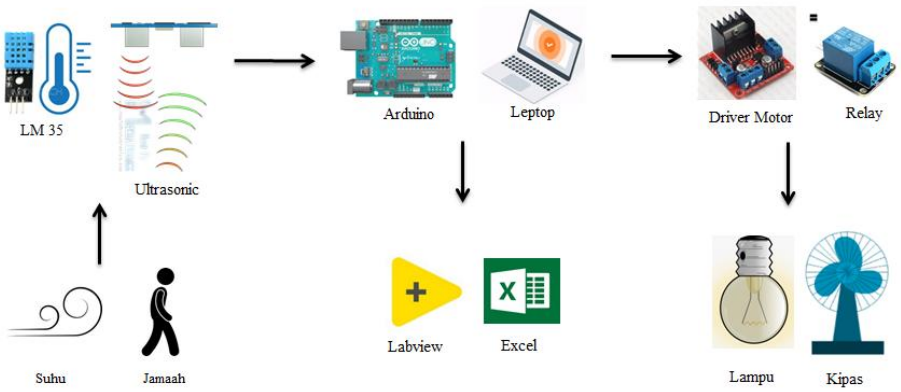
PORTFOLIO PROJECT OF RIYAN SEPTIANA

1. LabVIEW

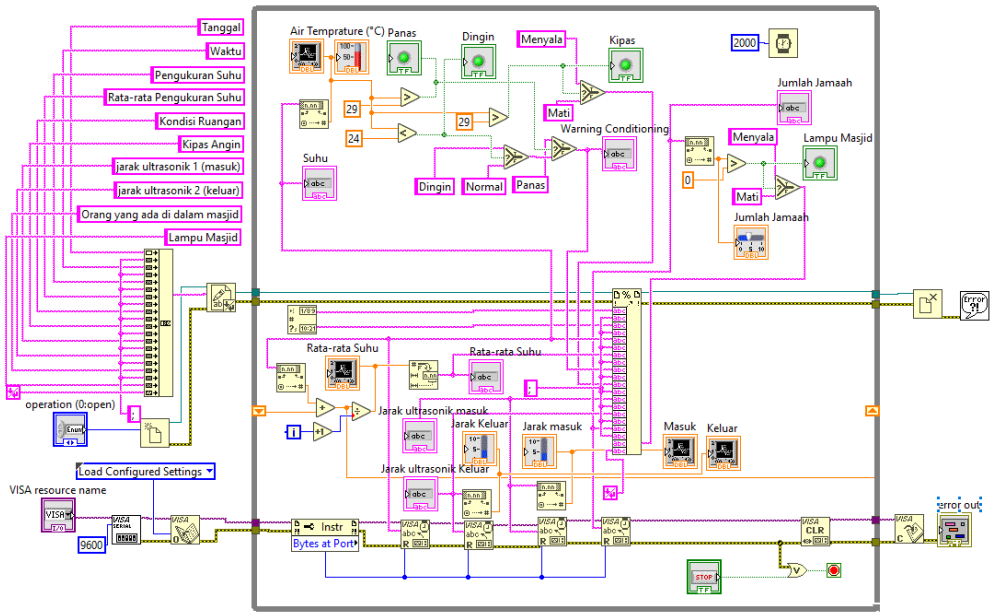


This project integrates **LabVIEW** as a *Human Machine Interface (HMI)* to control a motor and lamp based on sensor inputs. A temperature sensor regulates motor speed, while an ultrasonic sensor controls the lamp. The system allows users to define input/output pins, monitor servo angle, and visualize logic indicators in real time.

Key Features:

- LabVIEW-based HMI integration
- Motor control using temperature sensor input
- Lamp control with ultrasonic sensor input

Technology: LabVIEW, Arduino, Temperature Sensor, Ultrasonic Sensor, Servo Motor



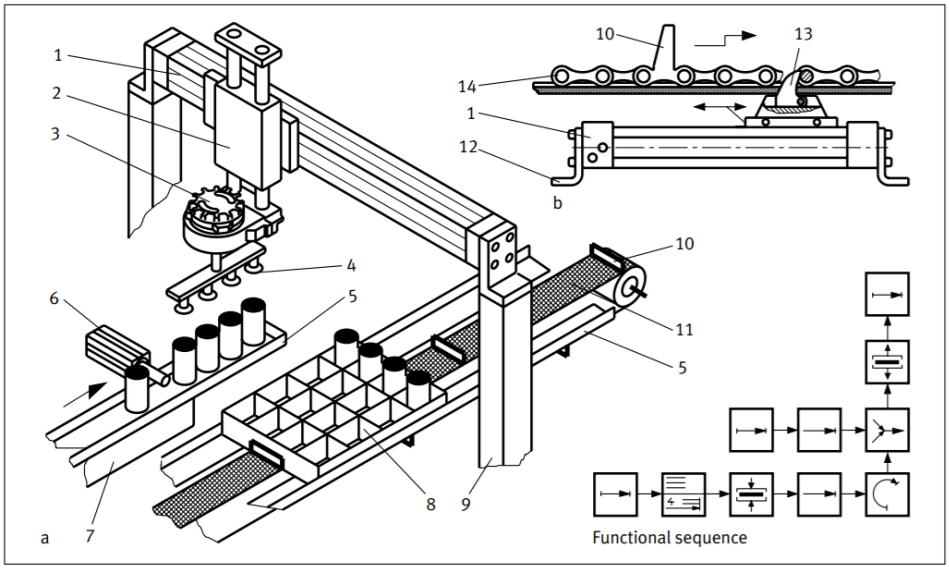
2. Pneumatic

This project simulates a pneumatic sequencer system controlling three actuators to perform unit transfer operations. The process begins with a **driver lifter** descending to pick up the unit, then the lifter laterally moves to another conveyor to place the unit at a specific location detected by sensors. Once the unit is positioned on the conveyor, the conveyor transports the unit to the next station.

Key Features:

- Pneumatic actuator sequencing (pick → transfer → place)
- Sensor-based interlocking to ensure safe, ordered steps
- Timing and sequence logic to prevent race conditions and collisions
- Integration of position sensors with solenoid valve control via PLC

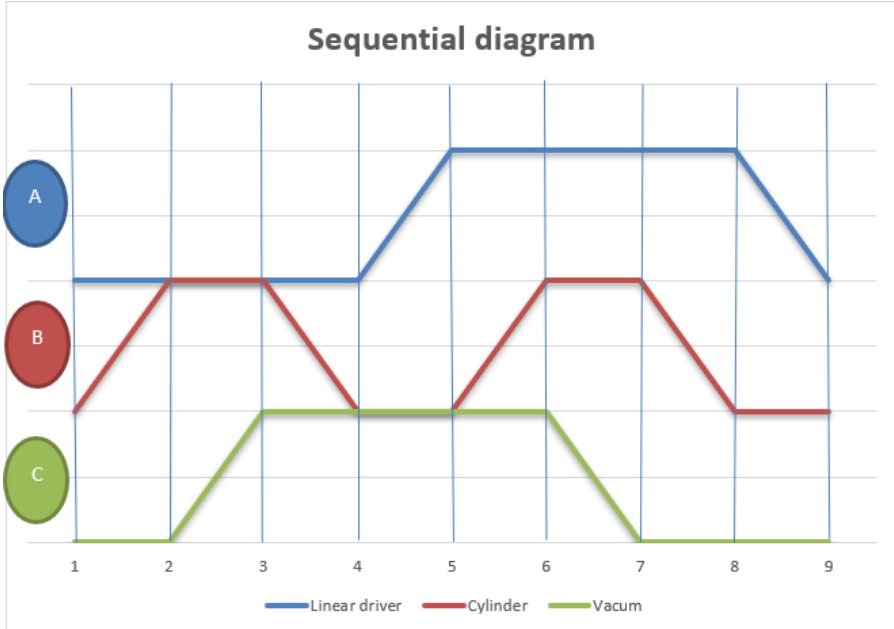
Technology: Pneumatic actuators (single/double-acting), Proximity/Position Sensors, Solenoid Valves, PLC Interface, Ladder Logic / Sequential Function Chart



Sequential :

- Single cylinder down
- Vacuum on
- Single cylinder up
- Linear driver slides to another conveyor
- Single cylinder down
- Vacuum off
- Single cylinder up
- Linear driver slides to the first conveyor

Sequential diagram



B+ = START and Sequence1

C+ = B1 and Sequence1

E2 = C1 and Sequence1

B - = Sequence2

A+ = B0 and Sequence2

E3 = A1 and Sequence2

B+ = Sequence3

C- = B1 and Sequence3

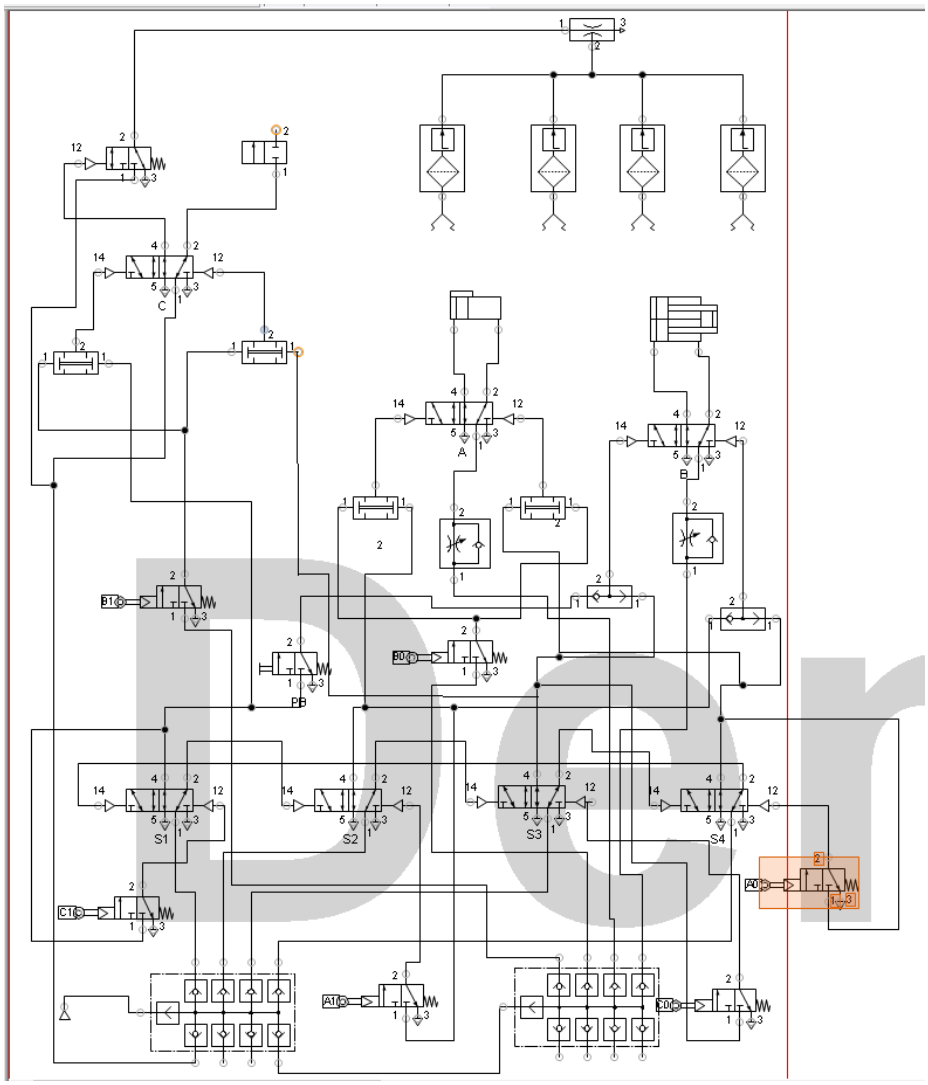
E4 = C0 and Sequence3

B- = Sequence4

A - = B0 and Sequence4

E1 = A0 and Sequence4

pneumatic circuit schematic



3. 3 phase electric motor control system

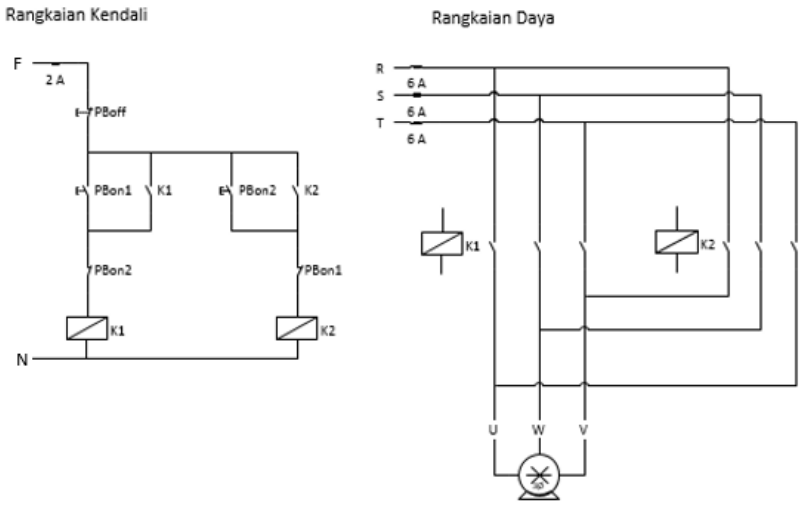
This project demonstrates how to control a three-phase motor using electrical diagrams divided into control and power circuits. It covers multiple motor control methods such as forward/reverse direction, Star-Delta configuration, dual-speed control, and braking systems.

Key Features:

- Separated control and power diagrams
- Forward/reverse direction control
- Star-Delta and dual-speed motor control

Technology: 3-Phase Motor, Contactor, Relay, Timer, Electrical Control Circuit

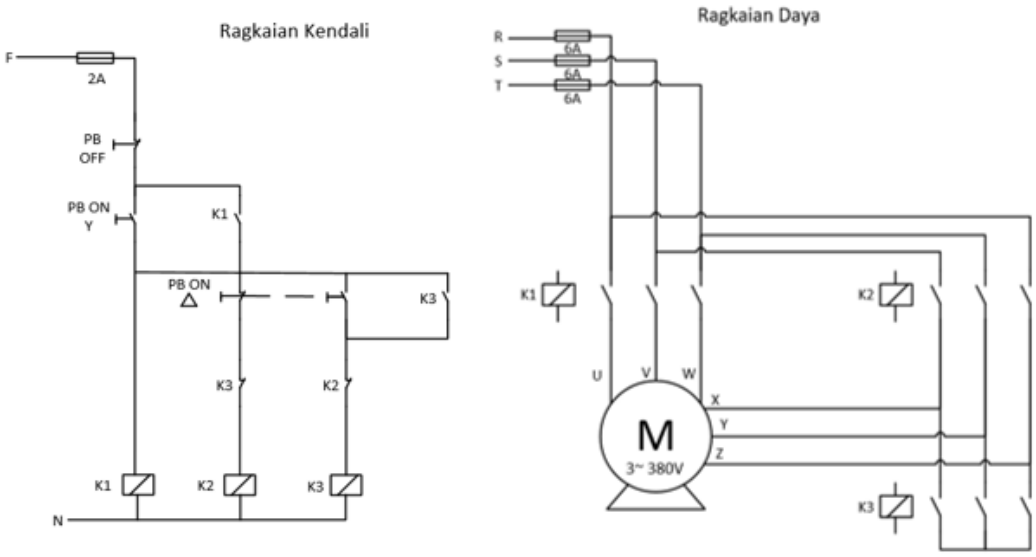
- **clockwise and counter clockwise**



Analysis:

- On Control circuit when **Push Button 1 pressed,** it will make **Contactor 1 connect self-holding** and **contactor 2 disconnected,** on the other hand, when **Push Button 2 pressed,** it will make **Contactor 2 connect self-holding** and **contactor 1 disconnected,**
- On **power circuit,** when **Contactor 1 active, R** phase connect to **U; S** phase connect to **W**; **T** phase connect to **V;** while **X,Y,Z** will connect each other. It will makes motor running clockwise.
- On **power circuit,** when **Contactor 2 active, R** phase connect to **V; S** phase connect to **W**; **T** phase connect to **U;** while **X,Y,Z** will connect each other. It will makes motor running counter clockwise. The simply we can trade 2 wire to make running motor counter clockwise.

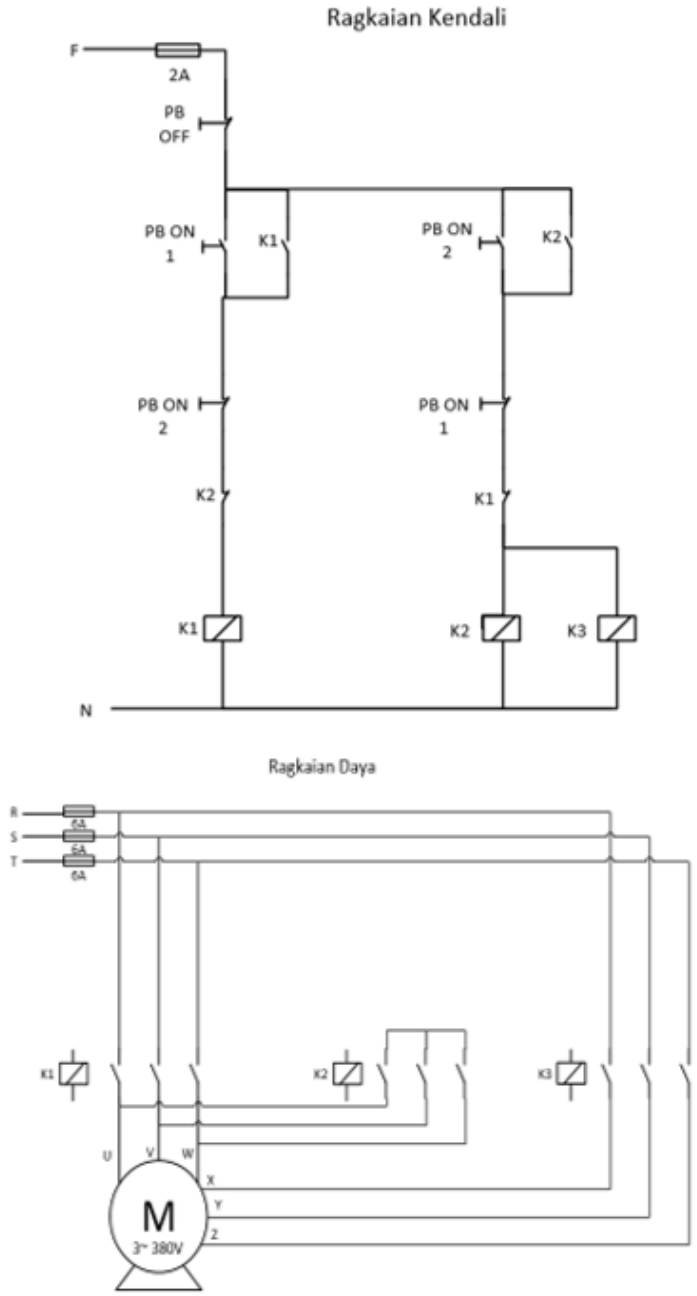
- **Star Delta**



Analysis:

- On Control circuit when **Push Button Y pressed** to active contactor 1 and 2 its mean on **R** phase connect to **U** and **Z; S** phase connect to **V** and **X**; **T** phase connect to **W** and **Y.** this connection makes a START CIRCUIT. Start circuit is used to preventing significantly increased current spikes in a short period of time when a 380V motor is switched on.
- Next, when **Push Button Delta pressed,** on the control circuit, it will disconnect contactor 2 and at the same time it will connect contactor 1 and 3. Its mean that **R** phase connect to **U; S** phase connect to **V**; **T** phase connect to **W;** while **X,Y,Z** will connect each other.

- **2 Speed / YY**

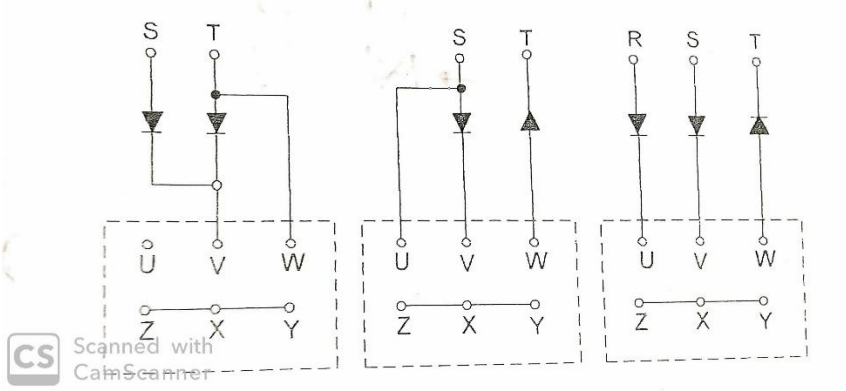


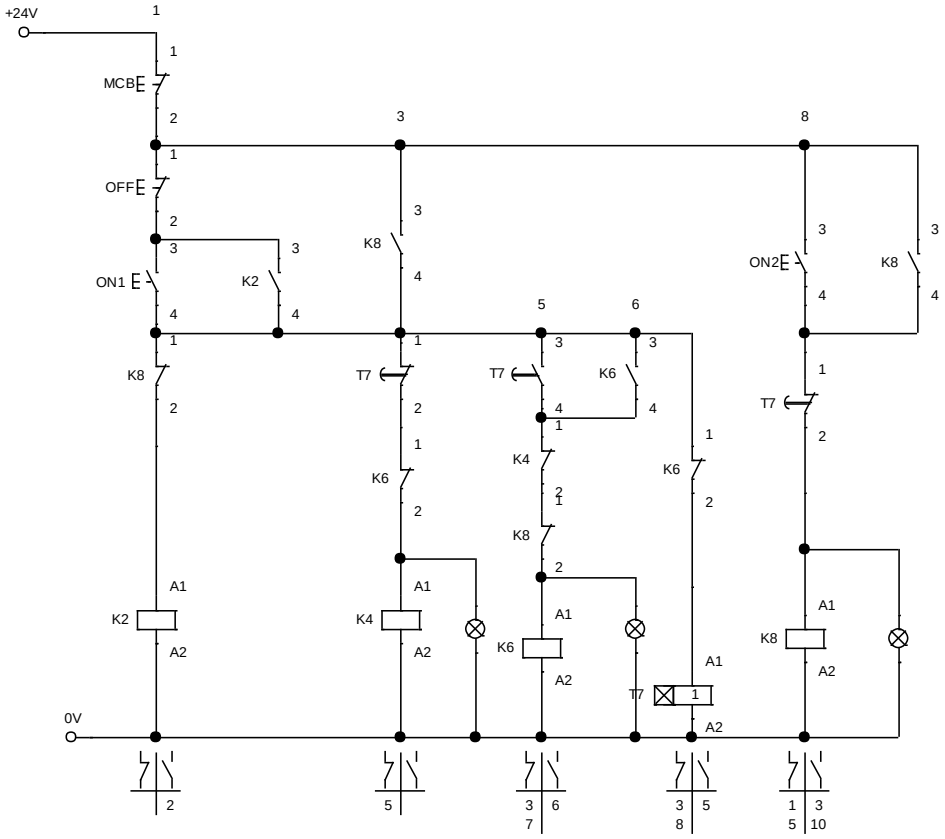
Analysis:

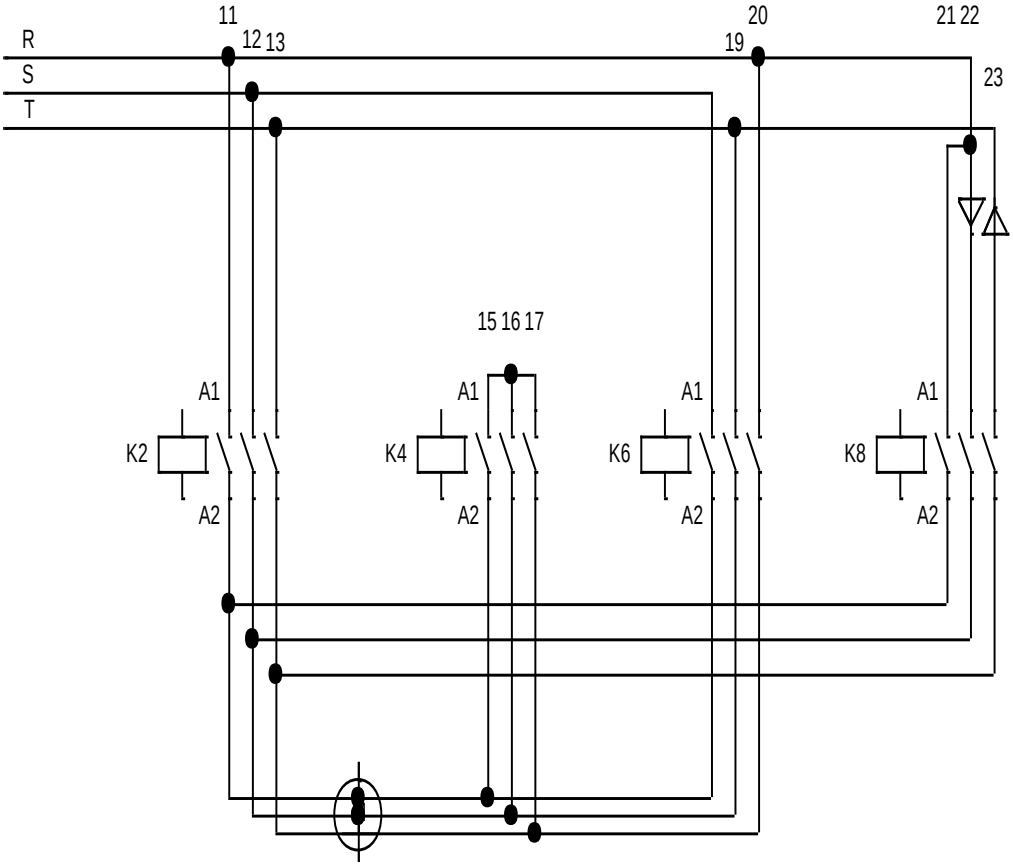
- On Control circuit when **Push Button 1 pressed** to active contactor 1; disconnected contactor 2 and 3. Its mean that **R** phase connect to **U; S** phase connect to **V**; **T** phase connect to **W;** while **X,Y,Z** will connect each other. Its same like **delta circuit**
- Next, when **Push Button 2 pressed,** on the control circuit, it will disconnect contactor 1 and at the same time it will connect contactor 2 and 3. Its mean that **R** phase connect to **X; S** phase connect to **Y**; **T** phase connect to **Z;** while **U,V,W** will connect each other. This circuit will make speed motor faster than before.

- **Braking**

  we can choose on of them to do a braking system



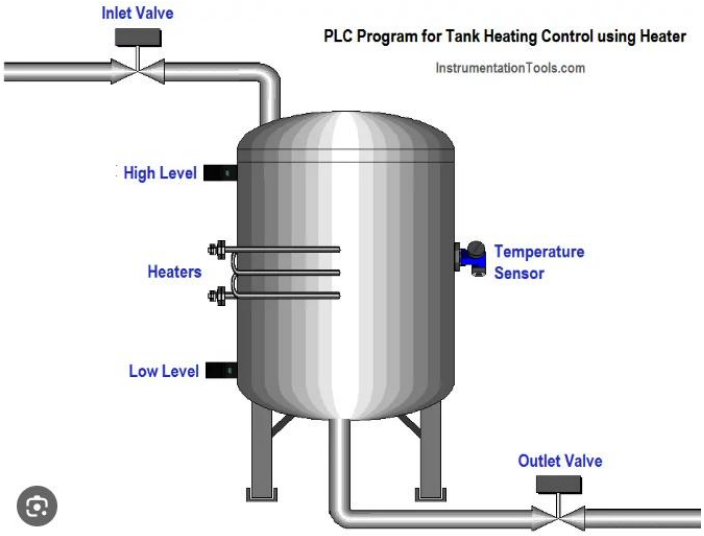




Sequence

- **Contactor 2 and 4 = star circuit**
- **Contactor 2 and 6 = delta circuit**
- **Contactor 8 = braking system**

4. **Programmable Logic Control : Plant Temperature – Level - Pressure**



This automatic distillation system uses level, temperature, and pressure sensors to simulate essential oil production.

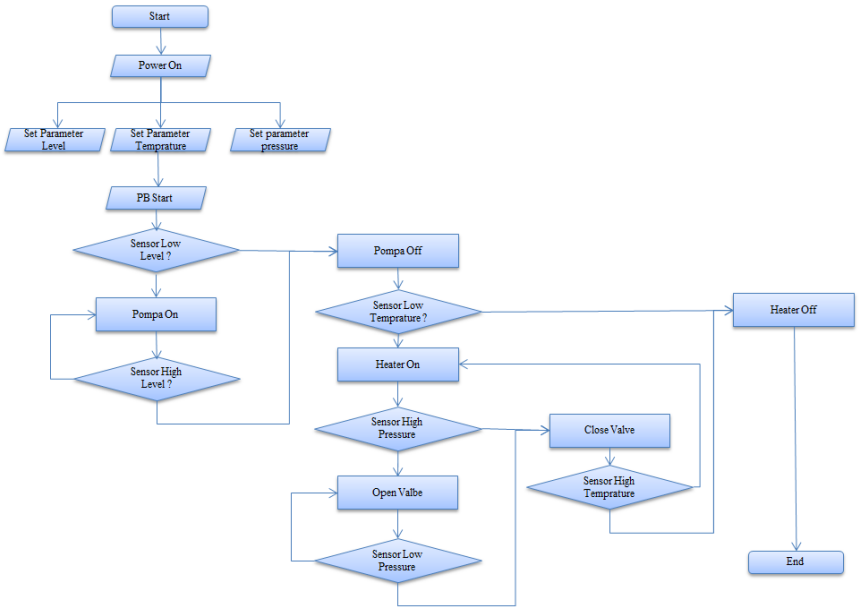
- The **level sensor** controls the pump based on tank water level.
- The **temperature sensor** activates or stops the heater.
- The **pressure sensor** opens or closes a valve to regulate pressure for optimal oil quality.

Key Features:

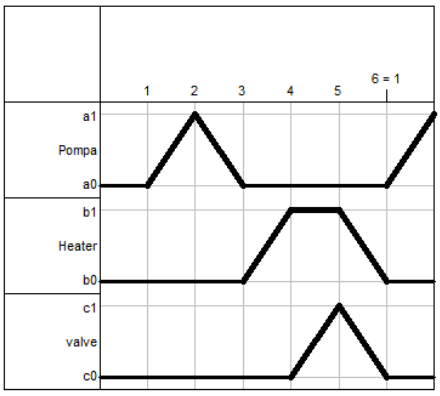
- Automated distillation process
- Multi-sensor and actuator control
- Real-time pressure and temperature regulation

Technology: PLC, Level Sensor, Temperature Sensor, Pressure Sensor, Valve Actuator

- **Flowchart**



- **Sequence Diagram**



Set Parameter = low level, high level, low temprature, high temprature, low pressure, high pressure

A+ = Pb.sec1

e2 = a1.sec1

A- = Sec2

B+ = a0.sec2

C+ = b1.Sec2

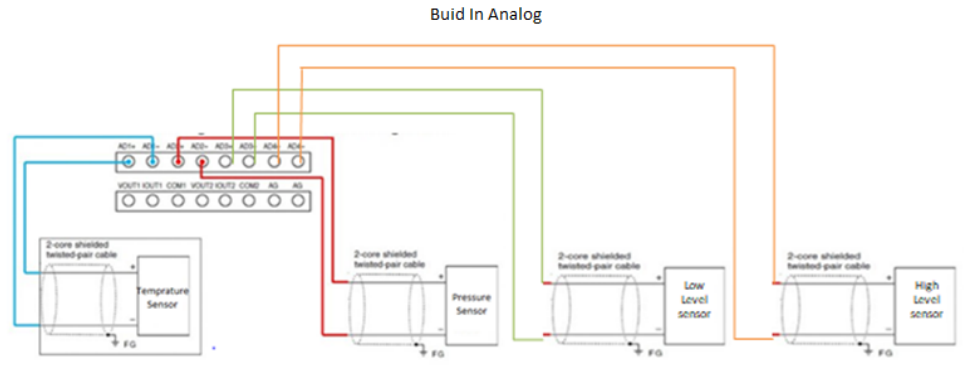
e3 = c1.sec2

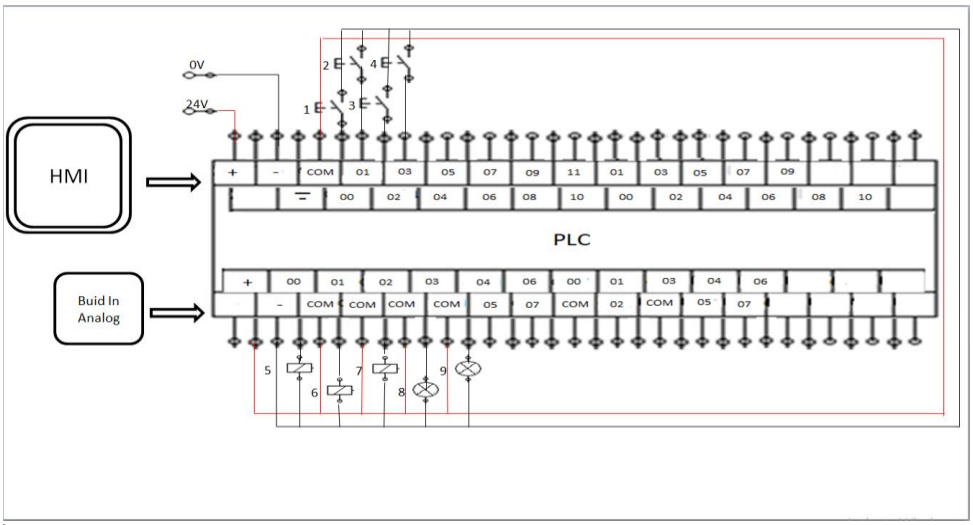
B- = Sec3

C- = Sec3

e1 =bo.co.Sec3

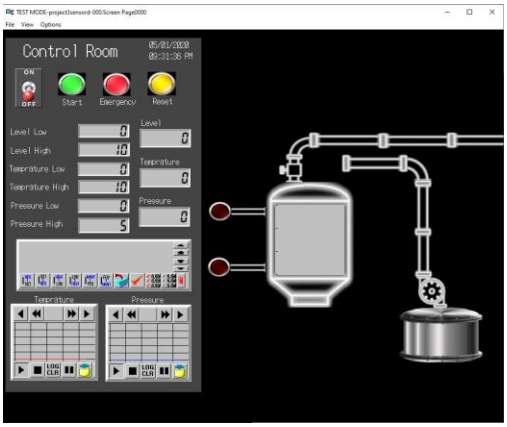
- **Wiring Digaram – PLC CP1H type CPU XA**

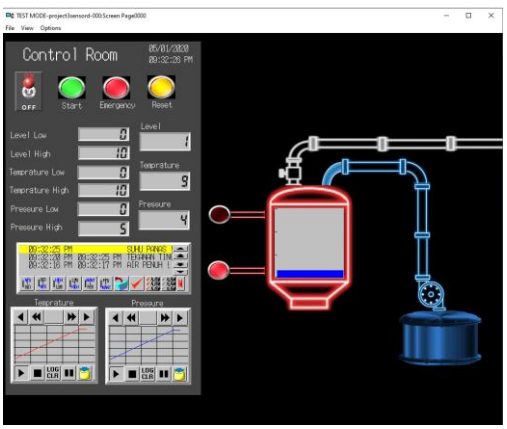


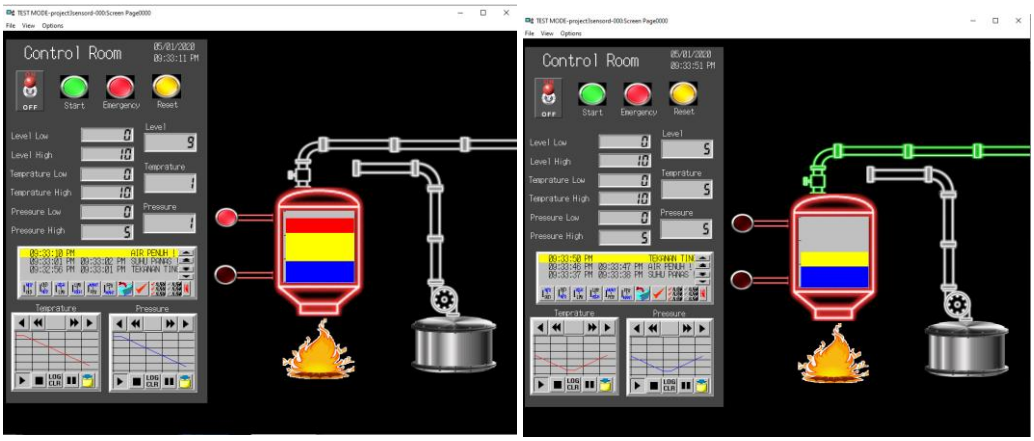


1 PB On
2 PB Start
3 PB Emergency
4 PB Reset
5 Pompa
6 Heater
7 Valve
8 Indicator High Level
9 Indcator Low Level

- **HMI Designed**







5. Data Communication

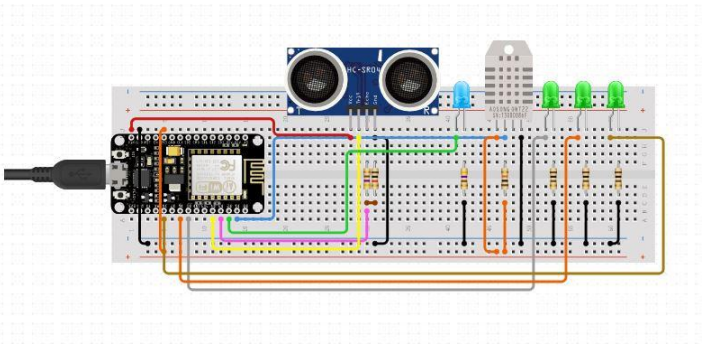
This project monitors henhouse conditions via an Android app. The ultrasonic sensor detects feed level — if the distance is too high, the feed is empty, and an LED indicator turns on. The temperature sensor monitors environmental temperature and humidity, triggering an indicator if values are abnormal.

Key Features:

- Android-based remote monitoring
- Automatic feed and temperature detection
- LED visual indicators for abnormal conditions

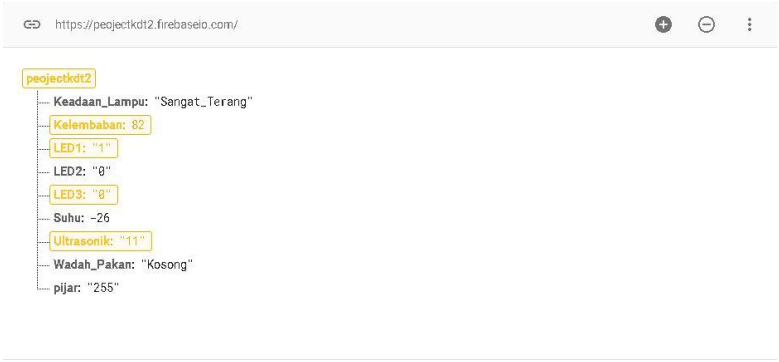
Technology: Arduino, Ultrasonic Sensor, DHT11, Android App, Wi-Fi Module

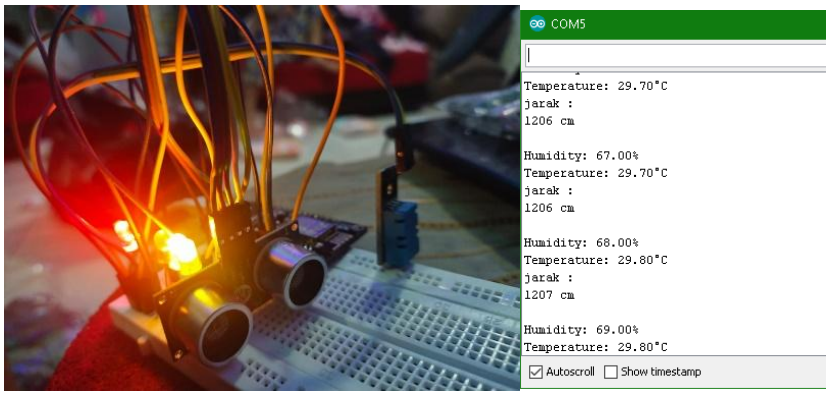
Wiring Diagram



Stucture Database with Firebase

Result





6. **Data Acquisition :** Control and monitor Henhouse : Temprature, Ultrasonic and water level (with Android Application)

Description :

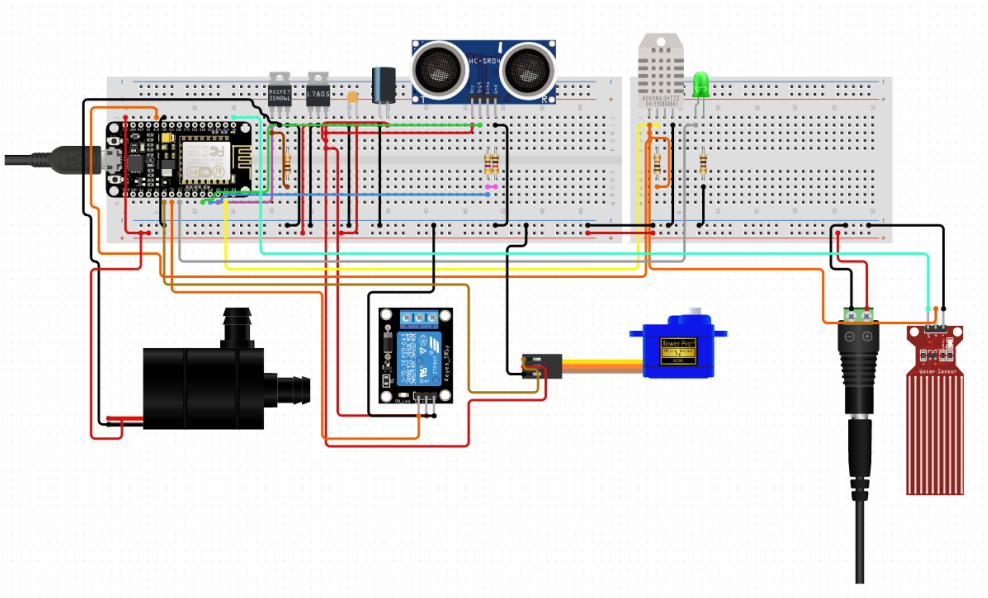
This IoT-based chicken coop management system monitors and controls feeding, drinking, and temperature via Android. It uses three sensors and actuators connected to Firebase for real-time data storage and control.

Key Features:

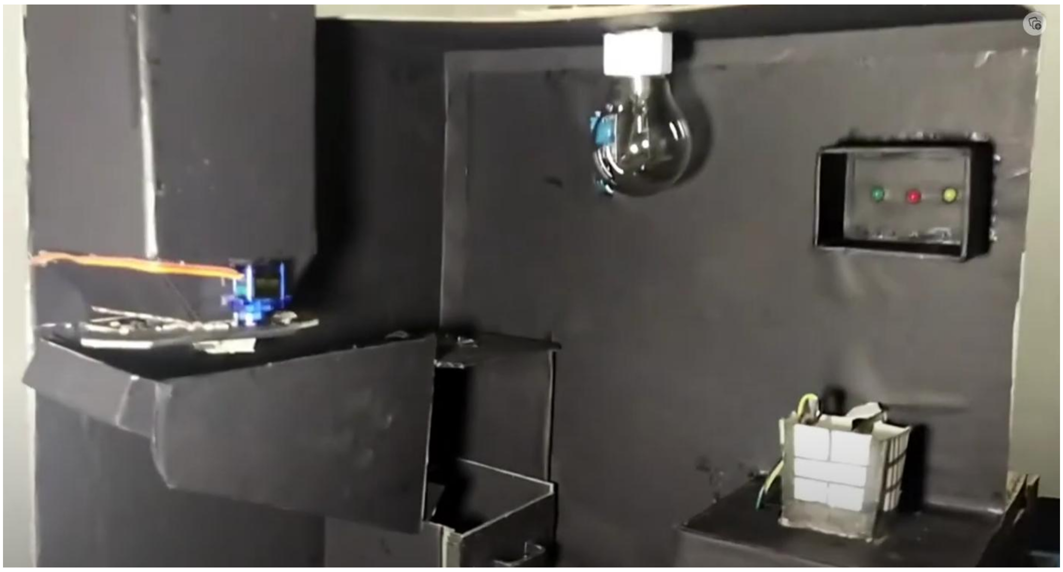
- IoT-based control and monitoring
- Firebase and Android integration
- Multi-sensor, multi-actuator automation

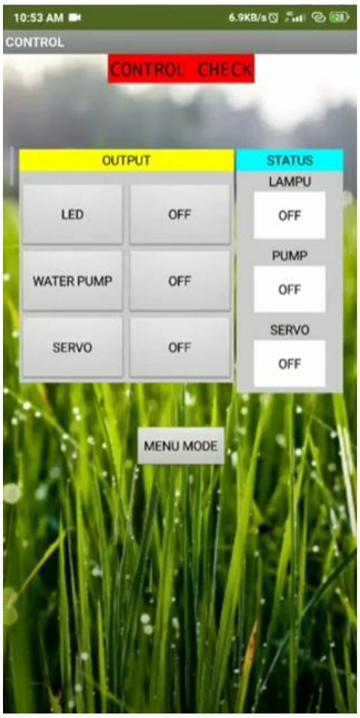
Technology: ESP32, Ultrasonic Sensor, DHT11, Water Level Sensor, Firebase, Android

Wiring electrical :



Result

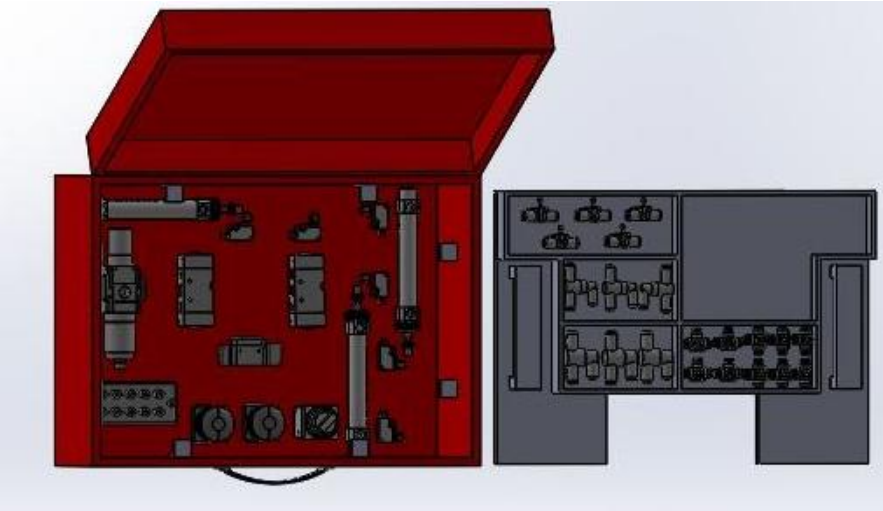




Youtube simulation : https://www.youtube.com/watch?v=CUOgQmq9LQ4

7. Production Planning Control

Product : Teaching Aid Pneumatic

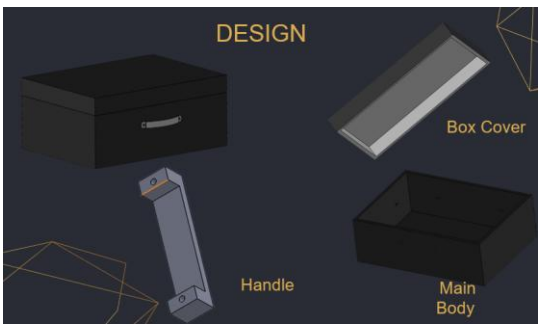


This teaching aid demonstrates **Production Planning and Control (PPC)** using pneumatic and electro-pneumatic components. The system includes 17 parts such as single/double cylinders, 3/2 and 5/2 valves, OR/AND fittings, and one-way flow controls.

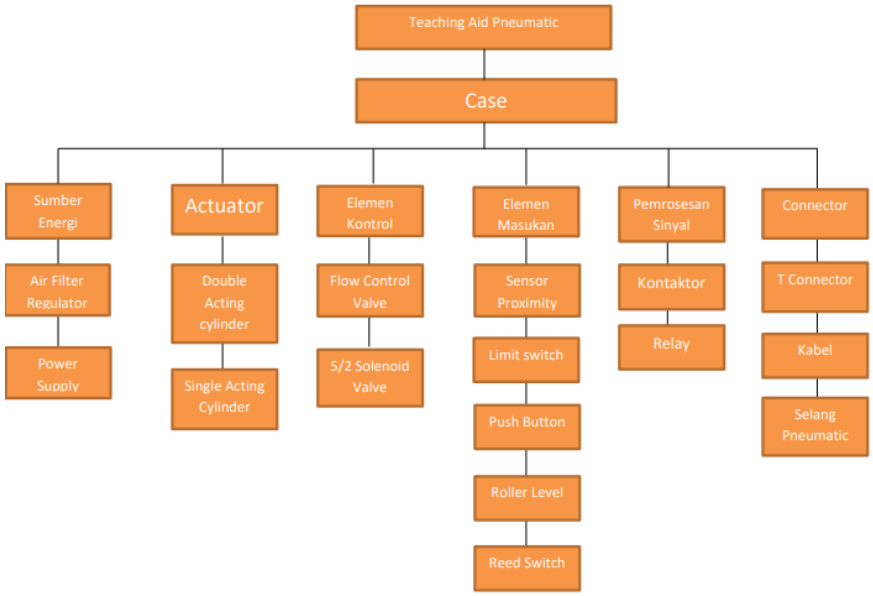
Key Features:

- Comprehensive pneumatic setup
- Full PPC process simulation
- Electro-pneumatic integration

Technology: Pneumatics, PLC, Electro-Pneumatic System



Structure of Product



Standard Operational

1. Use Pneumatic Teaching Aid at room temperature
2. Use Pneumatic Teaching Aid at Normal humidity
3. Open the Pneumatic Teaching Aid Suitcase in a horizontal position
4. Connect the air source to the Pneumatic regulator
5. Avoid sources of air with flammable gas content
6. Make sure the air pressure is not more than 4.5 bar
7. Connect the power source to a 24 VDC
8. Pneumatic Teaching Aid is ready to use
9. After using Pneumatic Teaching Aid, inventory components and ensure that no equipment is lost / damaged. The number of components can be checked by looking at the inventory card
10. Close the suitcase slowly and lock it.
11. Store Pneumatic Teaching Aid properly, not stacked, and not stored at the end of the table to prevent the suitcase from falling

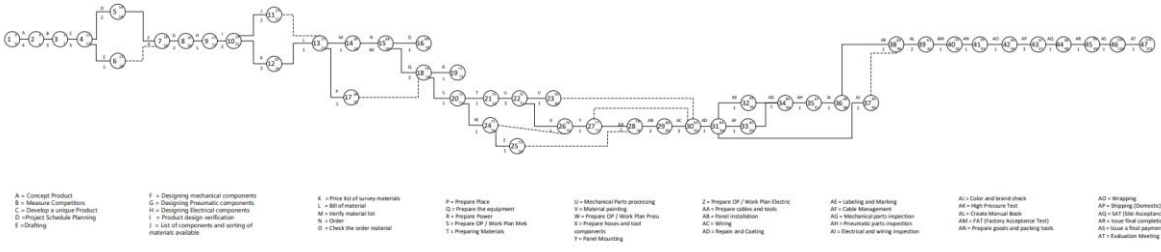
Schedulling and Networking

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors
1		**Manually Scheduled**	**101 days**	**Mon 04/01/21**	**Mon 24/05/21**	
2		**Initiation**	**12 days**	**Mon 04/01/21**	**Tue 19/01/21**	
3		Concept Product	4 days	Mon 04/01/21	Thu 07/01/21	
4		Measure competitors	3 days	Fri 08/01/21	Tue 12/01/21	3
5		Develop a unique Product	5 days	Wed 13/01/21	Tue 19/01/21	4
6		**General Concept Description**	**2 days**	**Wed 20/01/21**	**Thu 21/01/21**	
7		Project Schedule Planning	2 days	Wed 20/01/21	Thu 21/01/21	5
8		Drafting	1 day	Wed 20/01/21	Wed 20/01/21	5
9		**General Design Descriptions**	**9 days**	**Fri 22/01/21**	**Wed 03/02/21**	
10		Designing mechanical components	4 days	Fri 22/01/21	Wed 27/01/21	7;8
11		Designing Pneumatic components	2 days	Thu 28/01/21	Fri 29/01/21	10
12		Designing Electrical components	1 day	Mon 01/02/21	Mon 01/02/21	11
13		Product design verification	2 days	Tue 02/02/21	Wed 03/02/21	12
14		**General Material Component Descriptions**	**4 days**	**Thu 04/02/21**	**Tue 09/02/21**	
15		List of components and sorting of materials available	2 days	Thu 04/02/21	Fri 05/02/21	13
16		Price list of survey materials	3 days	Thu 04/02/21	Mon 08/02/21	13
17		Bill of material	1 day	Tue 09/02/21	Tue 09/02/21	15;16
18		**Ordering Materials**	**42 days**	**Wed 10/02/21**	**Thu 08/04/21**	
19		Verify material list	1 day	Wed 10/02/21	Wed 10/02/21	17
20		Order	40 days	Thu 11/02/21	Wed 07/04/21	19
21		Check the order material	1 day	Thu 08/04/21	Thu 08/04/21	20
22		**Preparation**	**44 days**	**Wed 10/02/21**	**Mon 12/04/21**	

Project: TeachingAidPneumatic
Date: Sat 19/12/20

Task	Inactive Summary	External Tasks	
Split	Manual Task	External Milestone	
Milestone	Duration-only	Deadline	
Summary	Manual Summary Rollup	Critical	
Project Summary	Manual Summary	Critical Split	
Inactive Task	Start-only	Progress	
Inactive Milestone	Finish-only	Manual Progress	

Page 1



A = Concept Product
B = Measure Competitors
C = Develop a unique Product
D = Project Schedule Planning
E = Drafting

F = Designing mechanical components
G = Designing Pneumatic components
H = Designing Electrical components
I = Product design verification
J = List of components and sorting of materials available

K = Price list of survey materials
L = Bill of material
M = Verify material list
N = Order
O = Check the order material

P = Prepare Place
Q = Prepare the equipment
R = Prepare Power
S = Prepare OP / Work Plan Mek
T = Preparing Materials

U = Mechanical Parts processing
V = Material painting
W = Prepare OP / Work Plan Pneu
X = Prepare hoses and tool components
Y = Panel Mounting

Z = Prepare OP / Work Plan Electric
AA = Prepare cables and tools
AB = Panel installation
AC = Wiring
AD = Repair and Coating

AE = Labeling and Marking
AF = Cable Management
AG = Mechanical parts inspection
AH = Pneumatic parts inspection
AI = Electrical and wiring inspection

AJ = Color and brand check
AK = High Pressure Test
AL = Create Manual Book
AM = FAT (Factory Acceptance Test)
AN = Prepare goods and packing tools

AO = Wrapping
AP = Shipping (Domestic)
AQ = SAT (Site Acceptance Test)
AR = Issue final completion documents
AS = Issue a final payment request
AT = Evaluation Meeting

Man Power

No	Design	Object	Activity	Time	Labor Rates	NoP	Amount	Information
1	Design	Initiation	Concept Product	2 days	Rp3.713.696	1	Rp3.713.696	Project Manager;Finance & Bussiness Management
2			Measure Competitors	2 days	Rp3.448.432	1	Rp3.448.432	Secretary production
3			Develop a unique Product	1 day	Rp5.950.860	1	Rp5.950.860	Project Manager;Sales Marketing 1
4		General Concept Description	Project Schedule Planning	2 days	Rp3.183.168	1	Rp3.183.168	Finance & Bussiness Management;Project Manager
5			Drafting	1 day	Rp2.917.904	1	Rp2.917.904	Finance & Bussiness Management;Project Manager
6		General Design Descriptions	Designing mechanical components	4 days	Rp4.314.176	1	Rp4.314.176	Designer Engineer;Drafter
7			Designing Pneumatic components	2 days	Rp3.755.008	1	Rp3.755.008	Designer Engineer;Drafter
8			Designing Electrical components	1 day	Rp3.475.424	1	Rp3.475.424	Designer Engineer;Drafter
9			Product design verification	2 days	Rp3.211.296	1	Rp3.211.296	Project Manager
10		General Material Component Descriptions	List of components and sorting of materials available	2 days	Rp743.744	1	Rp743.744	General Service;IT Staff 1
11			Price list of survey materials	3 days	Rp3.744.520	1	Rp3.744.520	Consultant Material
12			Bill of material	1 day	Rp2.958.296	1	Rp2.958.296	Consultant Material;Secretary production
13		Ordering Materials	Verify material list	1 day	Rp2.943.688	1	Rp2.943.688	Project Manager
14			Order	40 days	Rp0	1	Rp0	
15			Check the order material	1 day	Rp3.168.440	1	Rp3.168.440	Consultant Material

Bill Of Material

BILL OF MATERIAL PNEUMATIC TEACHING AID

1	Seven ACP PVDF Glossy	1), This is 650 * 450 mm 2), Thik 4 mm 3), Weight: 8.13Kg/m.	1	pcs	Rp 475.000,00	Rp 475.000	PT Impack Pratama.	
2	Black ABS Aluminum Tool Case	1), Design: Tool-MS1701 2), Size: 460*330*150mm 3), Color: Black 4), Material: ABS 5), Locks, handle with should strap.	1	pcs	Rp 330.000,00	Rp 330.000,00	MSAC CO.,LTD	
3	SMC Standard Air Cylinder CM2B20-75Z Double Acting	1), Stroke (mm) 75 2), Cushion Rubber cushion Pipe 3), Port Diameter 2 x Rc1/8	2	pcs	Rp 649.000,00	Rp 1.298.000	SMC Corporation.	
4	Rectangular Multi-connector KDM10P-04	1), Type: Connecting Plug Tube 2), Tubing Outside Diameter: 4mm 3), No Of Tube: 10	1	pcs	Rp 770.000,00	Rp 770.000,00	SMC Corporation.	
5	3/2 VM1000-4N-01 Roller Level	1), Conformity Tube Outside Diameter (φmm) 4 2), Number of Ports 3 Port 3), Operating Pressure Range (MPa) 0 to 0.8 4), Actuator Type Roller Lever	6	set	Rp 484.000,00	Rp 2.904.000,00	SMC Corporation.	
6	OR Fitting VR12 Series	1), Logic Function OR 2), Connection Type Tube 3), Tube Connections 4mm	5	pcs	Rp 370.000,00	Rp 1.850.000,00	SMC Corporation.	
7	AND Fitting VR12 Series	1), Logic Function AND 2), Connection Type Tube 3), Tube Connections 4mm	5	pcs	Rp 370.000,00	Rp 1.850.000,00	SMC Corporation.	

8. Distributed Control System (DCS) Integration

Description

This project monitors a testing station using **Wonderware Intouch** as the HMI, with **Omron** and **Siemens PLCs** acting as control stations. Data communication is managed via **KepServerEX6**.

Key Features:

- Multi-PLC integration
- Wonderware Intouch HMI
- Real-time industrial data communication

Technology: Wonderware Intouch, Omron PLC, Siemens PLC, KepServerEX6

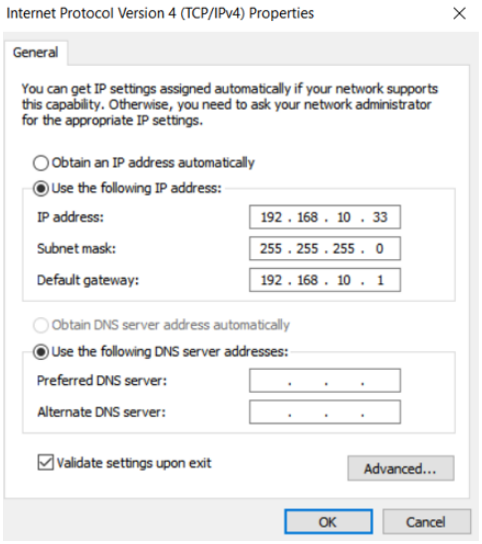
Communication Wiring

Connect PLC and PC with Switch HUB

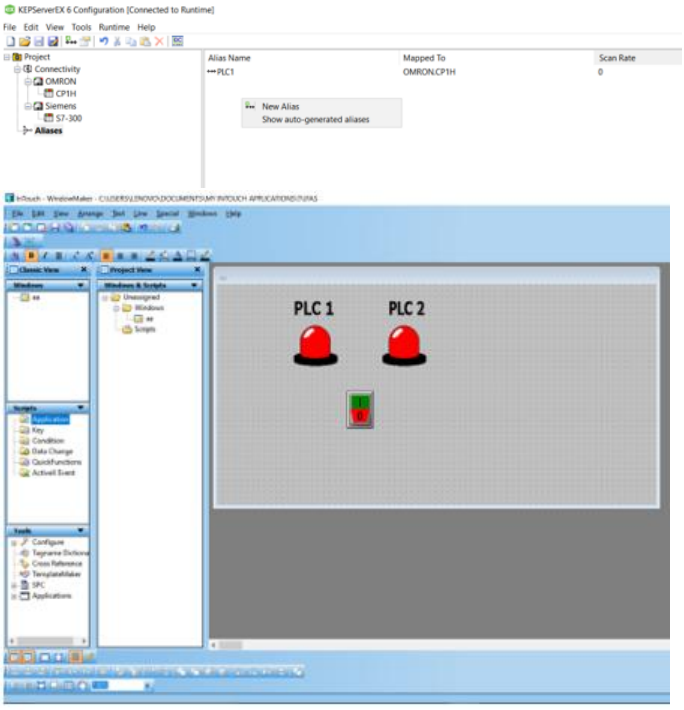
Network ID

IP PLC OMRON : 192.168.10.16

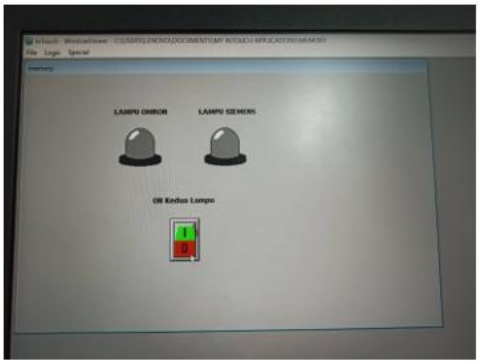
IP PLC Siemens : 192.168.10.6

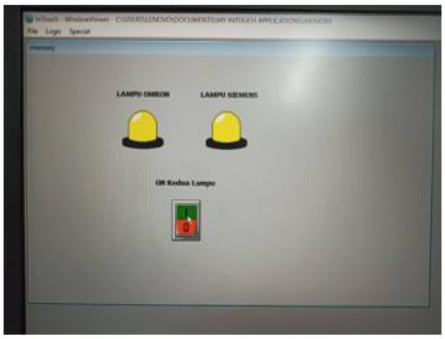


Design KepServerEX6 and Wonderware Intouch



Result





9. SCADA and DCS Study Casus

- **Decription**

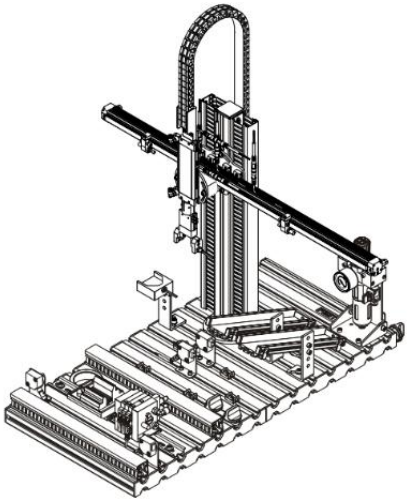
This SCADA/DCS project allows remote monitoring and control of multiple production plants using **Wonderware Intouch**. Data is logged to **SQL Server** and **Excel**, enabling centralized supervision and production analysis.

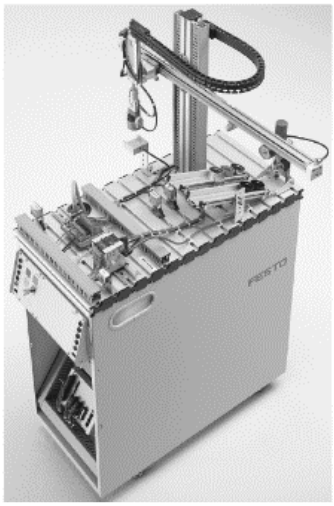
Key Features:

- Multi-plant remote monitoring
- Automated data acquisition and logging
- SQL Server and Excel integration

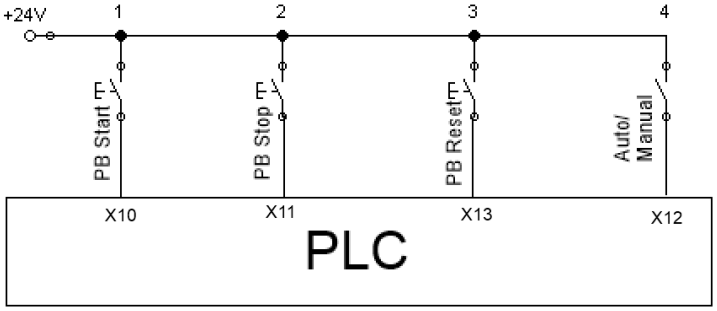
Technology: Wonderware Intouch, SCADA/DCS, SQL Server, Data Logging

- **Design**

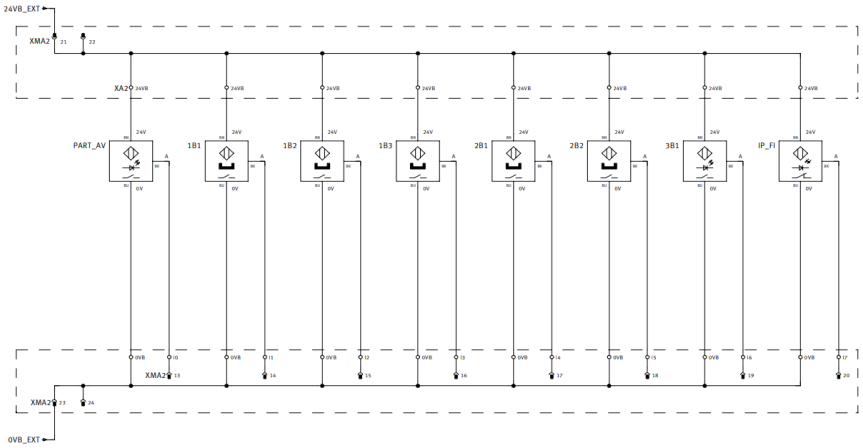




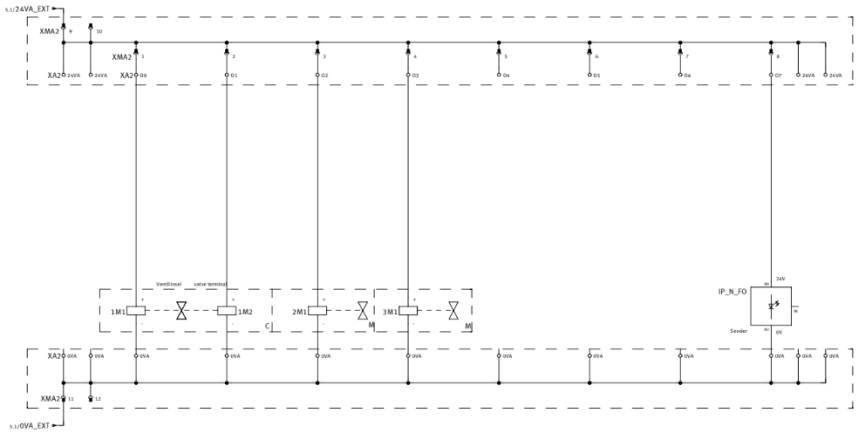
- **Wiring**



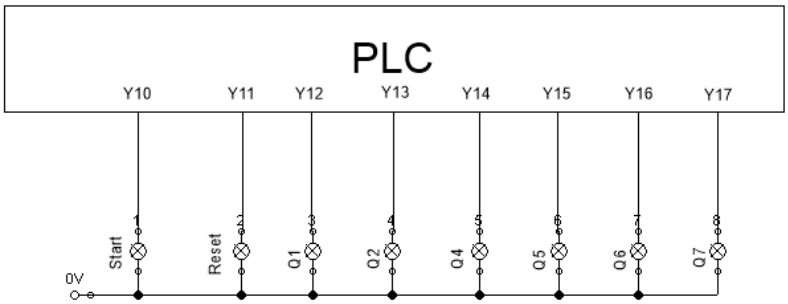
Input



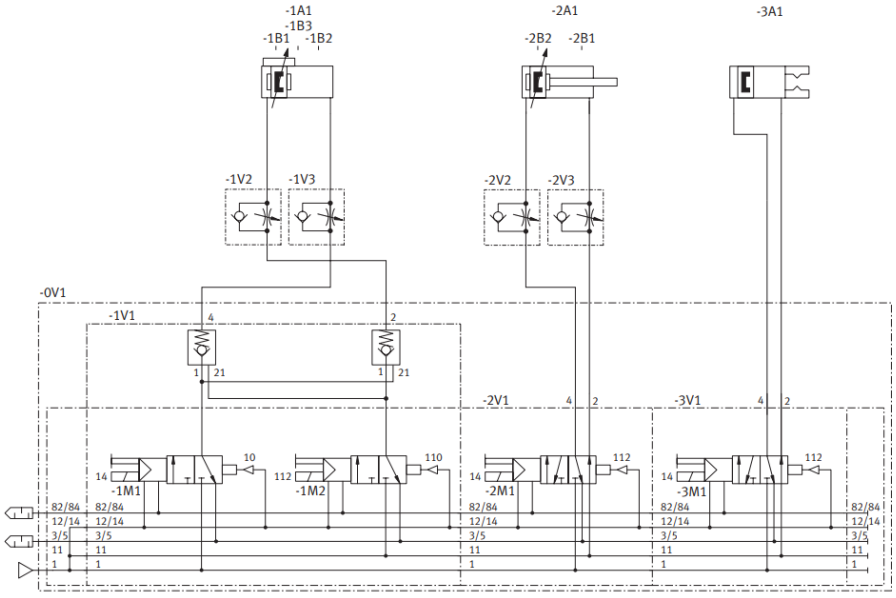
Sensor



Output

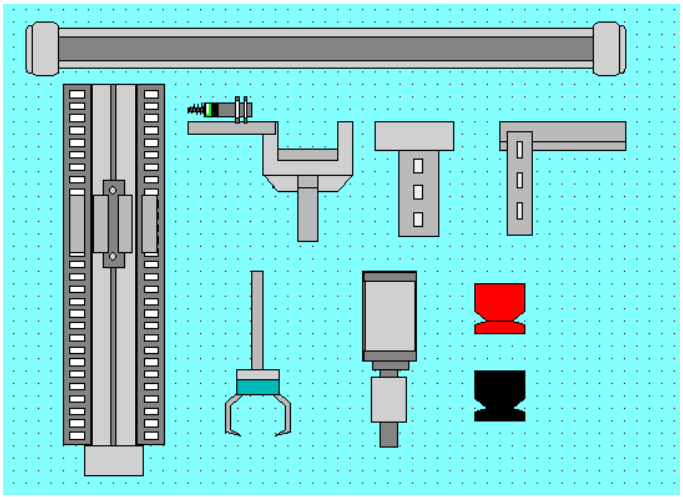


Indicator

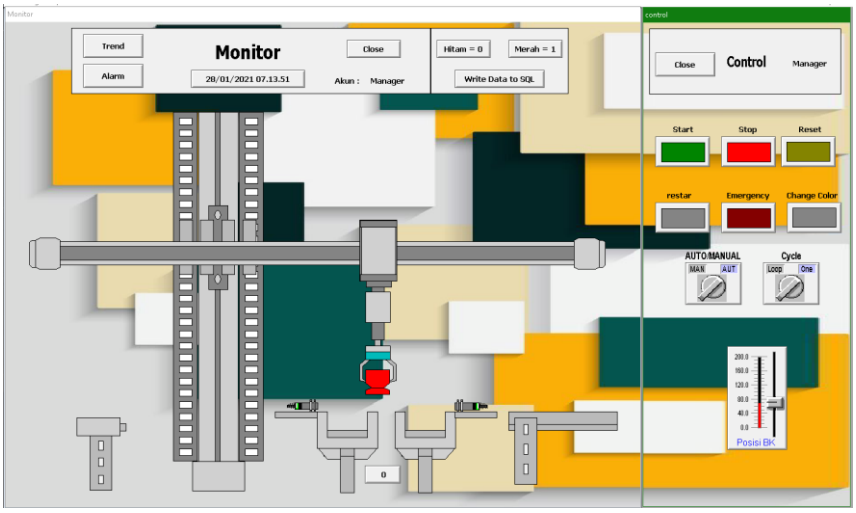


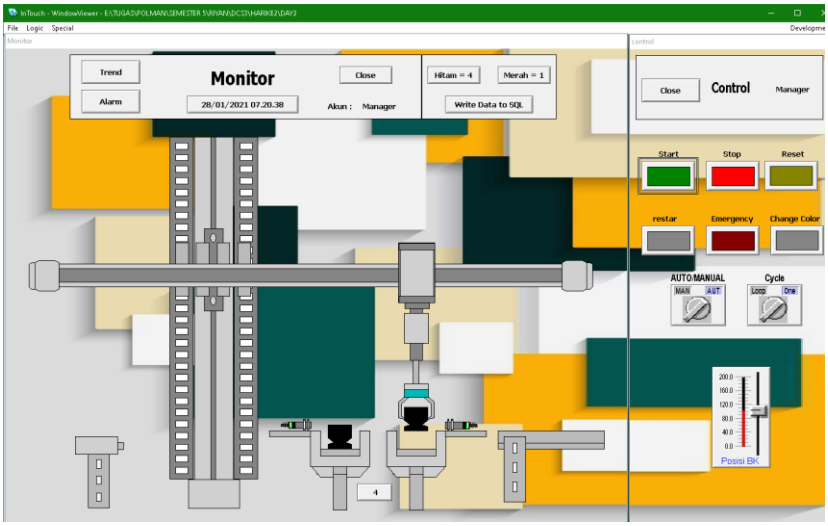
Pneumatic

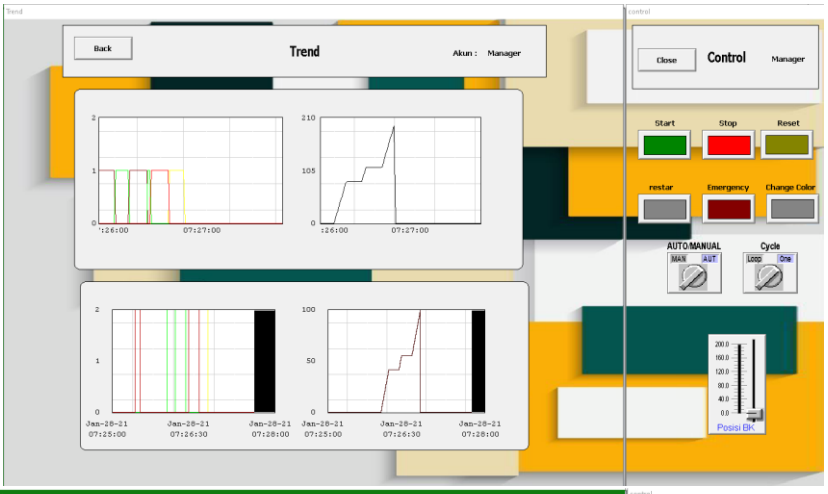
Design HMI

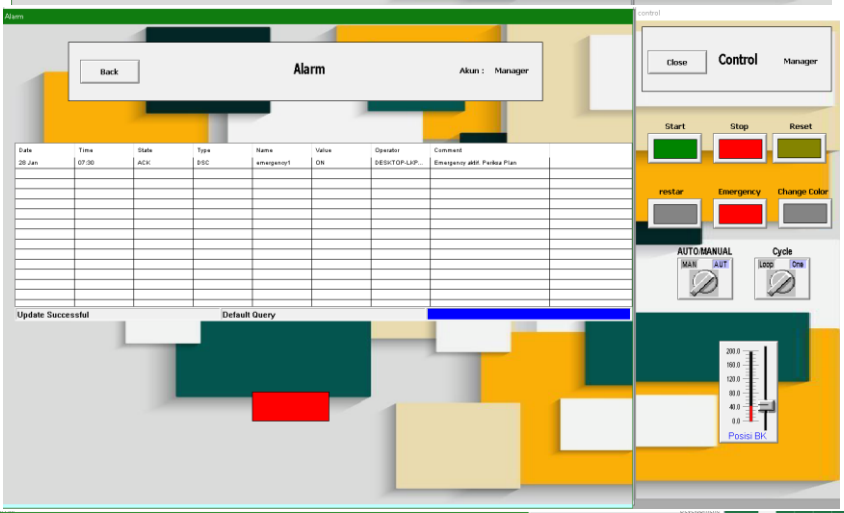


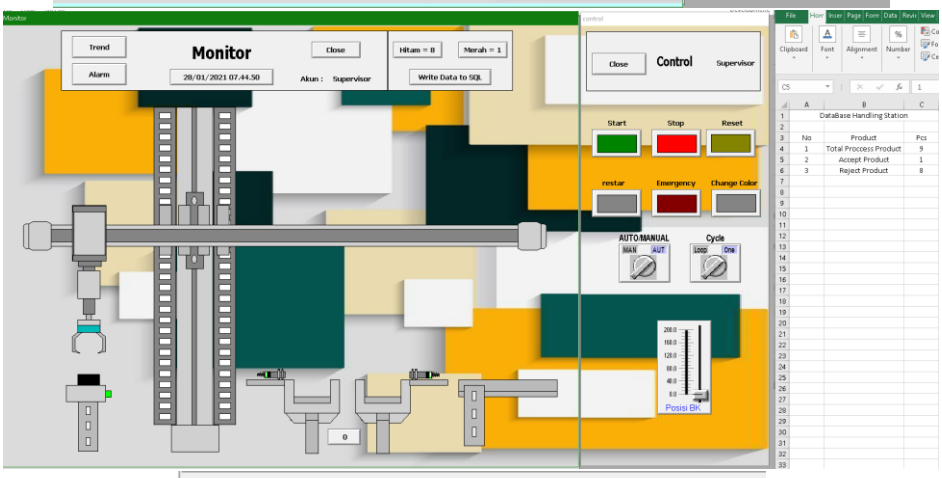
Result











Results | Messages

	DateTime	BendaH1	BendaM1	TotalProduct1
1	14/01/2021 22.28.04	4	3	NULL
2	14/01/2021 22.28.09	4	3	NULL
3	14/01/2021 22.29.42	5	3	NULL
4	14/01/2021 22.47.25	1	0	NULL
5	14/01/2021 22.51.39	1	1	2
6	16/01/2021 10.30.55	1	1	2
7	18/01/2021 19.23.48	0	0	0
8	18/01/2021 19.24.51	1	0	1
9	28/01/2021 07.43.56	8	1	9

10. Internship Project : Control and Monitor Air Conditioner Server room Polman Bandung

Description :

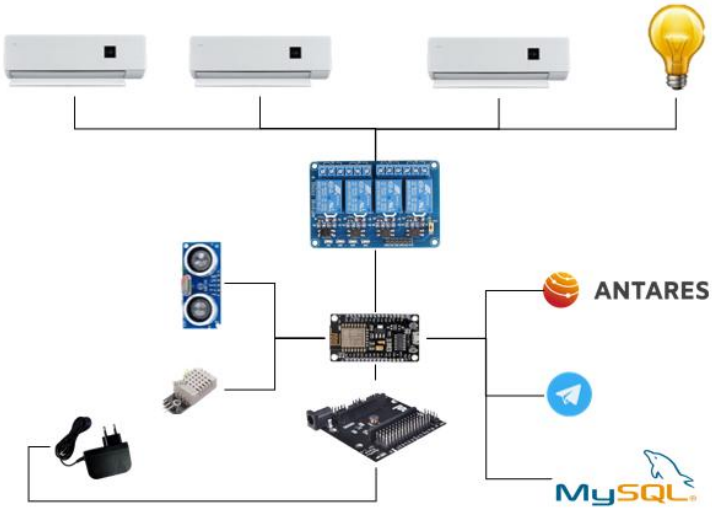
This system controls three air conditioners in the **Polman Bandung** server room, alternating every two days. Temperature data is stored in **MySQL** and **Antares**, with automatic notifications sent to operators when temperatures exceed thresholds.

Key Features:

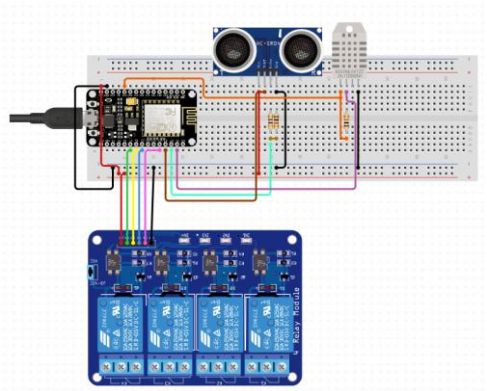
- Automatic rotation of three AC units
- Cloud-based temperature logging
- Ultrasonic motion detection for lighting control

Technology: ESP32, Ultrasonic Sensor, MySQL, Antares IoT, Cloud Notification

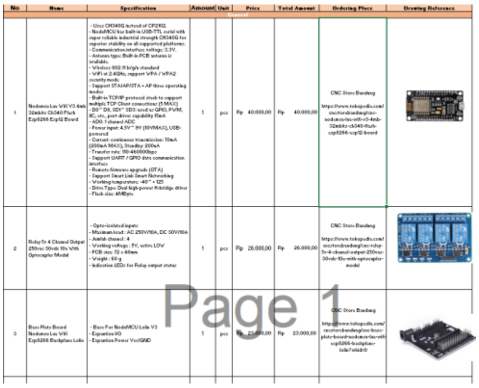
Design system



Wiring



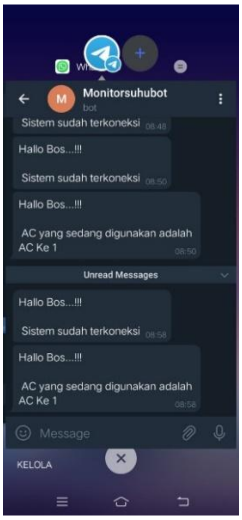
Bill of Material



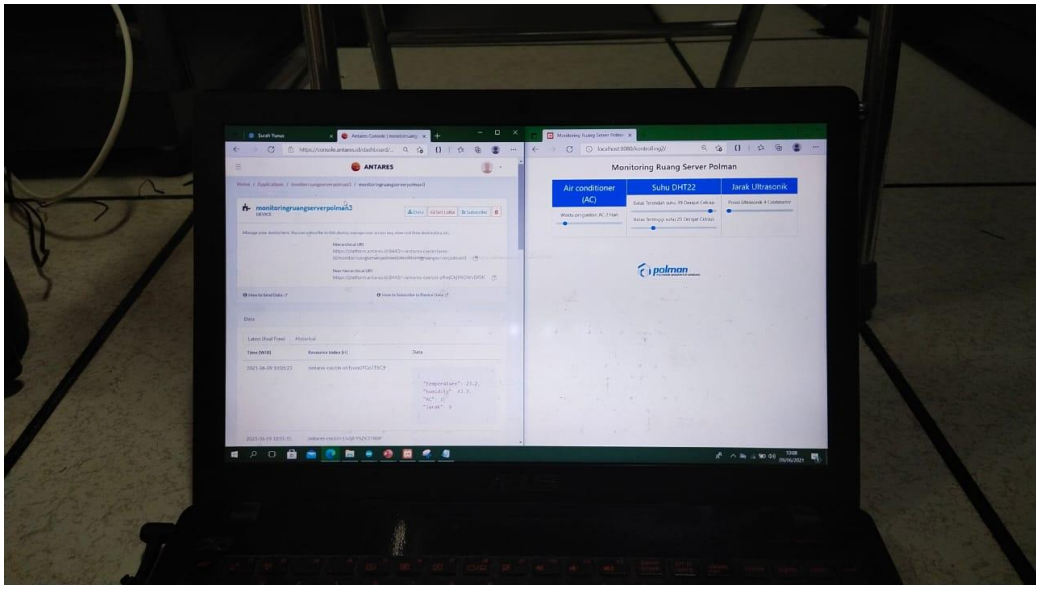
No	Name	Specification	Amount	Unit	Price	Total Amount	Ordering Place	Drawing Reference
		General						
1	Nodemcu Lua WiFi V3 4mb 32mbits Ch340 Flash Esp8266 Esp12 Board	- Uses CH340G instead of CP2102. - NodeMCU has built-in USB-TTL serial with super reliable industrial strength CH340G for superior stability on all supported platforms. - Communication interface voltage: 3.3V. - Antenna type: Built-in PCB antenna is available. - Wireless 802.11 b/g/n standard - WiFi at 2.4GHz, support WPA / WPA2 security mode - Support STA/AP/STA + AP three operating modes - Built-in TCP/IP protocol stack to support multiple TCP Client connections (5 MAX) - D0 ~ D8, SD1 ~ SD3: used as GPIO, PWM, IIC, etc., port driver capability 15mA - AD0: 1 channel ADC - Power input: 4.5V ~ 9V (10VMAX), USB-powered - Current: continuous transmission: 70mA (200mA MAX), Standby: 200uA - Transfer rate: 110-460800bps - Support UART / GPIO data communication interface - Remote firmware upgrade (OTA) - Support Smart Link Smart Networking - Working temperature: -40 ~ + 125 - Drive Type: Dual high-power H-bridge driver - Flash size: 4MByte	1	pcs	Rp 40.000,00	Rp 40.000,00	CNC Store Bandung https://www.tokopedia.com/cncstorebandung/cnc-nodemcu-lua-wifi-v3-4mb-32mbits-ch340-flash-esp8266-esp12-board	
2	Relay 5v 4 Channel Output 250vac 30vdc 10a With Optocoupler Modul	- Opto-isolated inputs - Maximum load : AC 250V/10A, DC 30V/10A - Jumlah channel : 4 - Working voltage : 5V, active LOW - PCB size: 72 x 48mm - Weight : 60 g - Indication LEDs for Relay output status	1	pcs	Rp 26.000,00	Rp 26.000,00	CNC Store Bandung https://www.tokopedia.com/cncstorebandung/cnc-relay-5v-4-channel-output-250vac-30vdc-10a-with-optocoupler-modul	
3	Base Plate Board Nodemcu Lua WiFi Esp8266 Backplane Lolin	- Base For NodeMCU Lolin V3 - Expansion I/O - Expansion Power Vcc/GND	1	pcs	Rp 23.000,00	Rp 23.000,00	CNC Store Bandung https://www.tokopedia.com/cncstorebandung/cnc-base-plate-board-nodemcu-lua-wifi-esp8266-backplane-lolin?whid=0	

Implementation

Notification to Operator Telegram



Monitoring in operator PC



11. Internship Project : Control Ventilator Indonesia

Description :

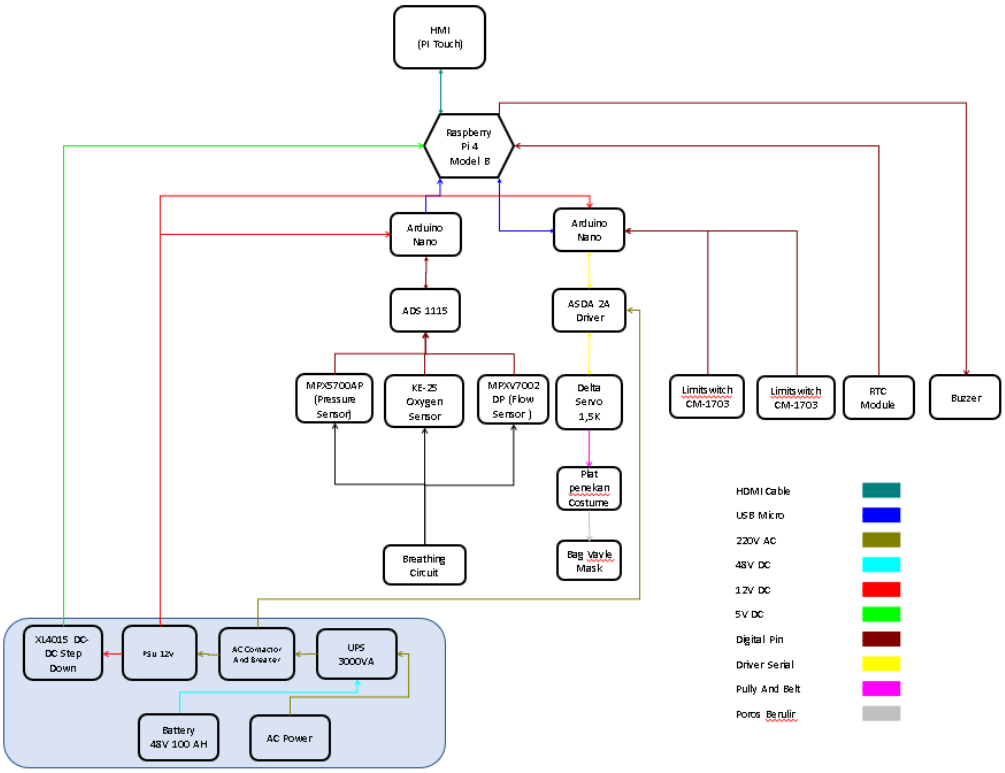
This ventilator system was designed for COVID-19 patients, featuring **Volume Control** and **Pressure Control** modes. It uses pressure, oxygen, and flow sensors to calculate control parameters for the servo motor. Equipped with HMI alarms and integrated with **Node-RED** for remote monitoring.

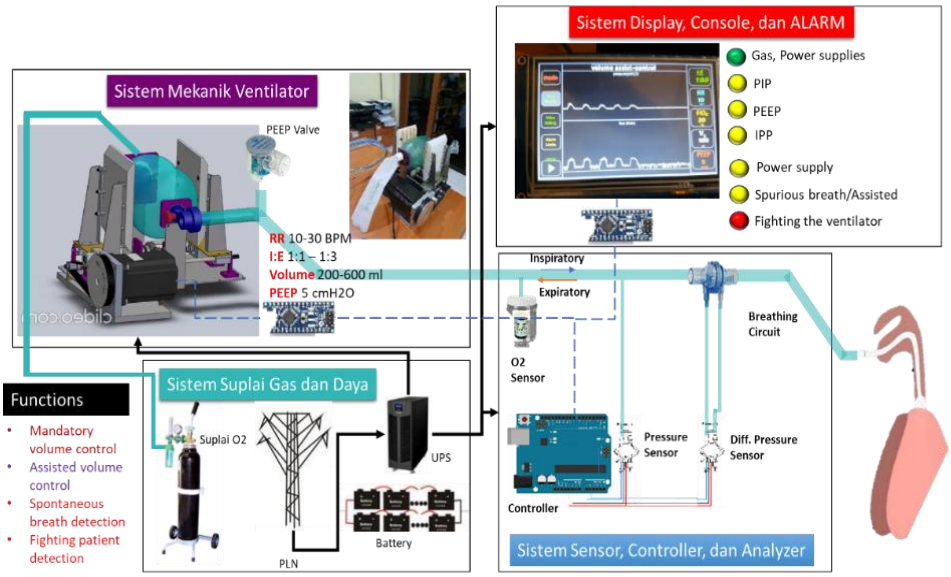
Key Features:

- Dual control modes (Volume/Pressure)
- HMI with visual and audible alarms
- Node-RED-based monitoring

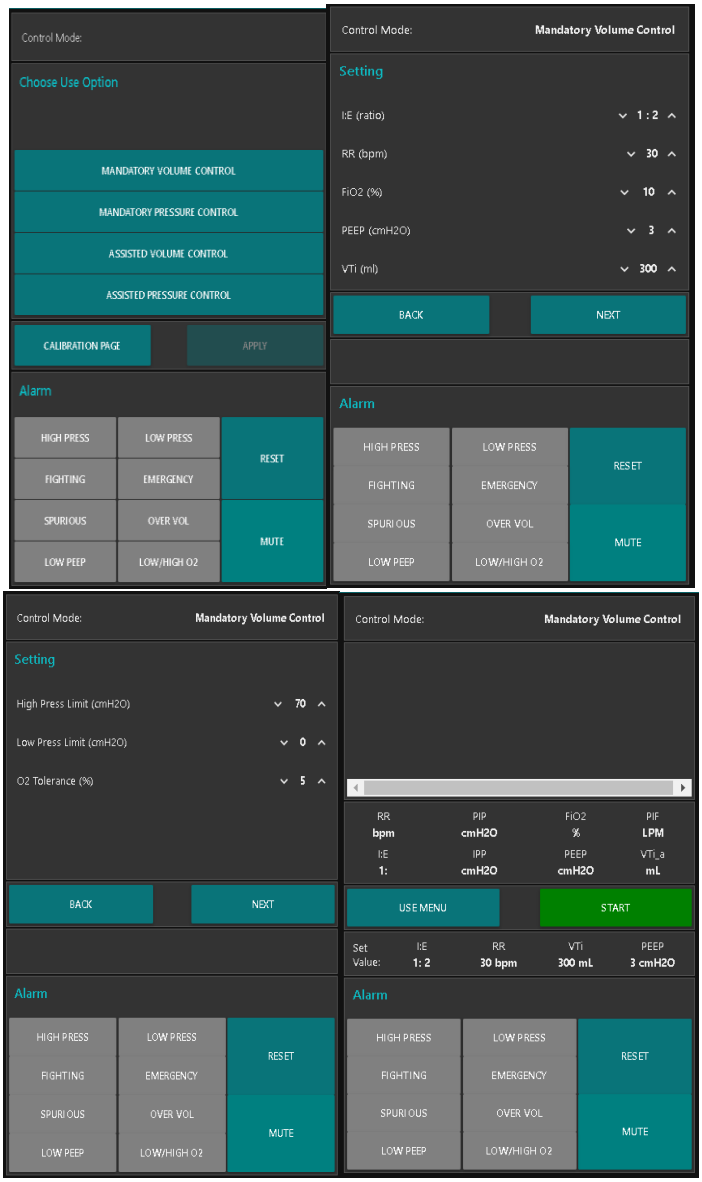
Technology: ESP32, Pressure Sensor, Flow Sensor, Node-RED, HMI

Design


HMI
(PI Touch)
Raspberry
Pi 4
Model B
Arduino
Nano
Arduino
Nano
ADS 1115
ASDA 2A
Driver
MPX5700AP
(Pressure
Sensor)
KE-25
Oxygen
Sensor
MPXV7002
DP (Flow
Sensor)
Delta
Servo
1,5K
Limitswitch
CM-1703
Limitswitch
CM-1703
RTC
Module
Buzzer
Plat
penekan
costume
Breathing
Circuit
Bag Vavle
Mask
XL4015 DC-
DC Step
Down
Psu 12v
AC Contactor
And Breaker
UPS
3000VA
Battery
48V 100 AH
AC Power
HDMI Cable
USB Micro
220V AC
48V DC
12V DC
5V DC
Digital Pin
Driver Serial
Pully And Belt
Poros Berulir


Sistem Display, Console, dan ALARM
Gas, Power supplies
PIP
PEEP
IPP
Power supply
Spurious breath/Assisted
Fighting the ventilator
Sistem Mekanik Ventilator
PEEP Valve
RR 10-30 BPM
I:E 1:1 – 1:3
Volume 200-600 ml
PEEP 5 cmH2O
Inspiratory
Expiratory
Breathing
Circuit
O2
Sensor
Pressure
Sensor
Diff. Pressure
Sensor
Controller
Sistem Sensor, Controller, dan Analyzer
Sistem Suplai Gas dan Daya
Suplai O2
UPS
Battery
PLN
Functions
Mandatory volume control
Assisted volume control
Spontaneous breath detection
Fighting patient detection

Interface HMI



Implementation

12. **Final Project : Design and Build Multi Device Infusion Control and Monitoring System Based on the Internet of Things**

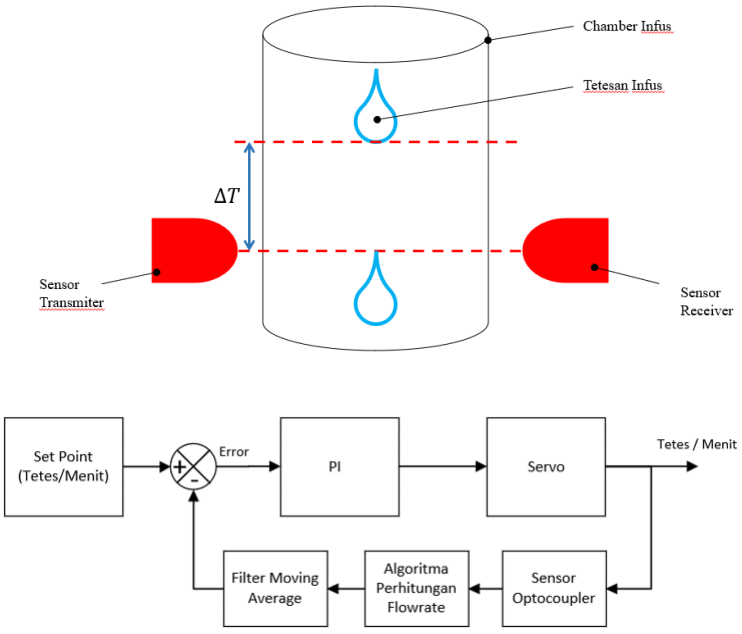
This IoT-based research project develops three infusion devices capable of flowrate control and hazard monitoring, including air bubble detection, blockage, and empty infusion. Data is transmitted via **MQTT** to a **Node-RED Server**, visualized on **Nextion HMI** and nurse monitoring screens. Each device includes a mini UPS for power backup. There is motor servo can control how much the pressing to pipe infusion using PID base on flowrate that set by the operator.

Key Features:

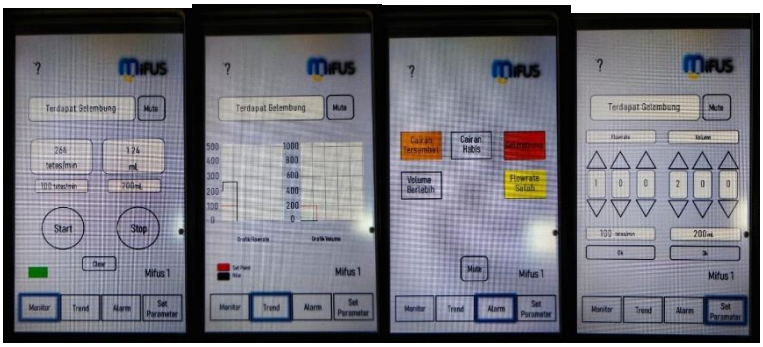
- Multi-device infusion control and monitoring
- Cloud communication using MQTT protocol
- Real-time hazard detection and power backup
- PID flowarate with servo motor and infrared sensor calculation

Technology: ESP32, IR & Bubble Sensors, Servo Motor, Node-RED, MQTT, MySQL, UPS

Flowrate PID Control



HMI Nextion



Dashboard in Server Room