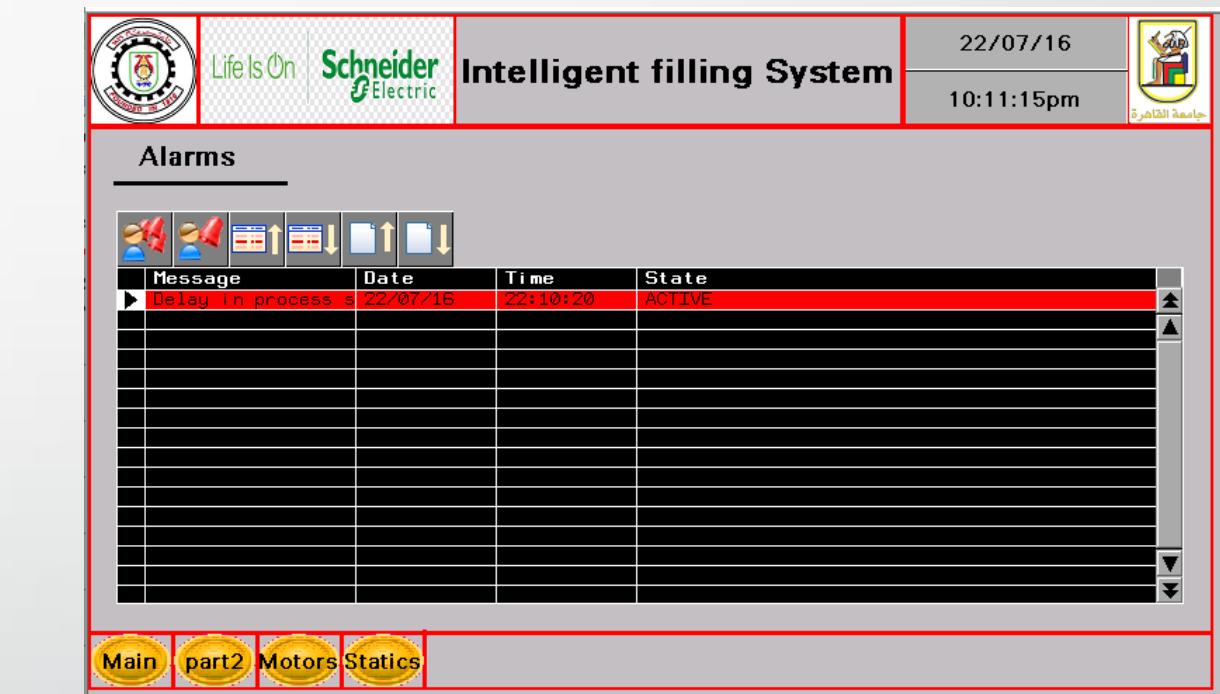
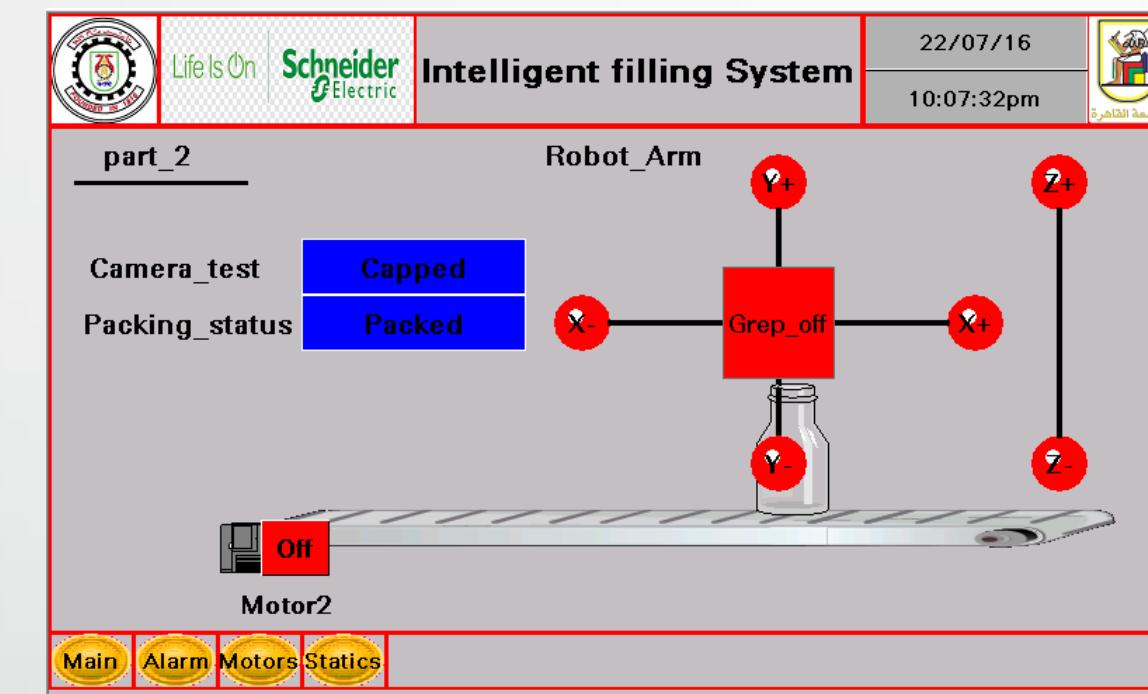
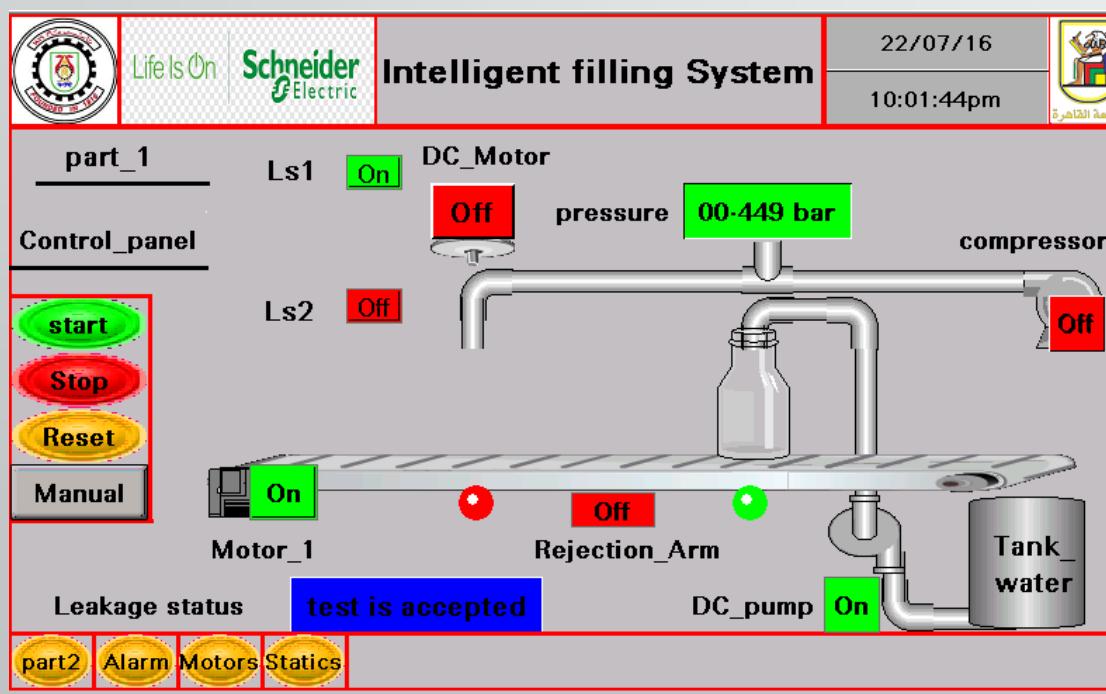
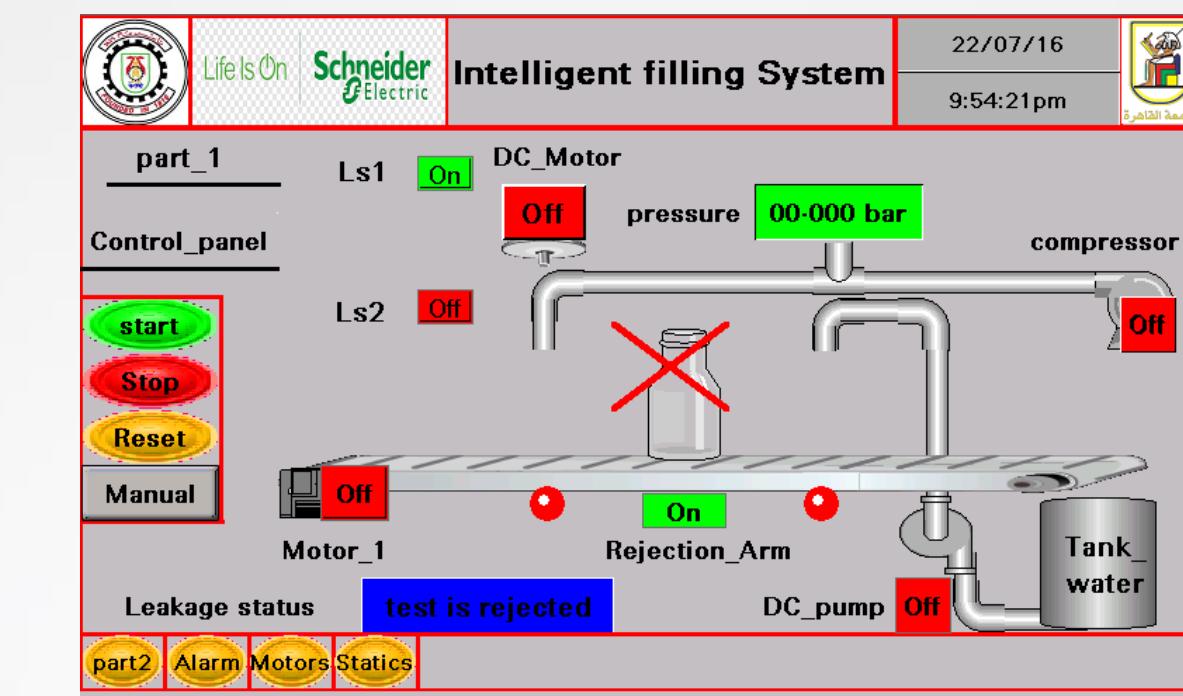
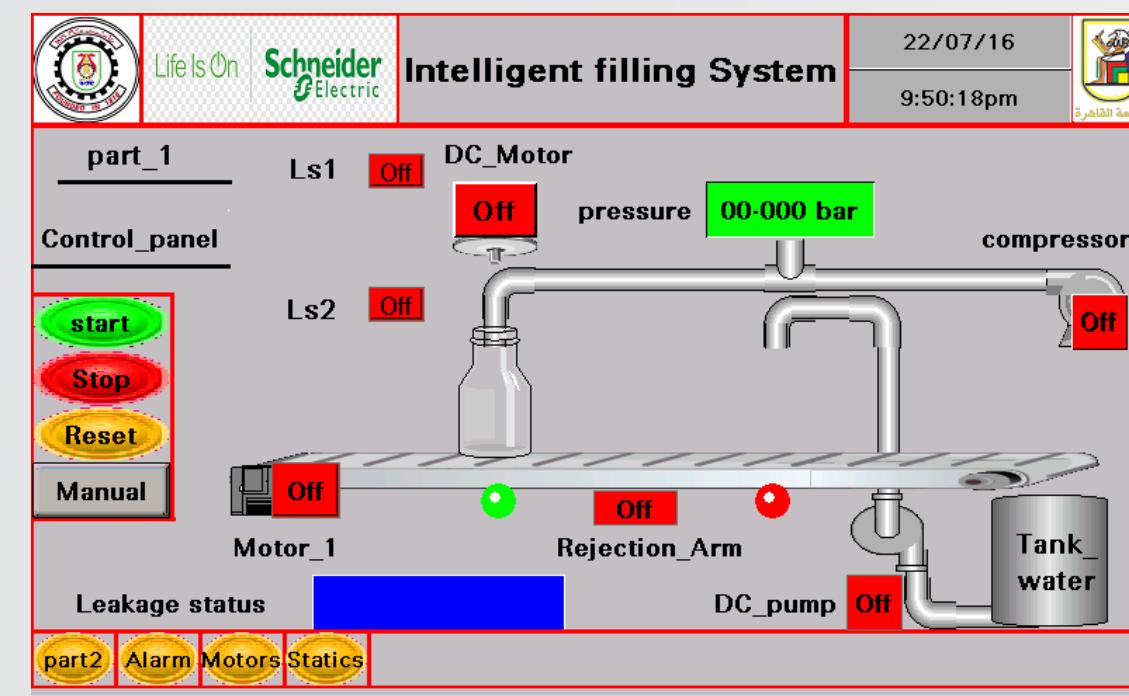
Definition

Free Application Enablement Platform
(AEP)

Usage



Visualization (HMI)



Intelligent filling System | 22/07/16 | 10:08:01pm

Motors

Speed_referencce_1 0HZ

Speed_referencce_2 0HZ

Actual_values	Motor_1	Motor_1
Current	0 mA	0 mA
Voltage	0 volt	0 volt
torque	0%	0%
Power	0%	0%
Speed	0 rpm	0 rpm

Main part2 Alarm Statics

Intelligent filling System | 22/07/16 | 10:10:32pm

Statistics

No of bottles	0 Bottle
No of filled bottles	1 Bottle
No of rejected bottles	1 Bottle
No of packed bottles	1 Bottle

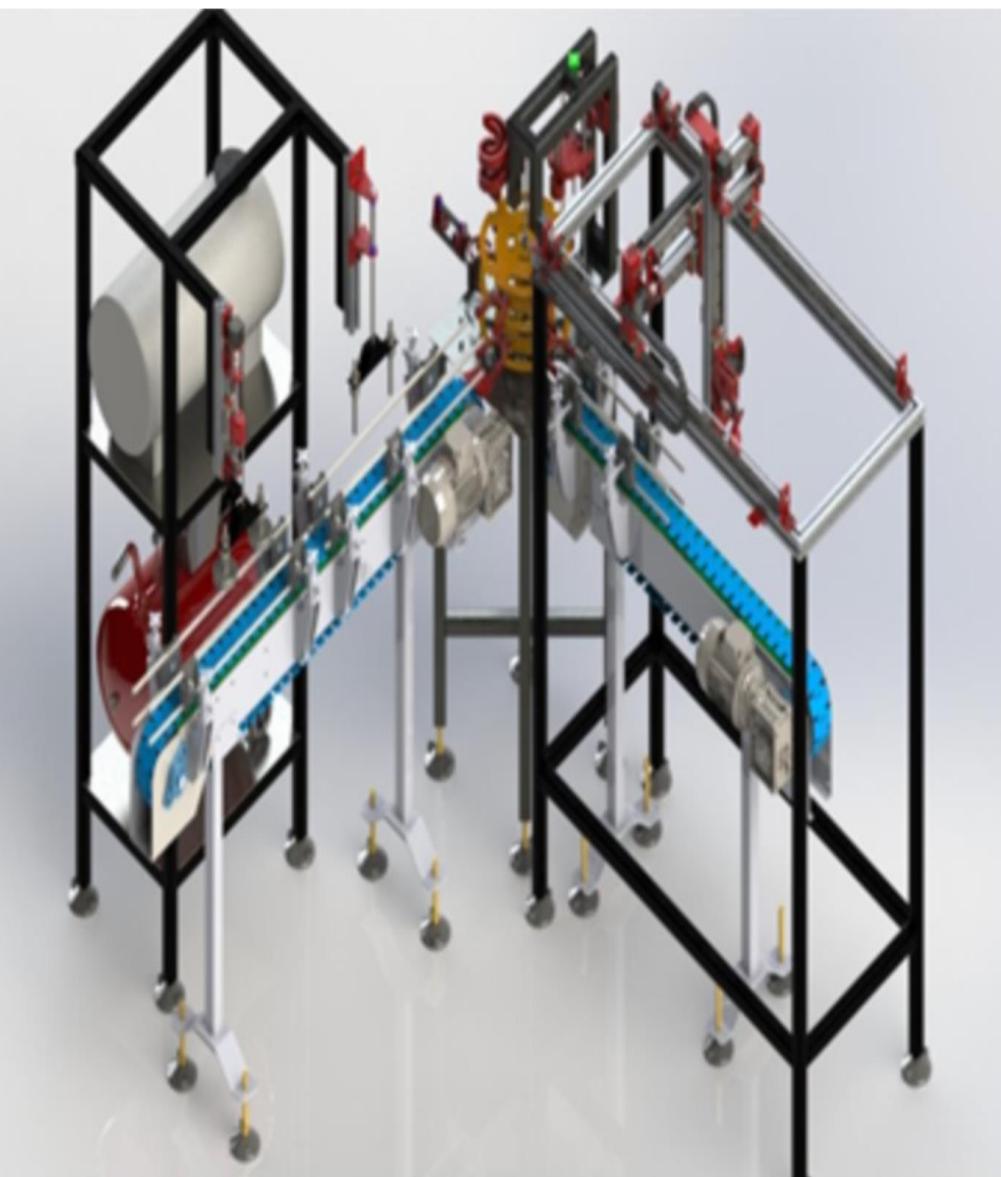
Main part2 Alarm Motors

Visualization (SCADA)

07/14/2022 Thursday 02:17:19

Intelligent Manufacturing Using industry 4.0

Motor Control
Operation



Previous Next Go Home Operation

07/14/2022 Thursday 02:17:28

motor 1 speed reference 5

motor 2 speed reference 5

motor 1 parameters

motor 1 speed	0
motor 1 current	0.000000
motor 1 voltage	0
motor 1 torque	0
motor 1 power	0

motor 2 parameters

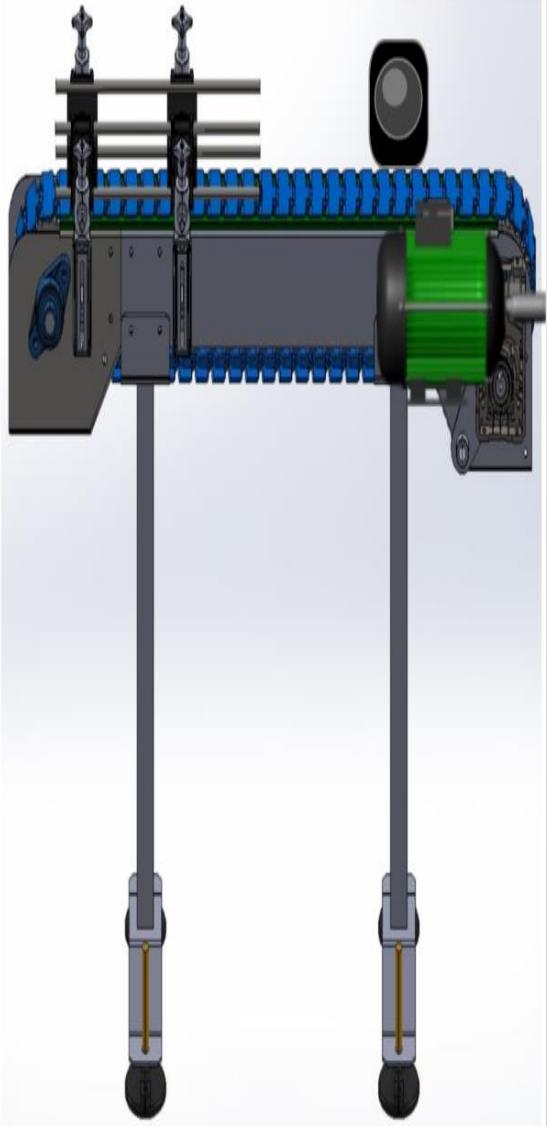
motor 2 speed	0
motor 2 current	0.000000
motor 2 voltage	0
motor 2 torque	0
motor 2 power	0

Next Previous Go Home Motor Control

07/14/2022 Thursday 02:17:13

Label

Automatic Manual



Next Previous Go Home Motor Control

Visualization (Dashboard)

Second Conveyor

Image Processing		Packing		Robot Arm Status	
Capped	Uncapped	CHECK MISMATCH	GO HOME	IR Sensor 2	
Packing	Not Packing	#Finish Packing		X +ve	X -ve
#Capped	<input checked="" type="checkbox"/>	#Uncapped	<input checked="" type="checkbox"/>	Y +ve	Y -ve
		To Box	To Bin	Z down	Z up
		Gripper Open	Gripper Close		
		End Packing			
		Arm At Home			
		Mismatched			

First Conveyor

Inputs State	Outputs State	Markers
Prox 1	Down	Rejected
Prox 2	Motorized Valve	Accepted
Up Limit	Up	
Down Limit	Pump	
IR Sensor 1	Solenoid Valve	
	Compressor 1	

Motion

MOTOR 1		Start - Stop		MOTOR 2	
Motor 1 Speed	RPM	#Start	<input checked="" type="checkbox"/>	Motor 2	Motor 2 Speed
MOTOR 1 Speed	0	#Stop	<input checked="" type="checkbox"/>	Motor 2	RPM
Run		#Reset	<input checked="" type="checkbox"/>	MOTOR 2 Speed	0
Alarm		#Edit Mode	<input checked="" type="checkbox"/>	Motor 2 Current	1800
MOTOR 1 Current	mA	MOTOR 1 Voltage	V	MOTOR 2 Current	mA
0	1500	0	500	0	1500
MOTOR 1 Torque	Nm	MOTOR 1 Power	W	MOTOR 2 Torque	Nm
0	100	0	50	0	100

Status

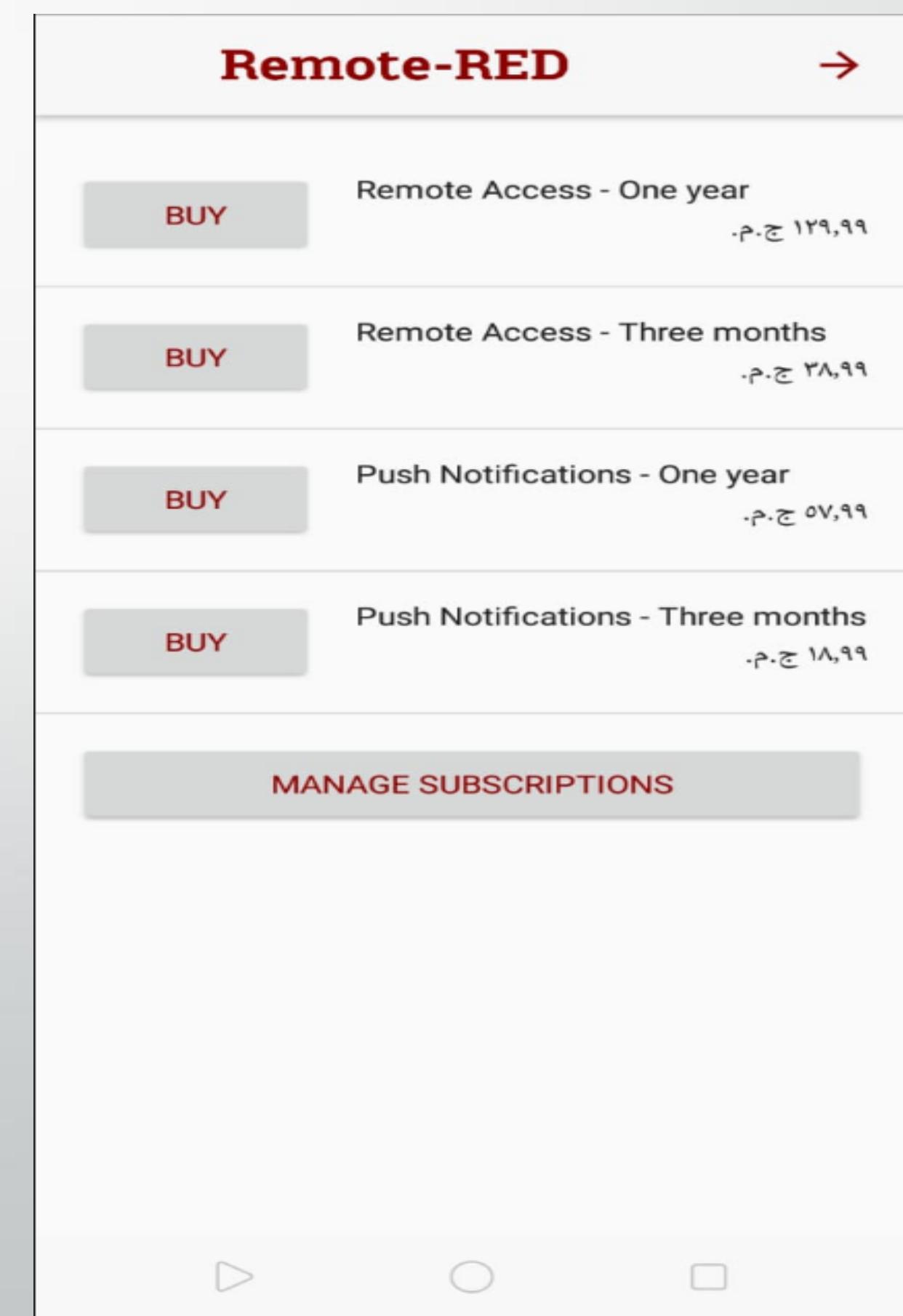
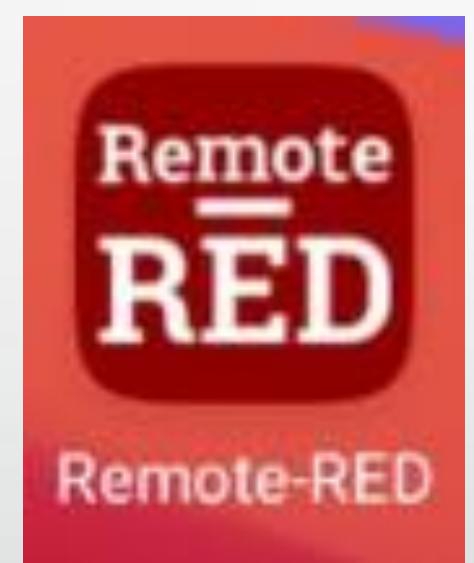
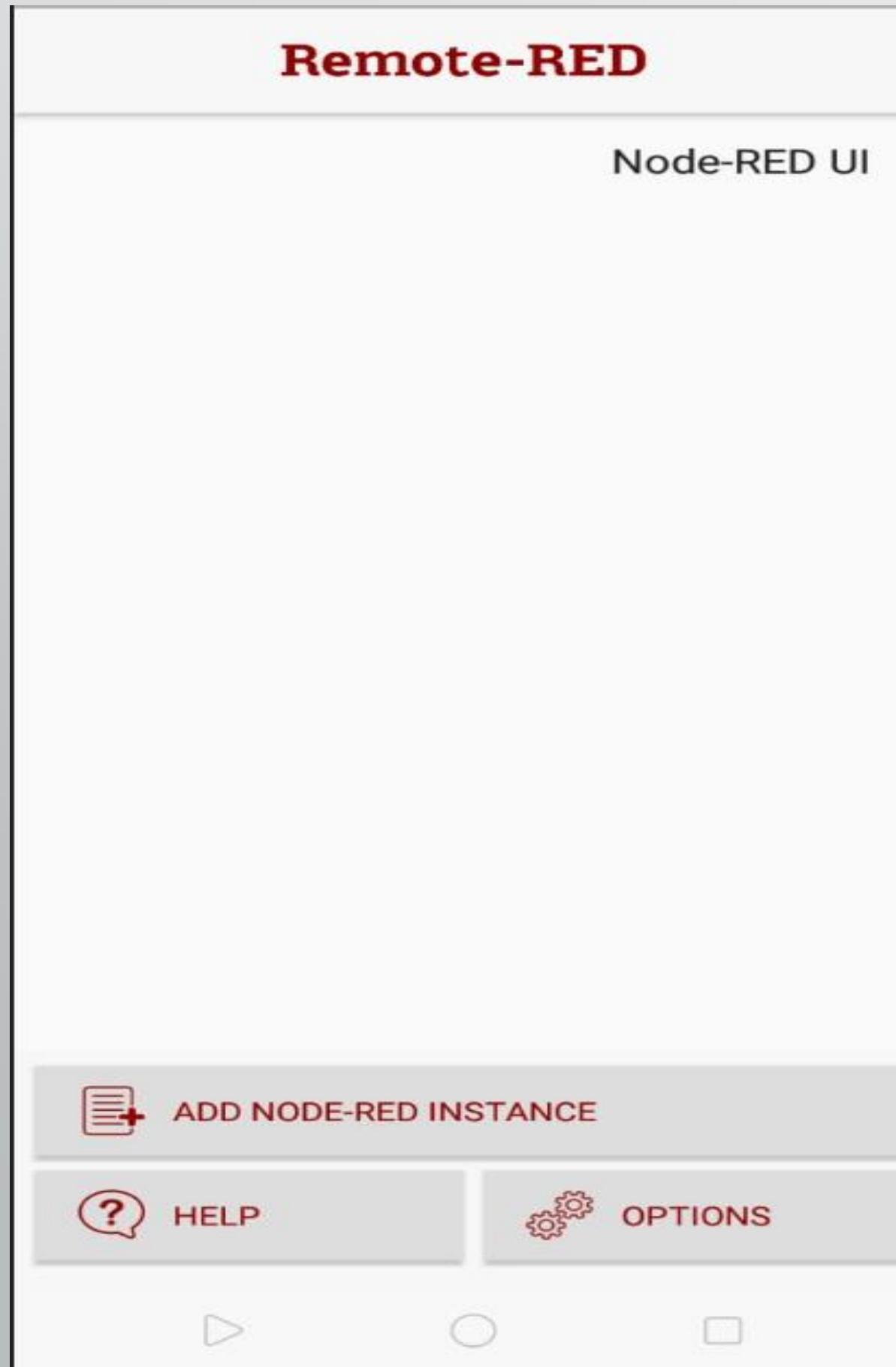
Counters		Pressure
LEAKAGE_COUNTER		Pressure
HEALTHY_BOTTLES_COUNTER		0
LEAKED_BOTTLE_COUNTER		10
FILLING_COUNTER		
CAPPED_BOTTLES_COUNTER		
UNCAPPED_BOTTLES_COUNTER		

Manual Mode

Inputs	Outputs
*Prox 1	*Down
*Prox 2	*Motorized Valve
*IR Sensor 2	*Pump
Up Limit	*Up
Down Limit	*Solenoid Valve
IR Sensor 1	*Compressor 1

Remote Red App

To log in Dashboard you can use remote red mobile application
(google play store) and remote red node

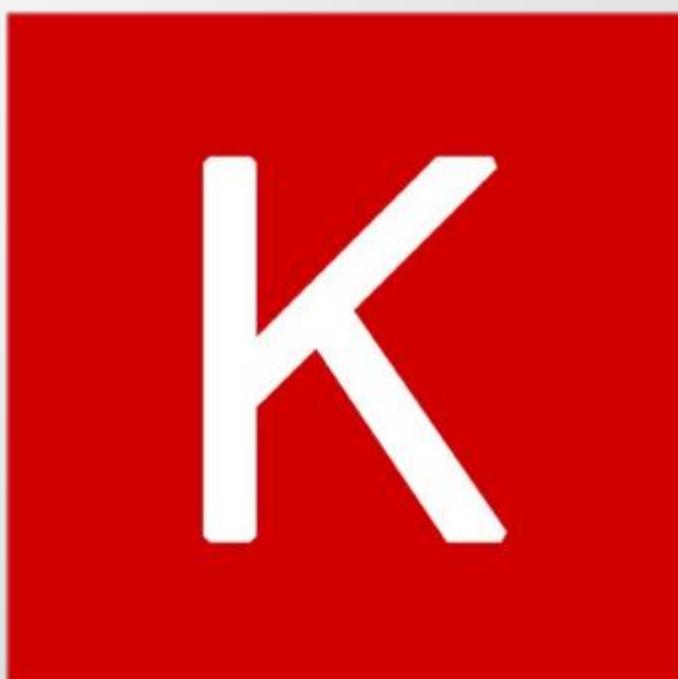


Project Processes

4. Product Quality System

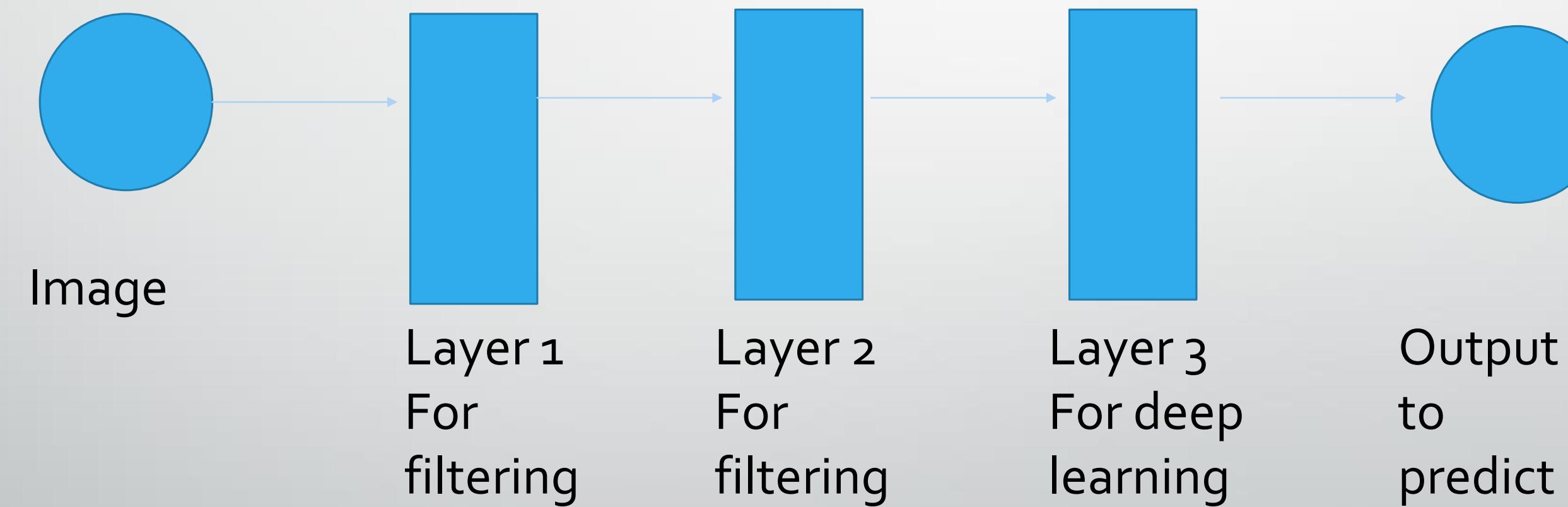


- In this system , we check if the bottle is Capped or uncapped.
- TensorFlow , Keras and OpenCV libraries are used
- The whole Code is written By python
- YOLO library is used for object detection to detect bottle
- Model is build by Keras for deep learning



Building the Model

- We build the model by CNN (conventional neural networks)
- Process flow:



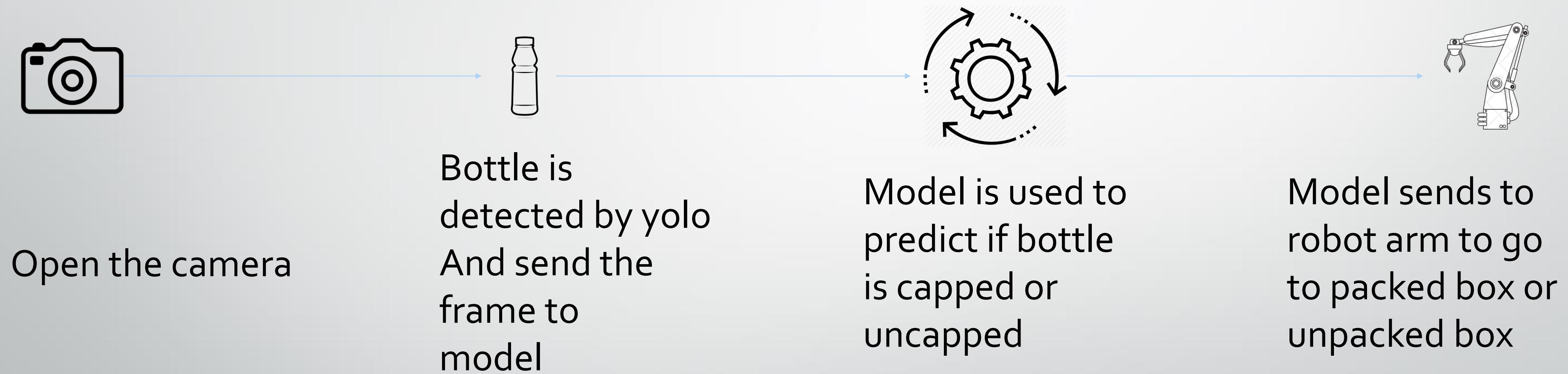
Building the Model

Layer (type)	Output Shape
conv2d (Conv2D)	(None, 148, 148, 32)
max_pooling2d (MaxPooling2D)	(None, 74, 74, 32)
conv2d_1 (Conv2D)	(None, 72, 72, 64)
max_pooling2d_1 (MaxPooling 2D)	(None, 36, 36, 64)
conv2d_2 (Conv2D)	(None, 34, 34, 64)
max_pooling2d_2 (MaxPooling 2D)	(None, 17, 17, 64)
flatten (Flatten)	(None, 18496)
dense (Dense)	(None, 128)
activation (Activation)	(None, 128)
dropout (Dropout)	(None, 128)
dense_1 (Dense)	(None, 1)
activation_1 (Activation)	(None, 1)

YOLO

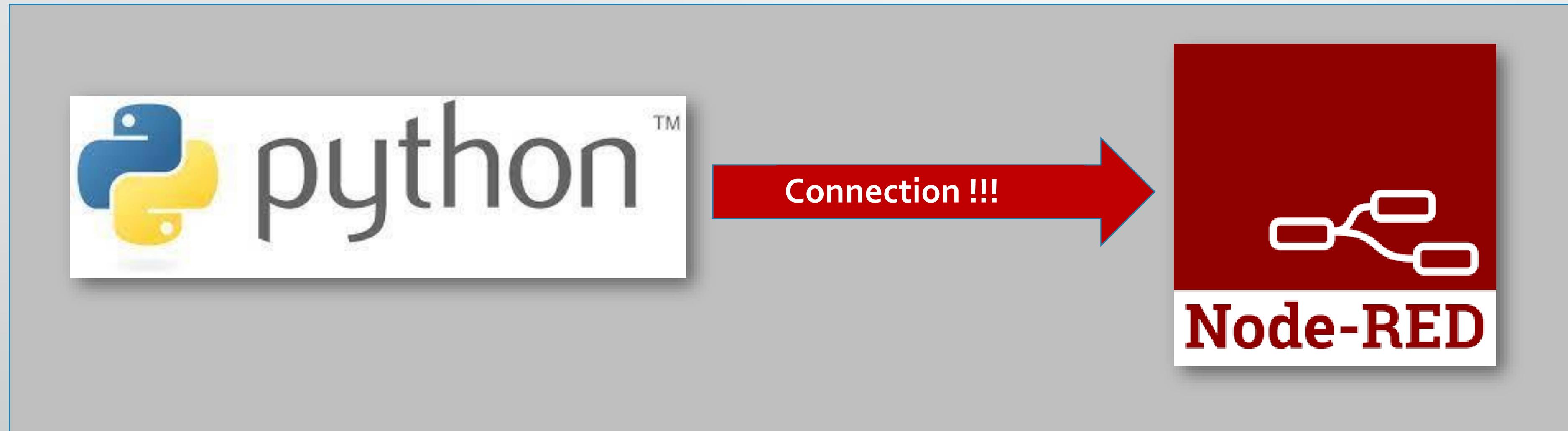
- ▶ It's abbreviation you only look once
- ▶ It's created by Google
- ▶ It contain the model that predicts the image according to the classes
- ▶ We used class bottle to detect our bottle

Code flow

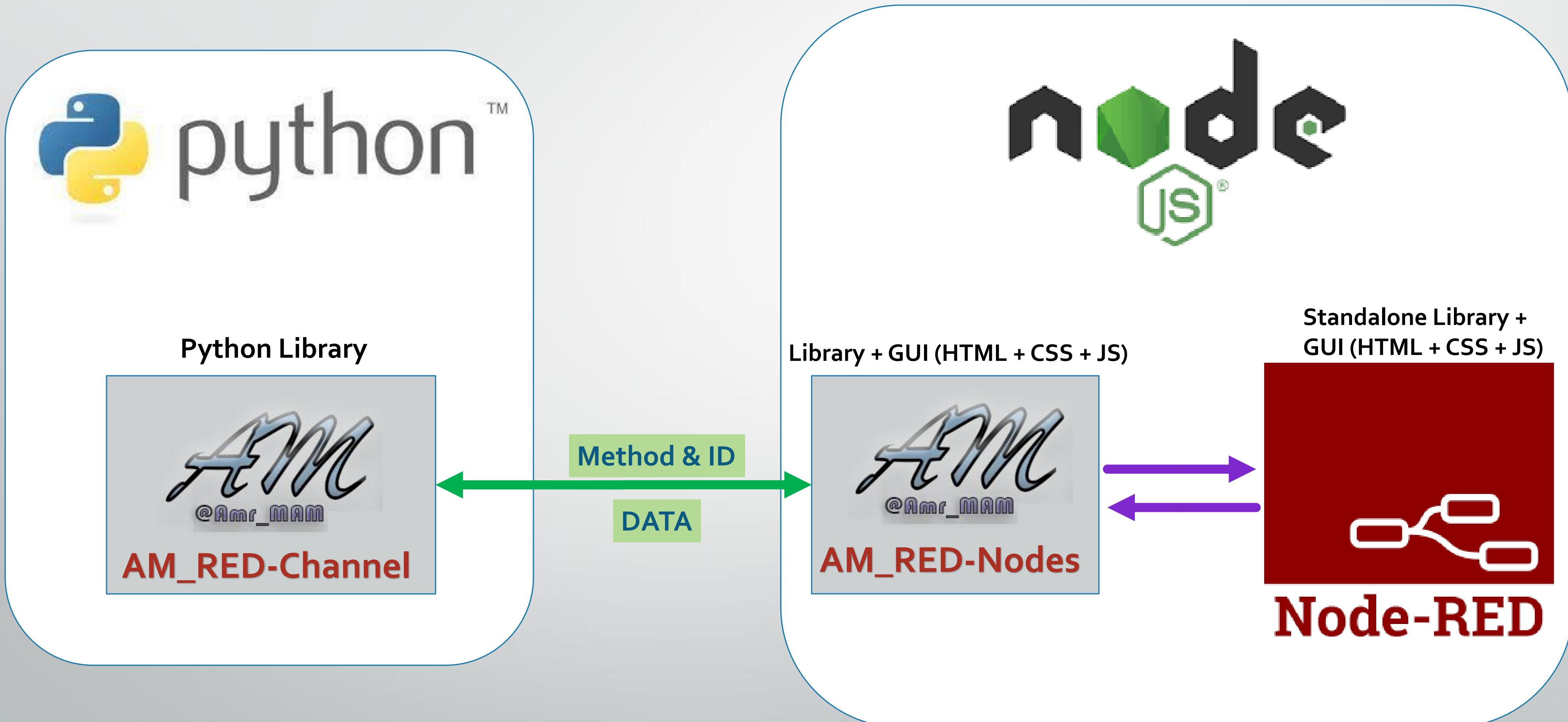


- **Python and Node-RED Connection**
- **Cartesian Robotic-Arm (Packing System)**
- **Mobile Application (Flutter)**
- **Public and Local Servers**

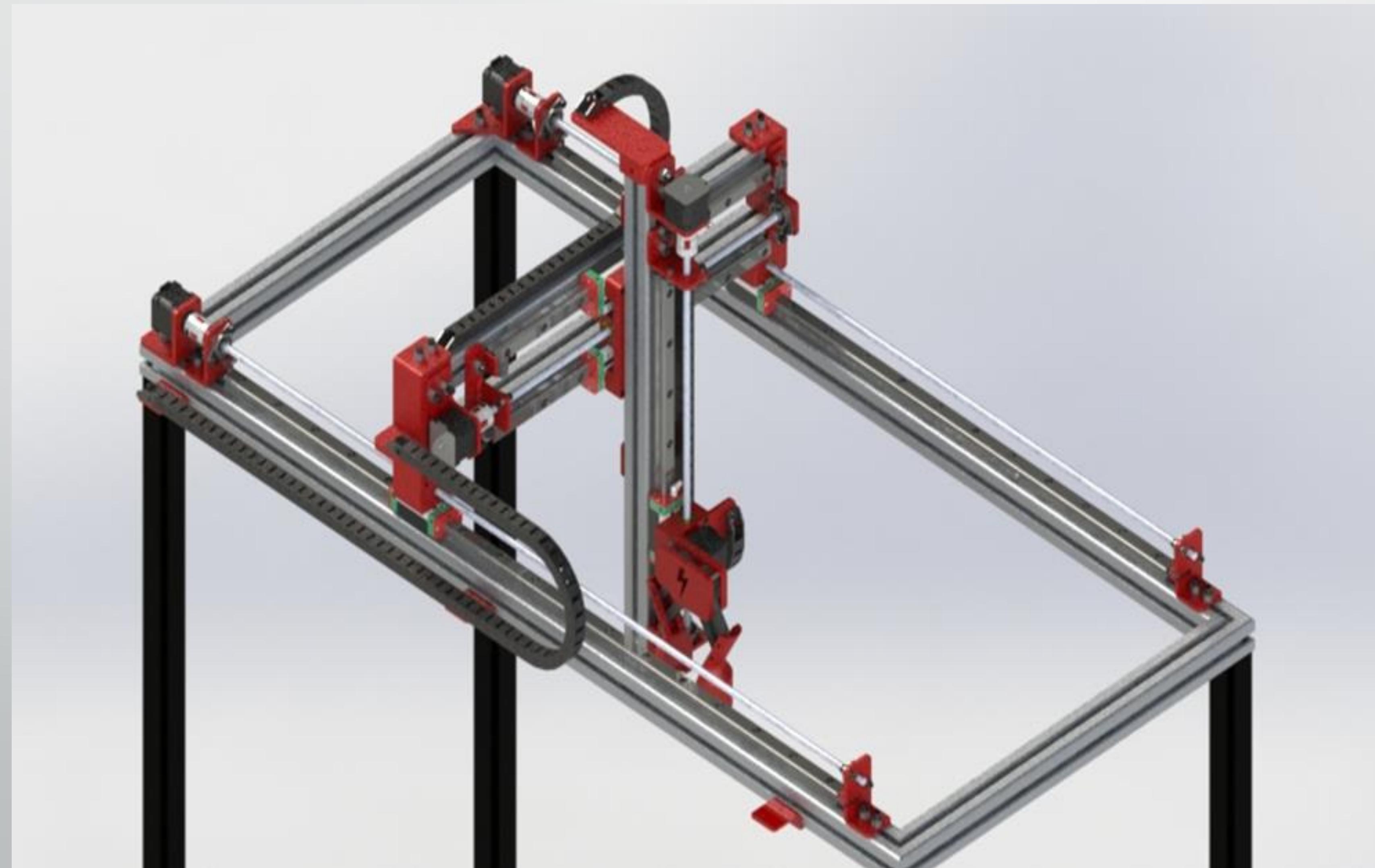
Python and Node-RED Connection



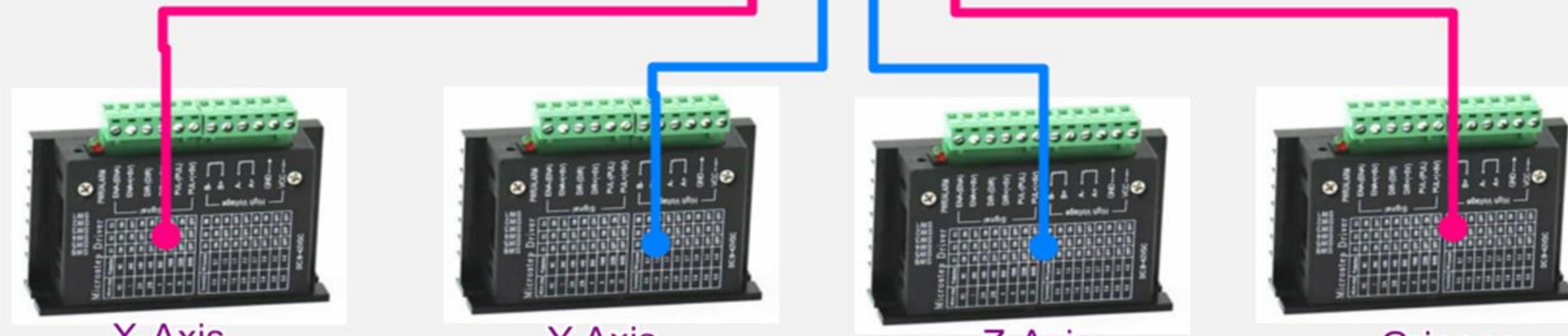
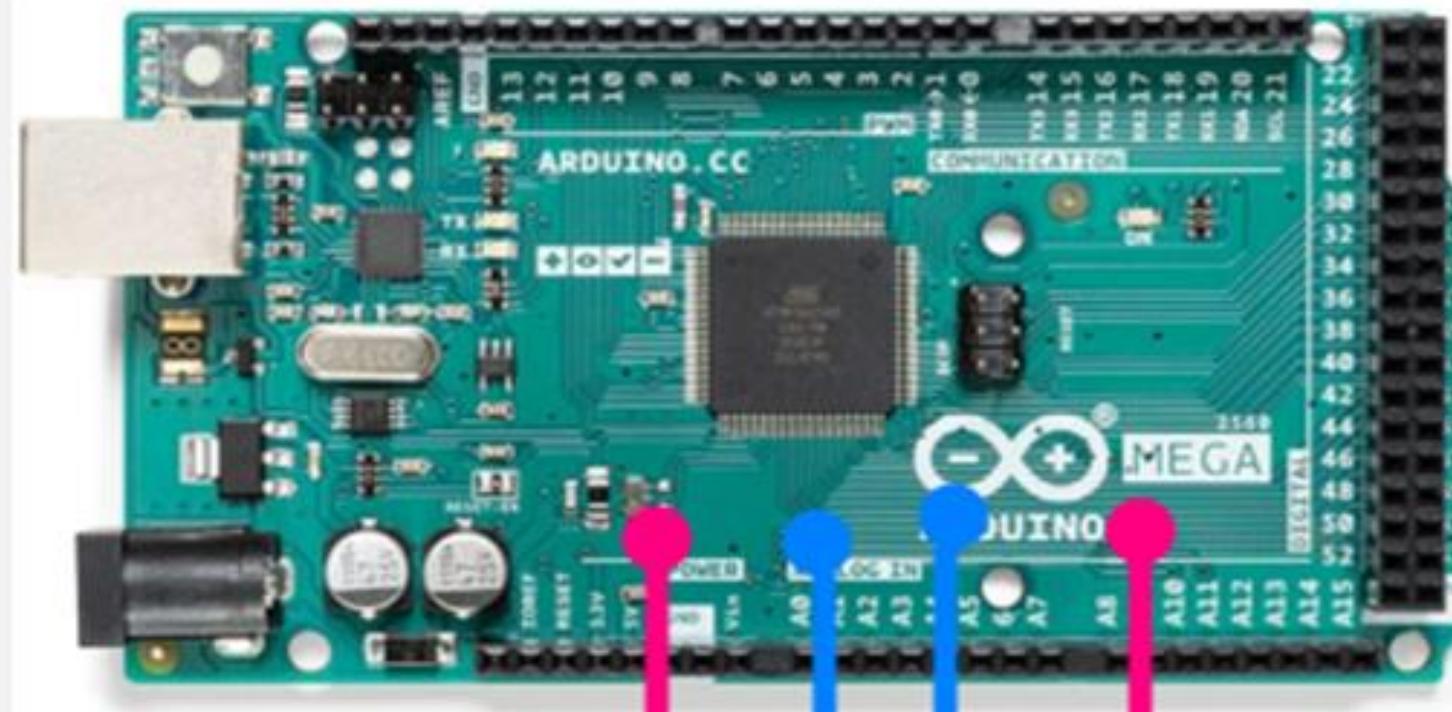
Python and Node-RED Connection



Cartesian Robotic-Arm (Packing System)



Cartesian Robotic-Arm (Packing System)



X-Axis

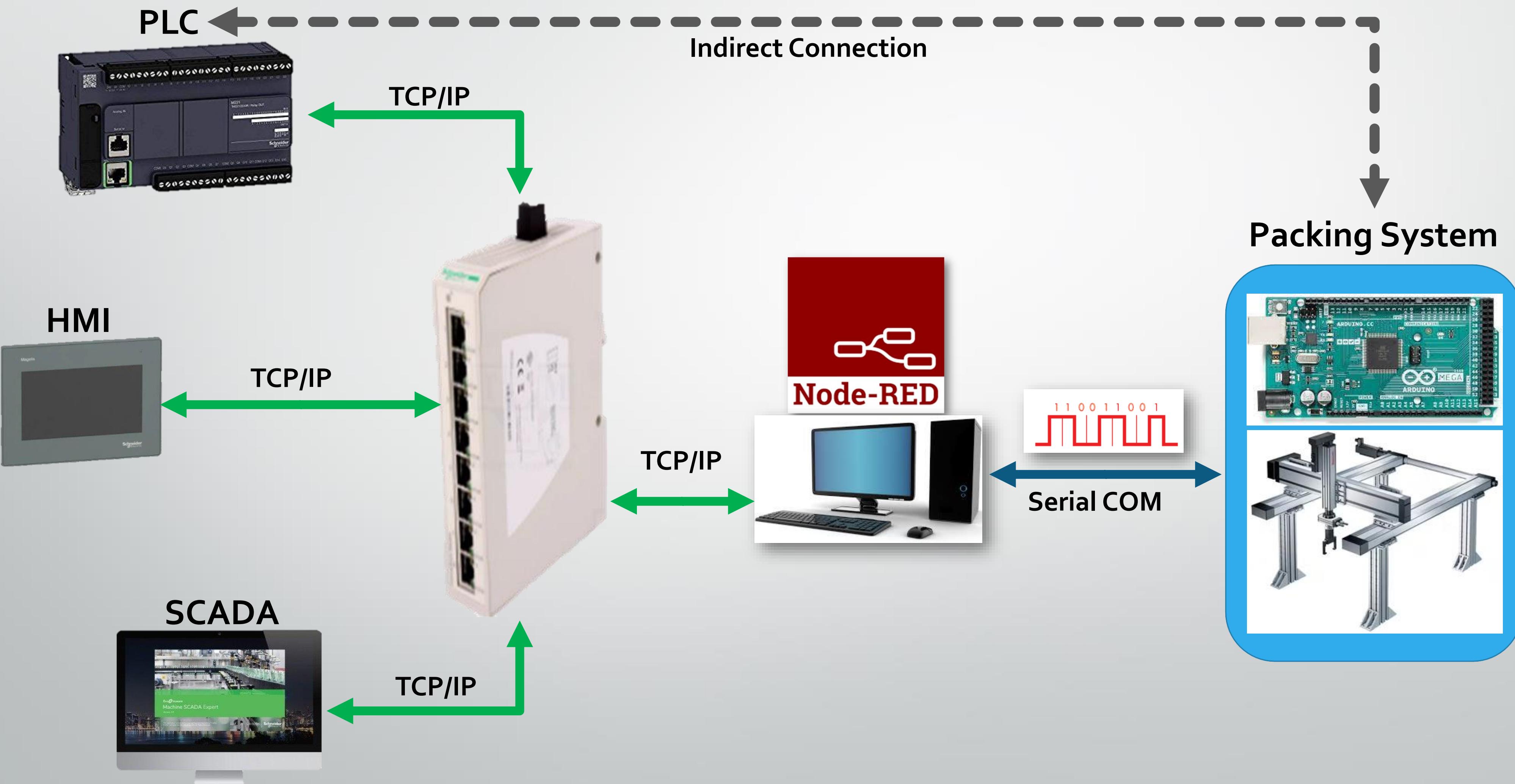
Y-Axis

Z-Axis

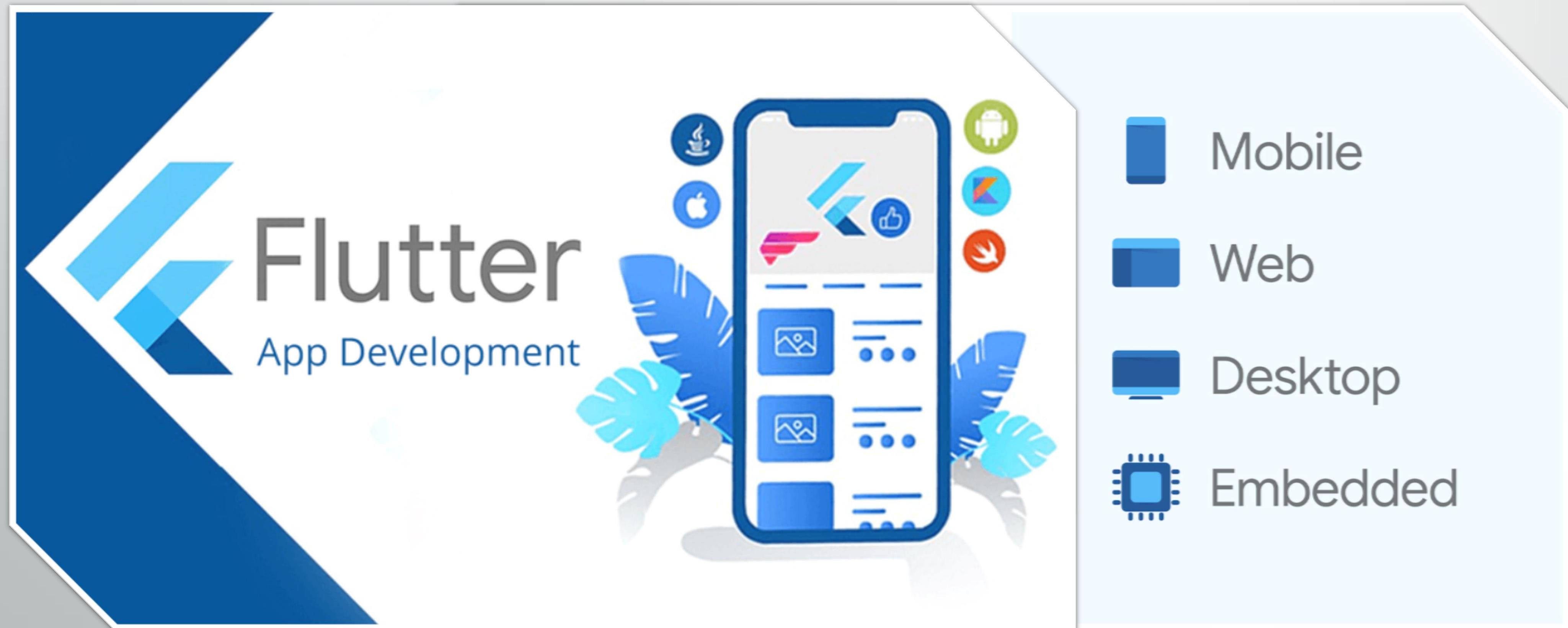
Gripper



Cartesian Robotic-Arm (Packing System)



➤ Mobile Application (Flutter)



Mobile

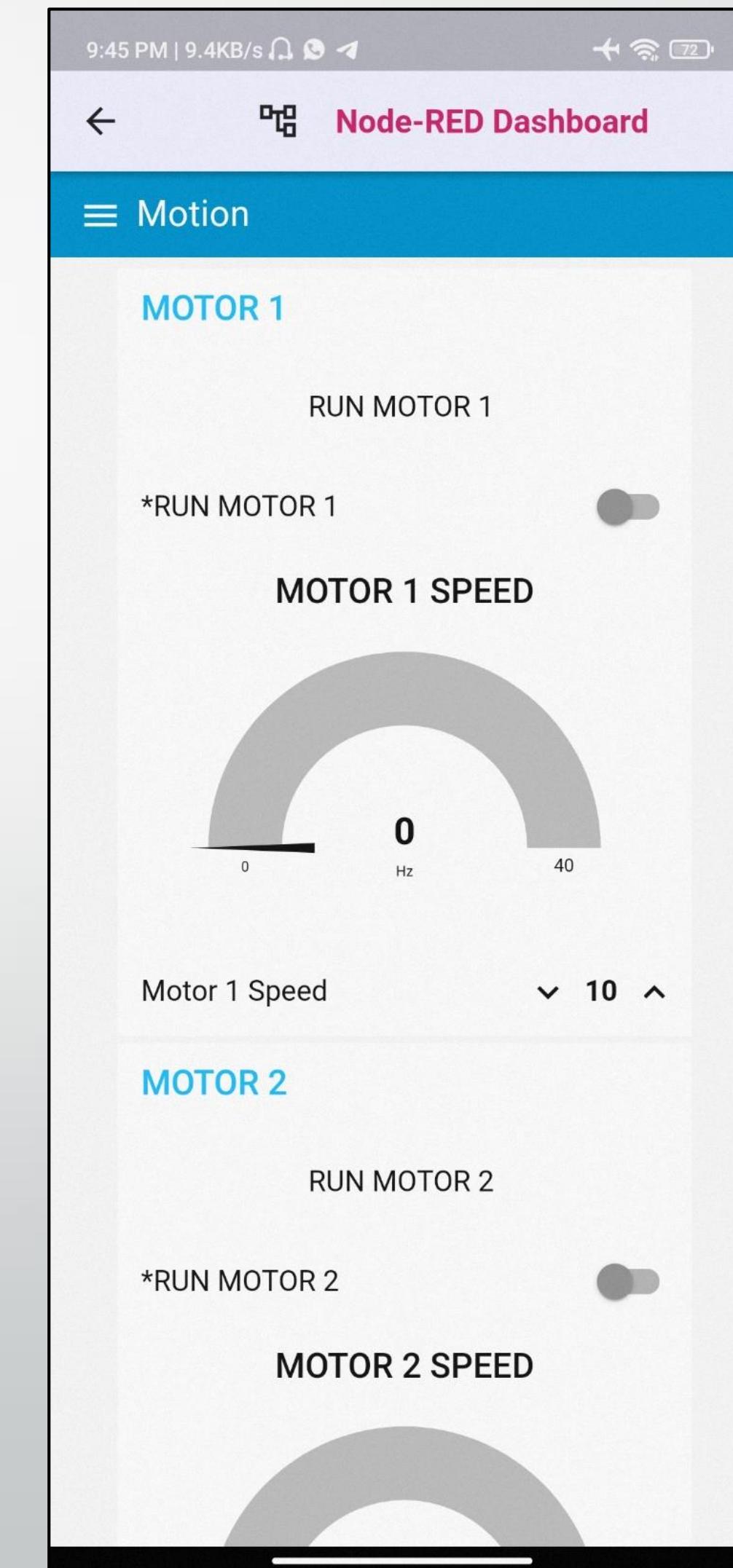
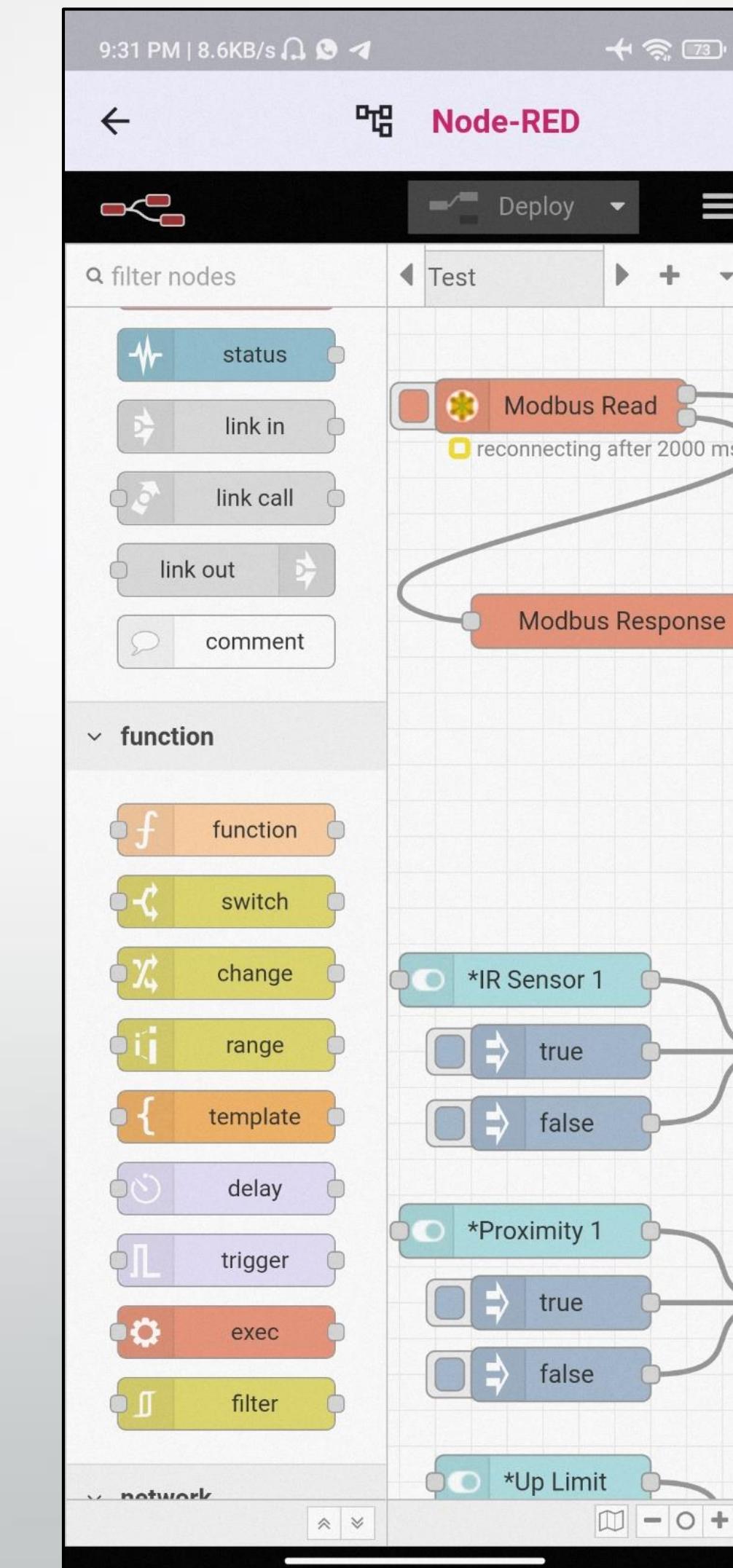
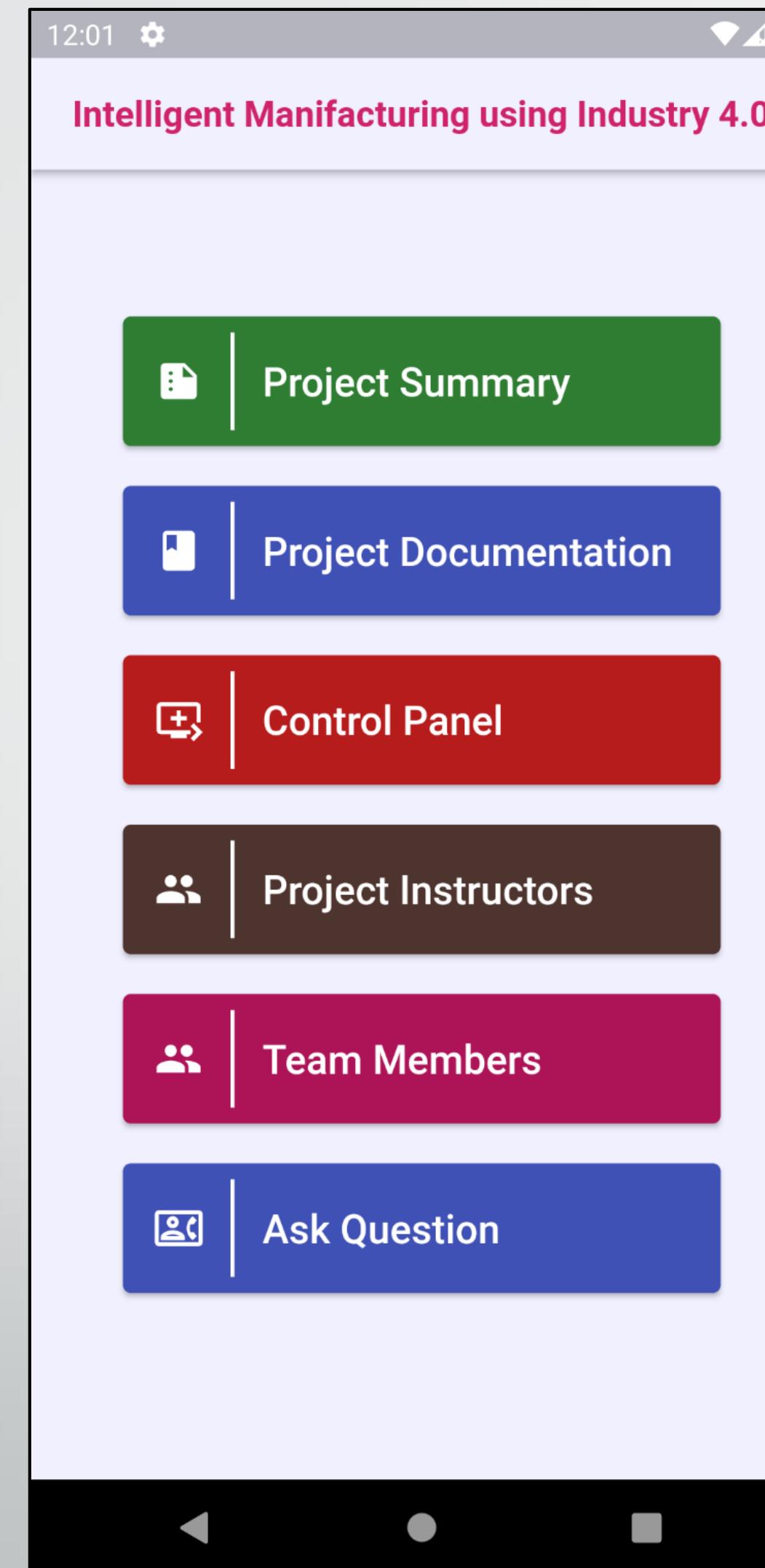
Web

Desktop

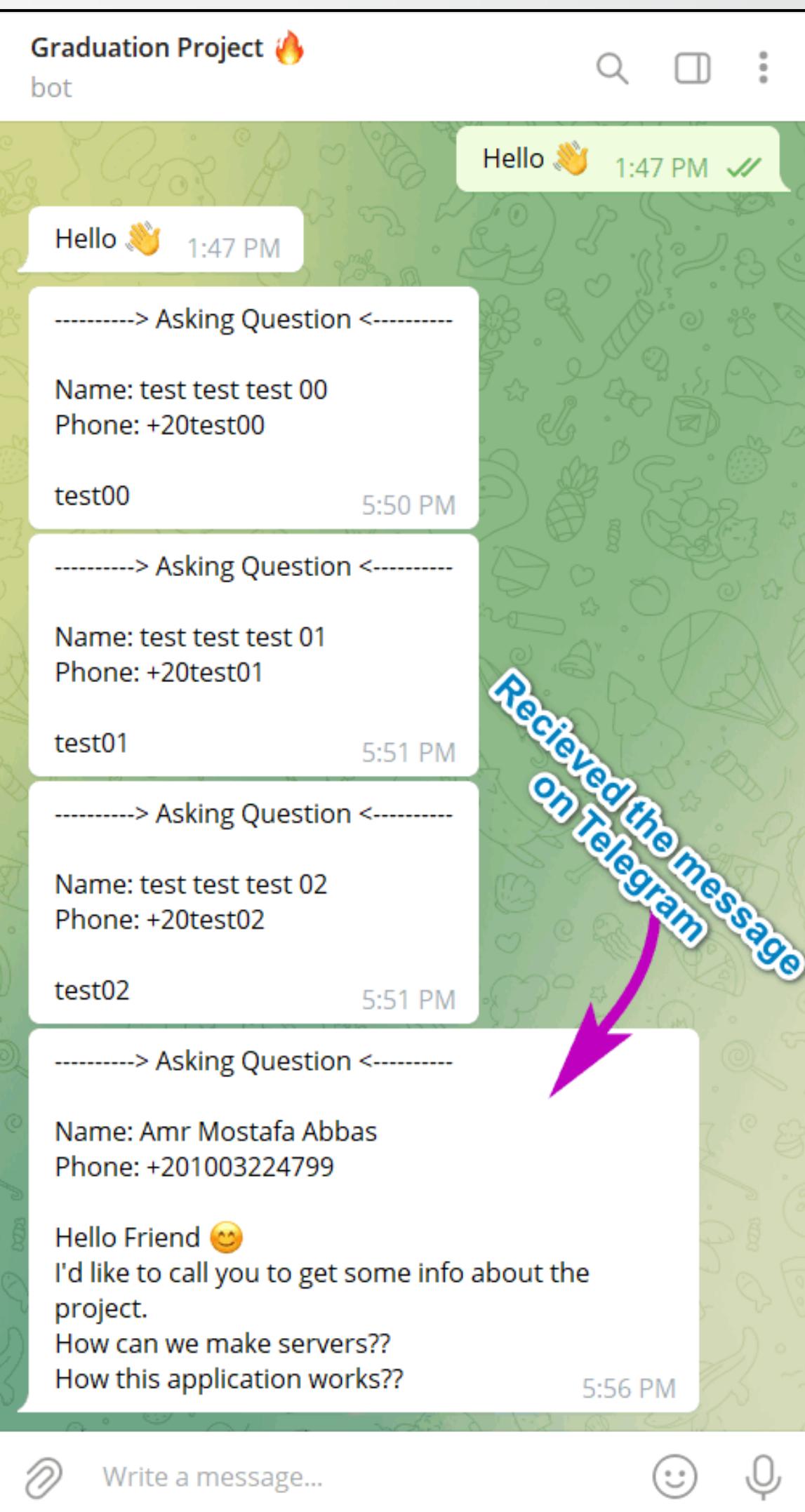
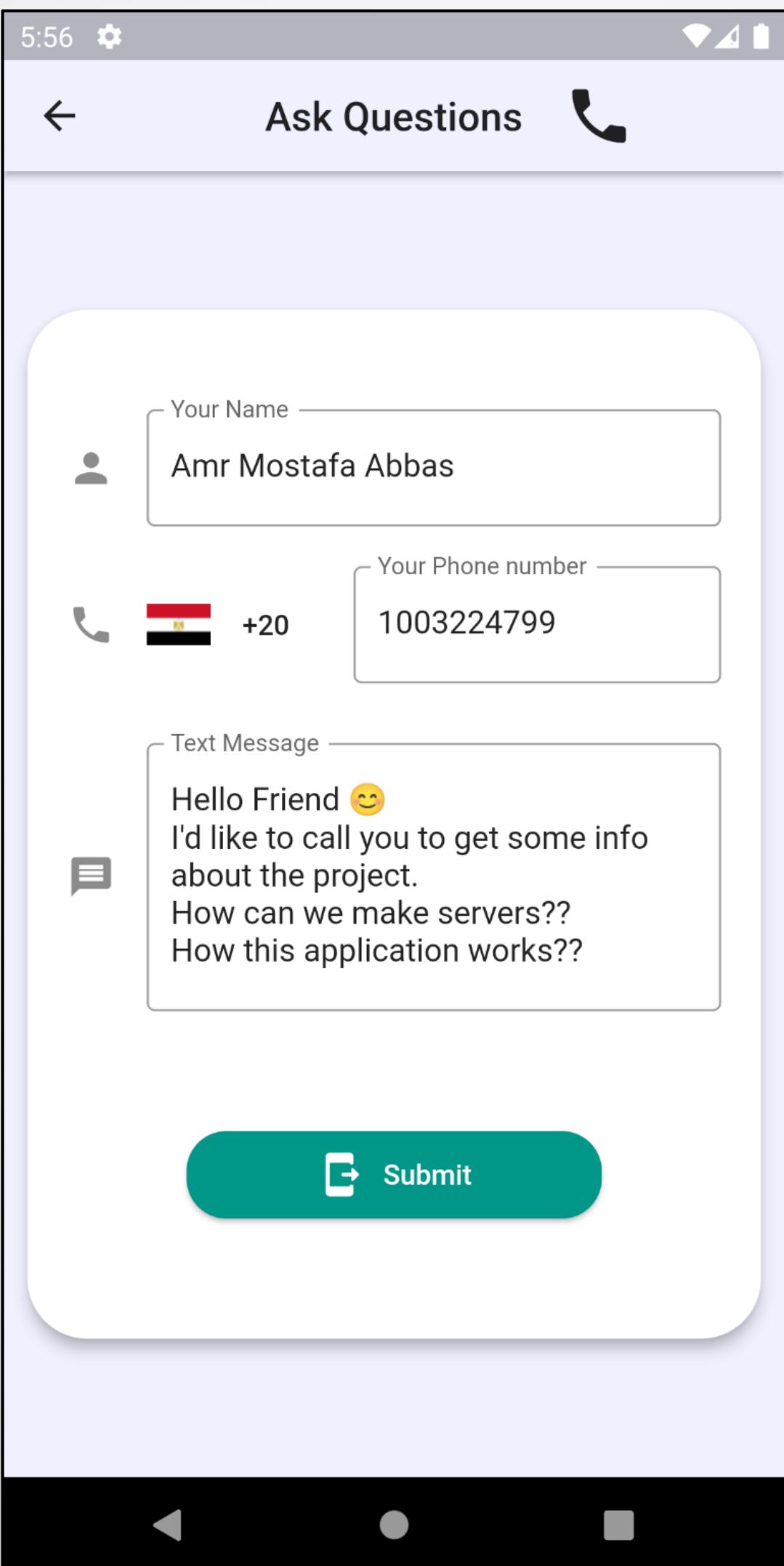
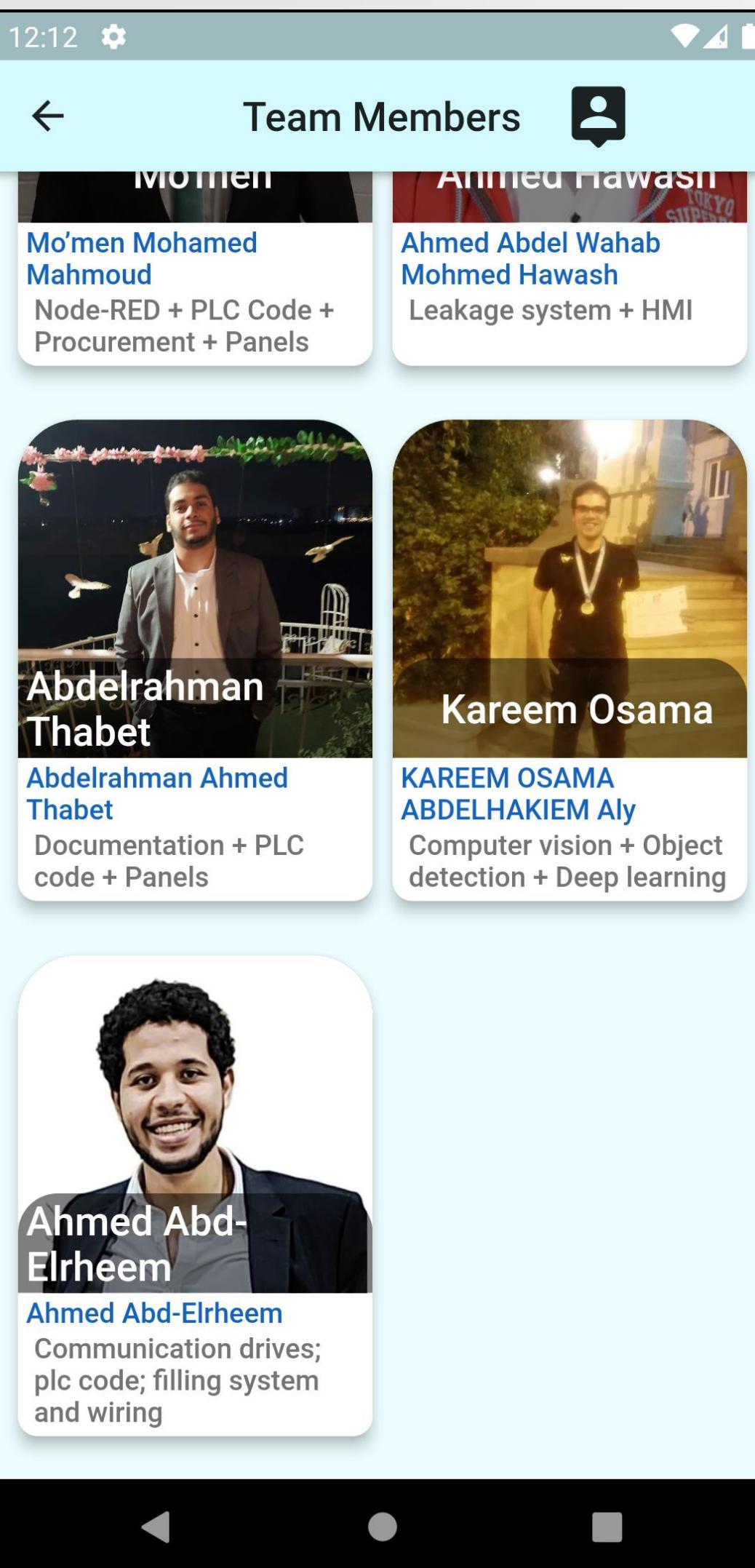
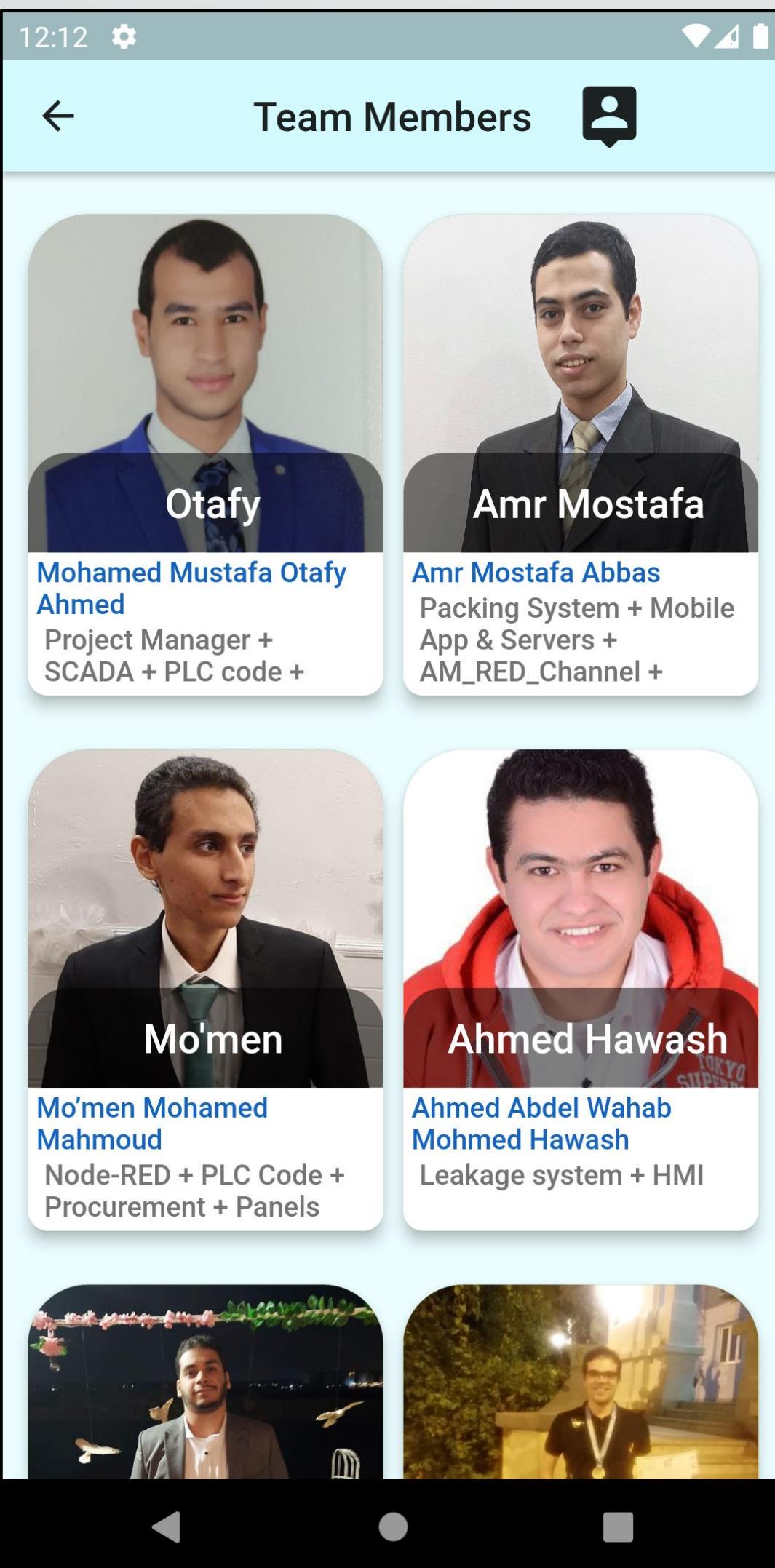
Embedded



Mobile Application (Flutter)



➤ Mobile Application (Flutter)



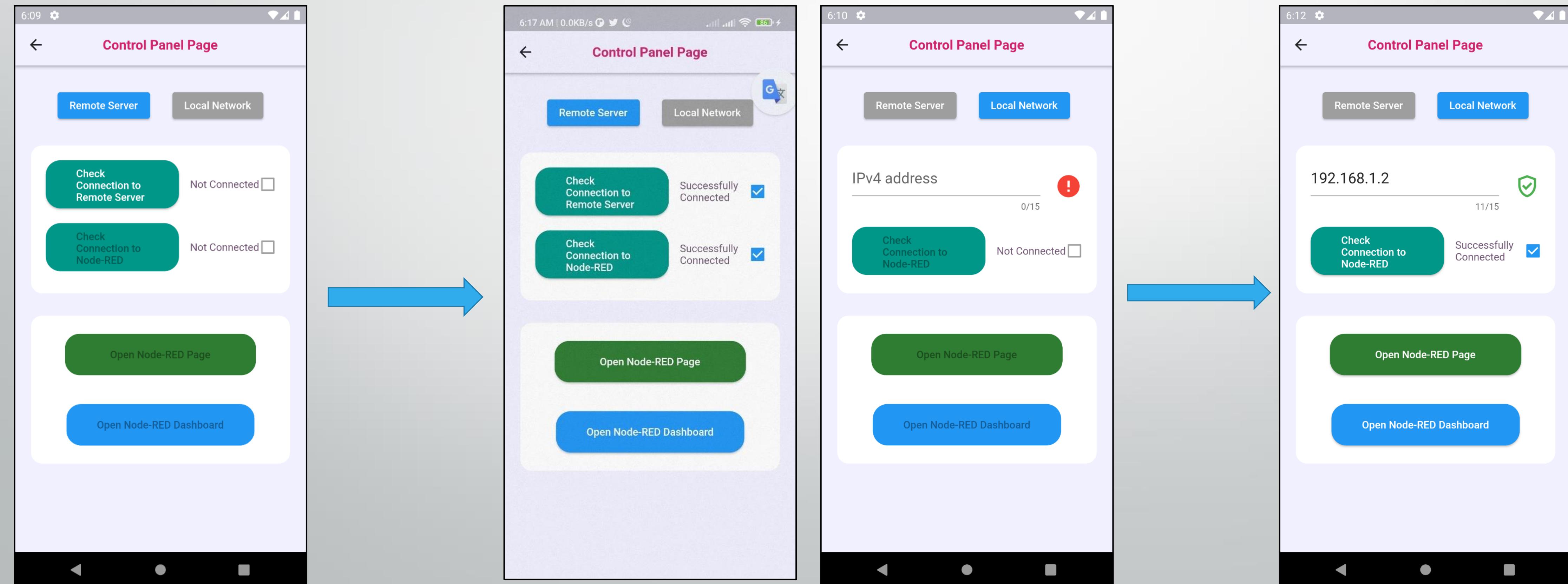
➤ Mobile Application (Flutter)

```
Am_Public-RED
=====
Hi, there => You're Welcom to Am_Public-RED =====
[Amr_MAM]: Successfully locally connected to port: 1351

[Public Connection]=====
[Amr_MAM]: Successfully connected to the server

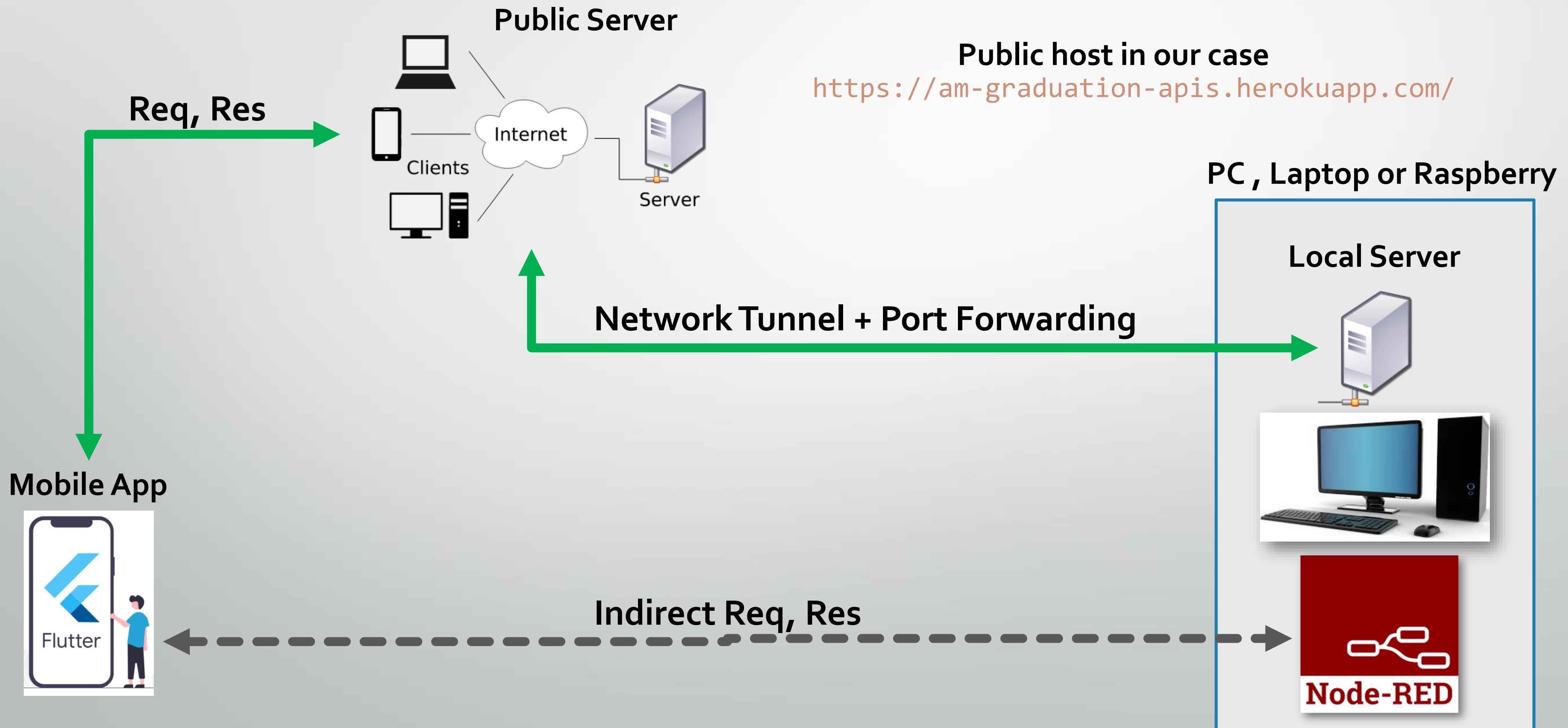
[Public Response]=====
{
  msg: '[Amr_MAM]: Successfully a streamed tunnel is constructed with the local server',
  status: 201
}=====
```

Local Connection



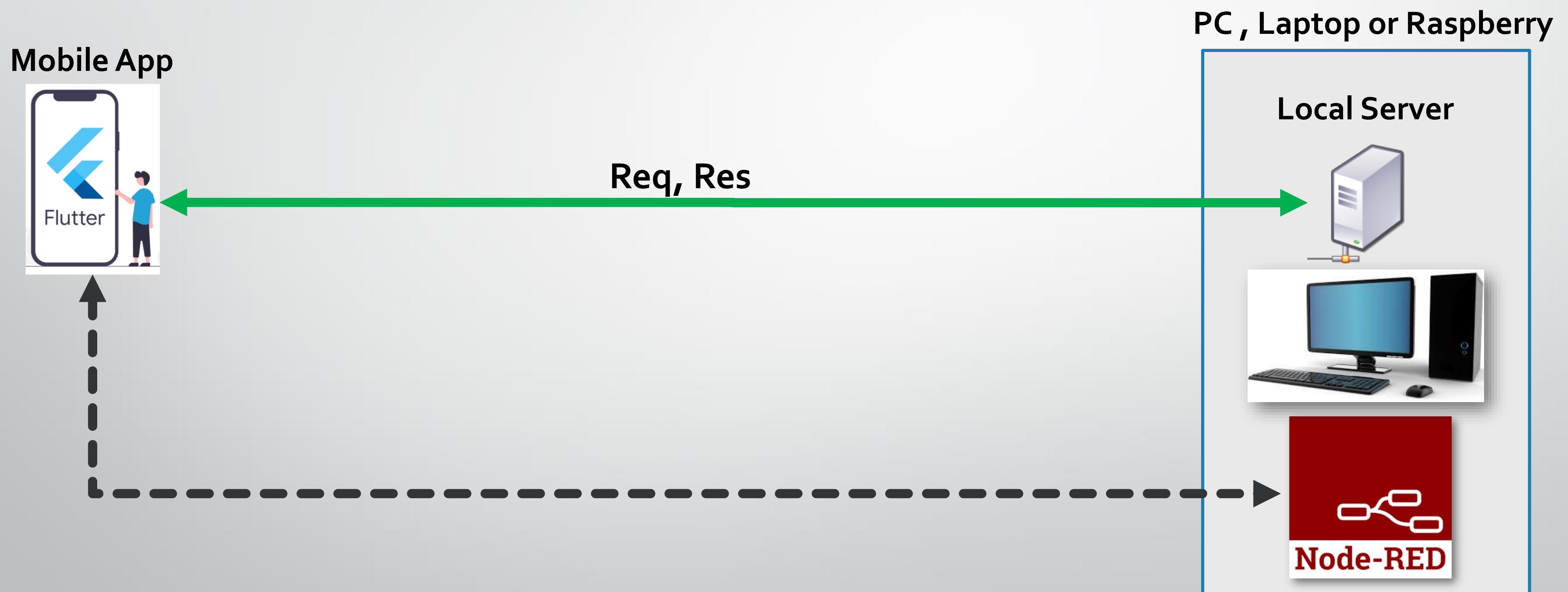
➤ Mobile Application (Flutter)

Remote connection



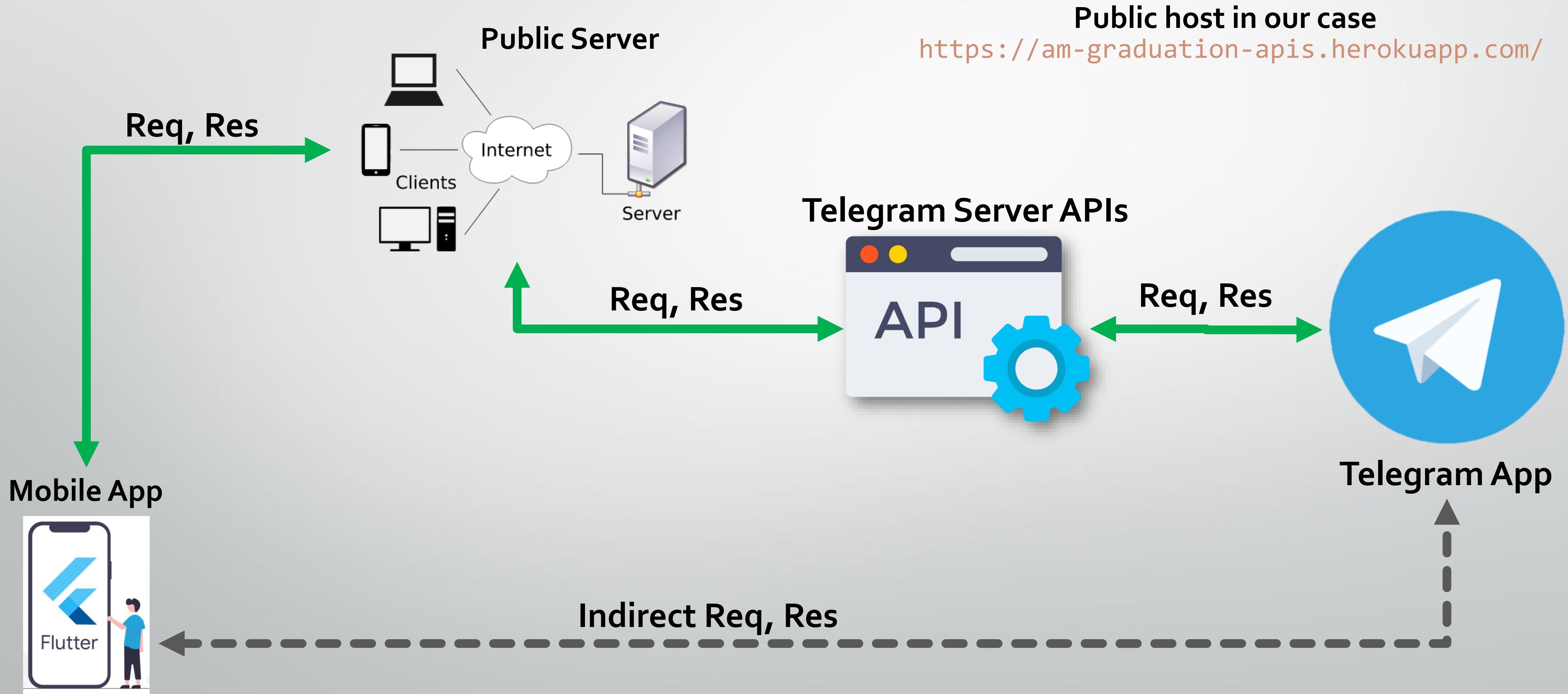
➤ Mobile Application (Flutter)

Local connection



➤ Mobile Application (Flutter)

Remote connection - Telegram



Future improvements

Replace control panel by a larger one

Installing a mechanical track

Show capping system to mechanical experts to assess the suitability of the design to perform the task

Buying a New capper

Transform the machine from semi-automatic state to a fully automatic state

ANY
QUESTIONS

