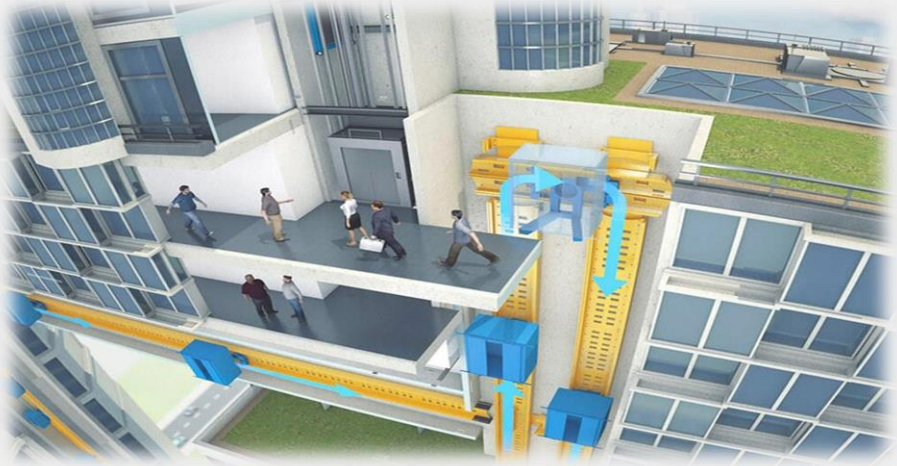

Design Real Elevator & Prototype Implementation

New Engineers Basic Training MITSUBISHI ELECTRIC

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Project Members

Ahmed Abdelhamed

Aviation Mechanics Engineer

Graduate from Zagazig University
2024

Mohamed Ashraf

Electric Power Engineer

Graduate from Cairo University
2024

Outline

- Training Benefits
- Project Overview & Introduction
- Traffic Analysis & Model Selection
- Prototype Structure Design
- Prototype Electronics
- Manufacturing
- Testing & Results

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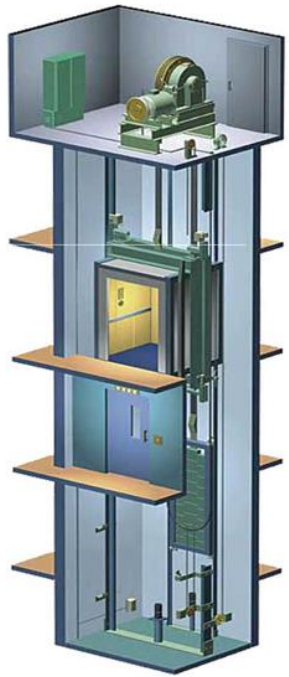
Training Benefits

Technical Skills

- Elevators mechanical system.
- Elevators power system and control unit.
- Project management (planning & scheduling and cost study.
- Safety tools.



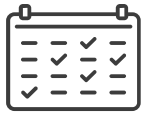
Training Benefits

Soft Skills

Leadership

Decision Making

Teamwork



Time Management

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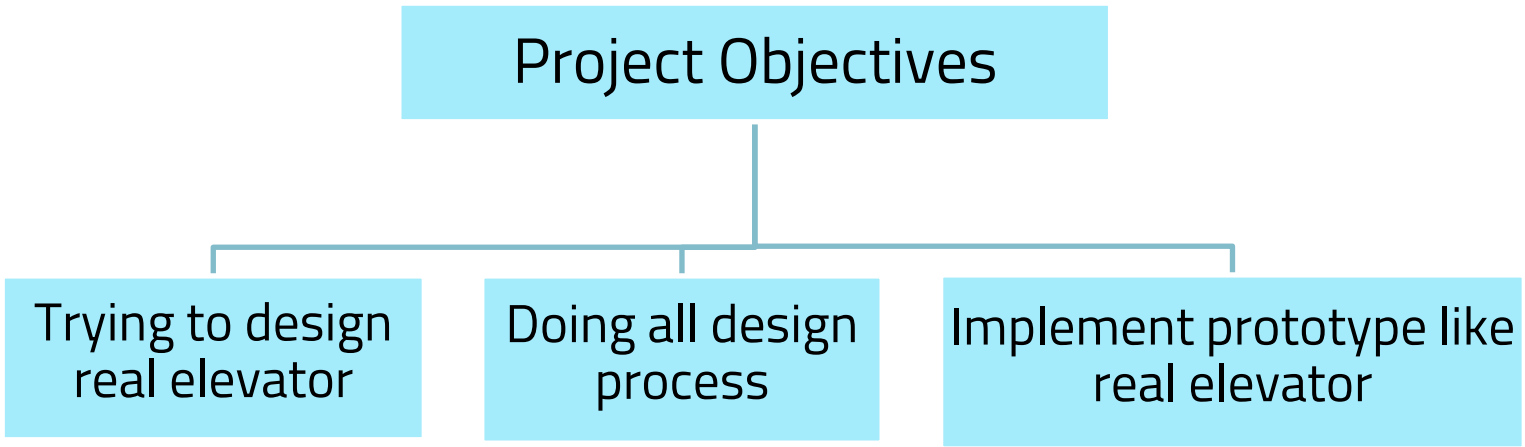
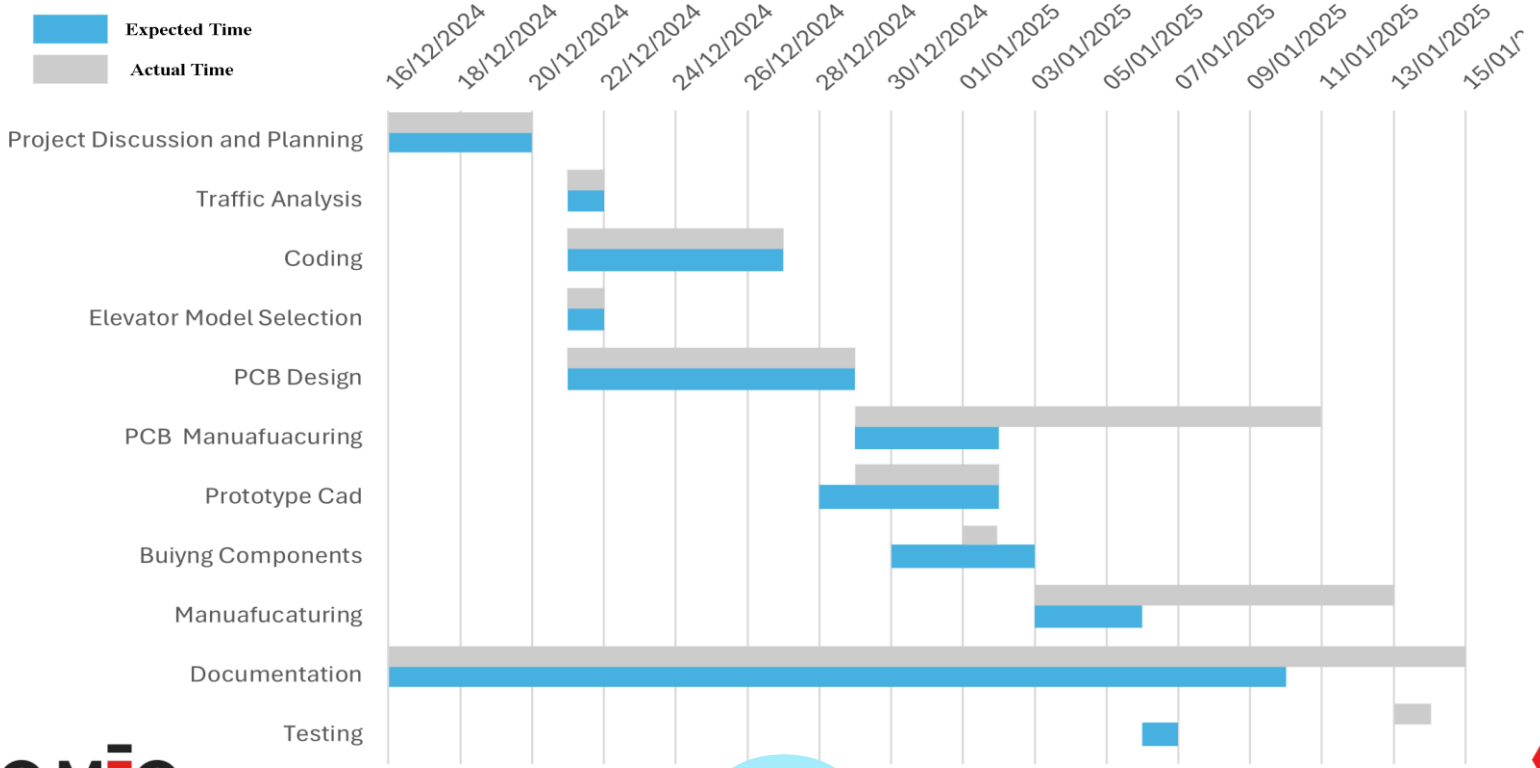
Project Overview & Introduction



Project Overview & Introduction

Project Schedule



Project Overview & Introduction

Literature Review

- Reading Books
- YouTube search
- Last Projects

- Training Benefits
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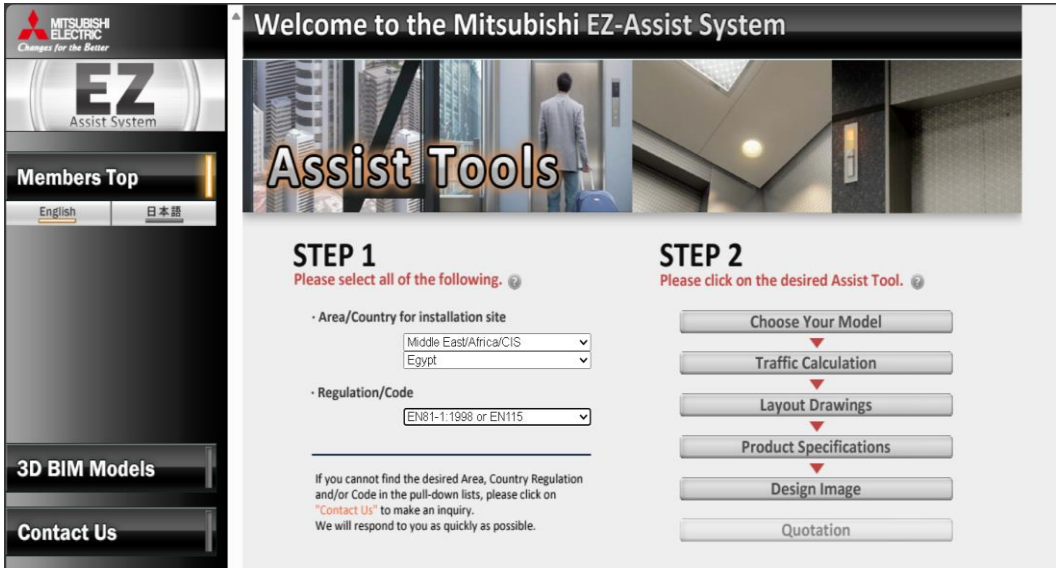
Traffic Analysis & Model Selection

Mitsubishi EZ-Assist System

- Traffic calculation
- Choose elevator model
- Layout drawings
- Product specifications



Traffic Analysis & Model Selection

Input Specifications

1. Traffc information

Building usage	Residence
Traffic ratio Up:Down	1:1
Loading rate	30
Transfer time	Mitsubishi standard

2. Elevator specification

Area	General
Model name	NEXIEZ-MRL
Door type	2S
Landing open	Yes

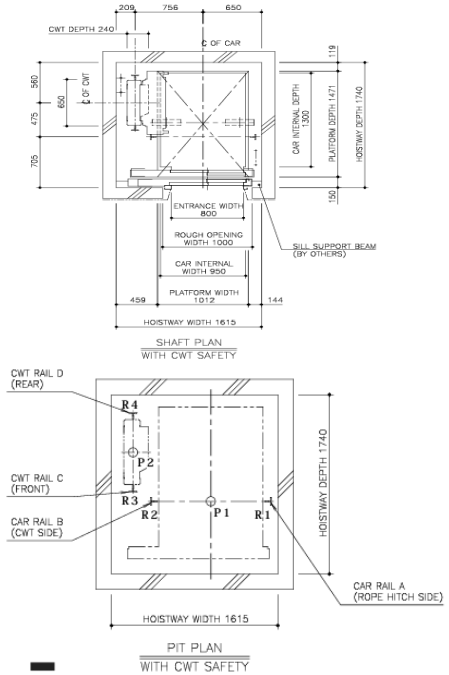
Bank	1
No. of passengers	6
Speed[m/s]	1.00
Entrance width[mm]	800
No. of units	1

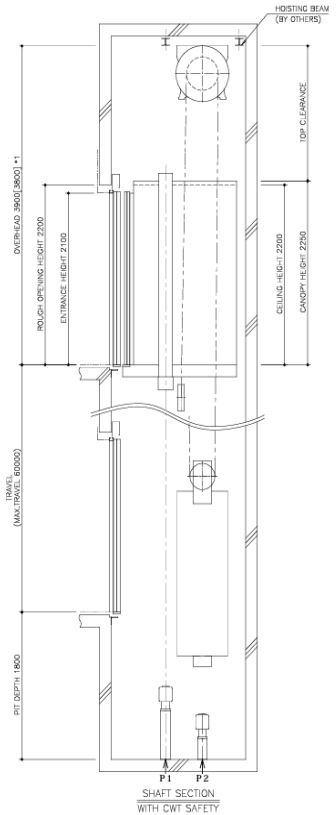
3. Building specification

Name	Height[mm]	Population	Group	Departure ratio
4		20	1	
3	3000	20	1	25
2	3000	20	1	25
1	2500	0	D	50

Traffic Analysis & Model Selection

Output File

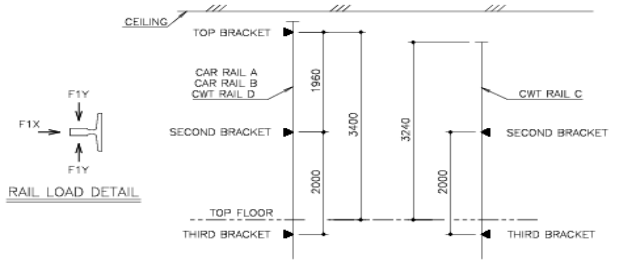




SPECIFICATIONS

SERIES		NEXIEZ-MRL (MODEL CODE : GQXL2)
LOAD		450 kg
NO. OF PERSONS		6
SPEED		1.0/1.6 m/s [60/96 m/min]
REGULATION / CODE		EN81-1
TRAVEL		MAX.TRAVEL : 60 m
DOOR TYPE		2S (BS)
CAR CEILING TYPE		S00 (STD)
ENTRANCE FRAME TYPE		E-102 (STD) LINTEL AND NARROW JAMB
GUIDE RAIL	CAR	T75-3/B
	CWT	T75-3/B
CWT SAFETY		APPLIED

RAIL REACTION LOAD



CAR RAIL				CWT RAIL			
A (ROPE HITCH SIDE)		B (CWT SIDE)		C (FRONT)		D (REAR)	
F1X	F1Y	F1X	F1Y	F1X	F1Y	F1X	F1Y
1427 N	3953 N	1427 N	1323 N	1571 N	3947 N	1571 N	3947 N

PIT REACTION LOAD

	RAIL REACTION LOAD				BUFFER REACTION LOAD	
	R1	R2	R3	R4	P1	P2
WITH CWT SAFETY	31000 N	22000 N	35000 N	32000 N	61000 N	52000 N

POWER FEEDER DATA 1CAR

MOTOR [kW]	STANDARD VOLTAGE 200V			STANDARD VOLTAGE 400V			POWER SUPPLY CAPACITY [kVA]	HEAT EMISSION [W]
	CURRENT		BREAKER IN CONTROL PANEL [A]	CURRENT		BREAKER IN CONTROL PANEL [A]		
	FLU [A]	FLAcc [A]		FLU [A]	FLAcc [A]			
2.8	15	25	20	8	13	15	4	740

POWER CRRENT CORRESPONDING TO LOCAL SUPPLY VOLTAGE (FLU or FLAcc) [A]
= EACH CURRENT (FLU or FLAcc)[A] × STANDARD VOLTAGE (E1 or E2)[V] / LOCAL SUPPLY VOLTAGE (V)

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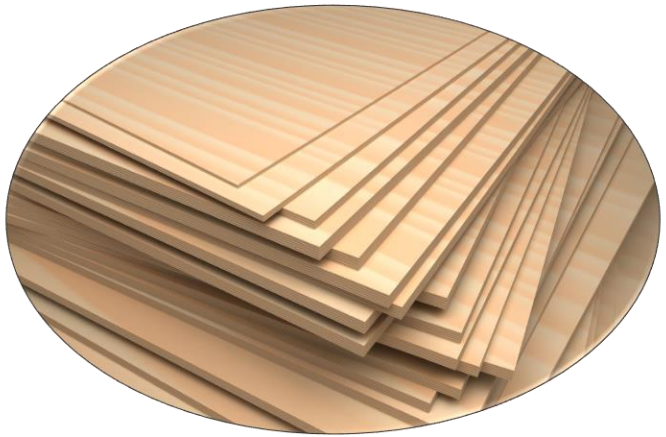
Prototype Structure Design

Structure Material(Plywood)

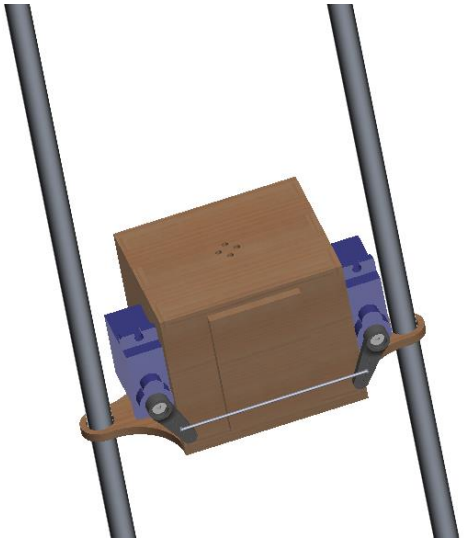
- Low cost
- Hight strength
- Ease of manufacturing



Prototype Structure Design

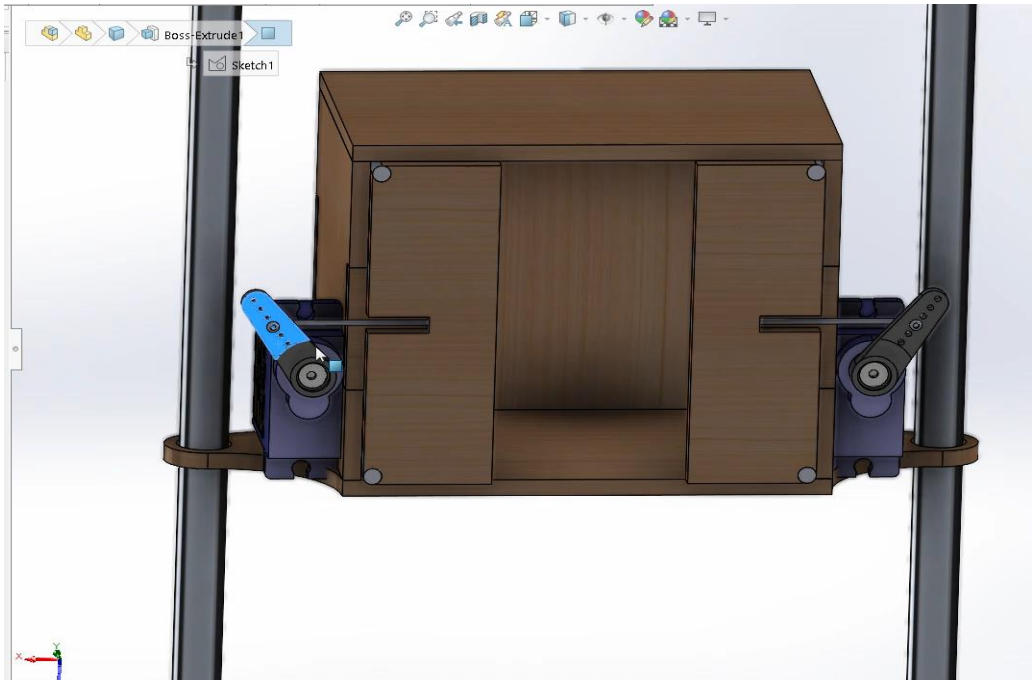
Cabine &CW Guide Rails(Circular Rodes)

- Smooth Movement
- Hight strength
- Ease of manufacturing



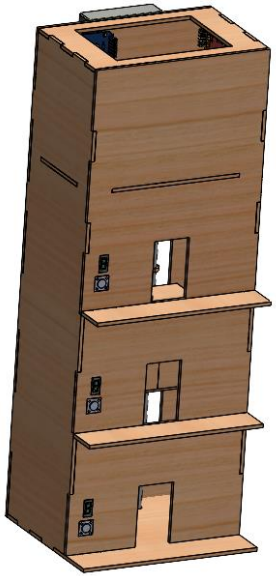
Prototype Structure Design

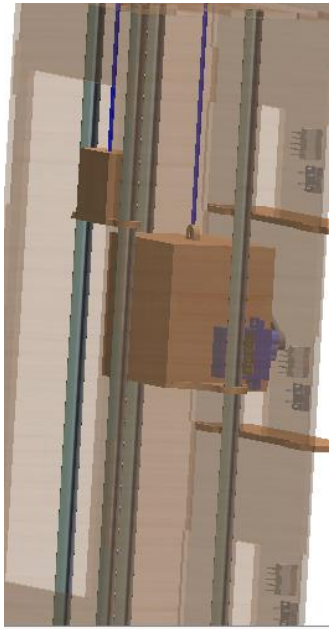
Cabine Door Mechanism

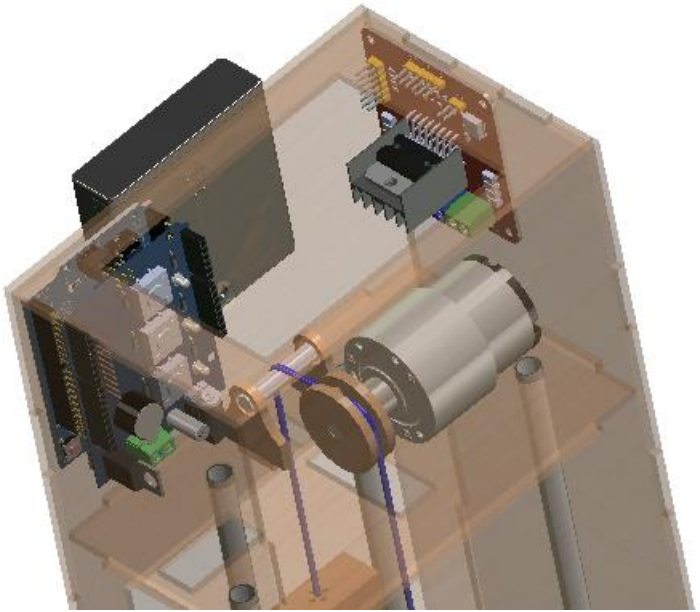


Prototype Structure Design

Final Structure







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Prototype Electronics

PCB Board

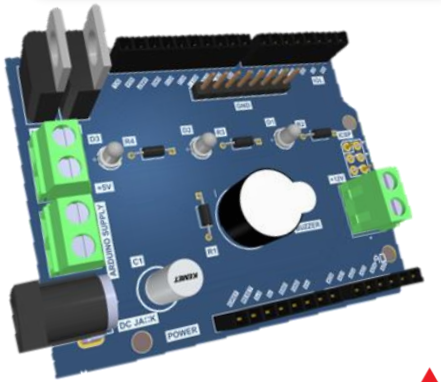
Single layer PCB

Using shield technique

- Robust design
- Easily assembled
- No need for wires

Printed locally & assembled manually

Tested for malfunctions



Prototype Electronics

Microprocessor (ARDUINO UNO)

Features

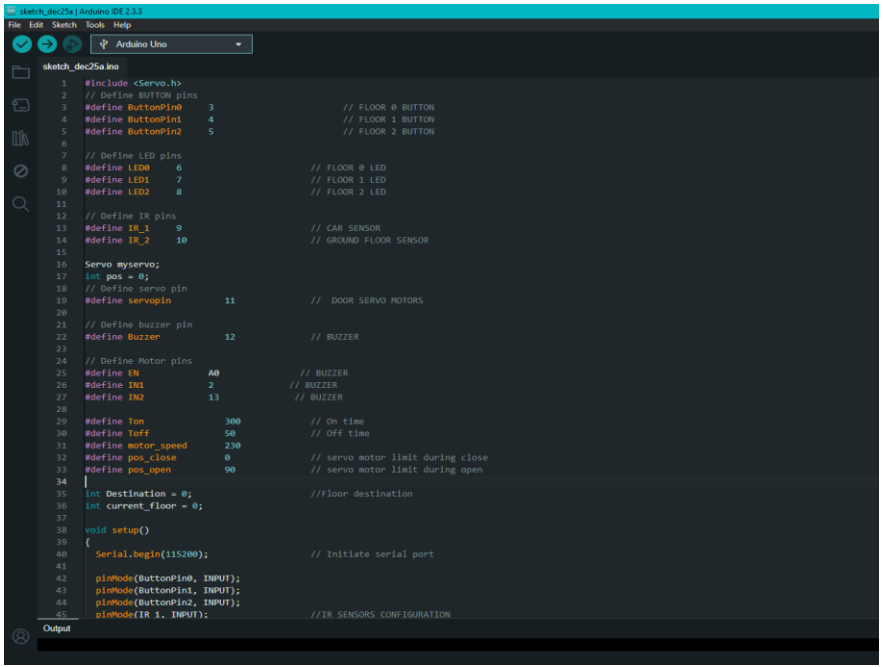
- Cost effective
- Easily programmable
- Error checking capabilities

Using sensors which are available in the market

Prototype Electronics

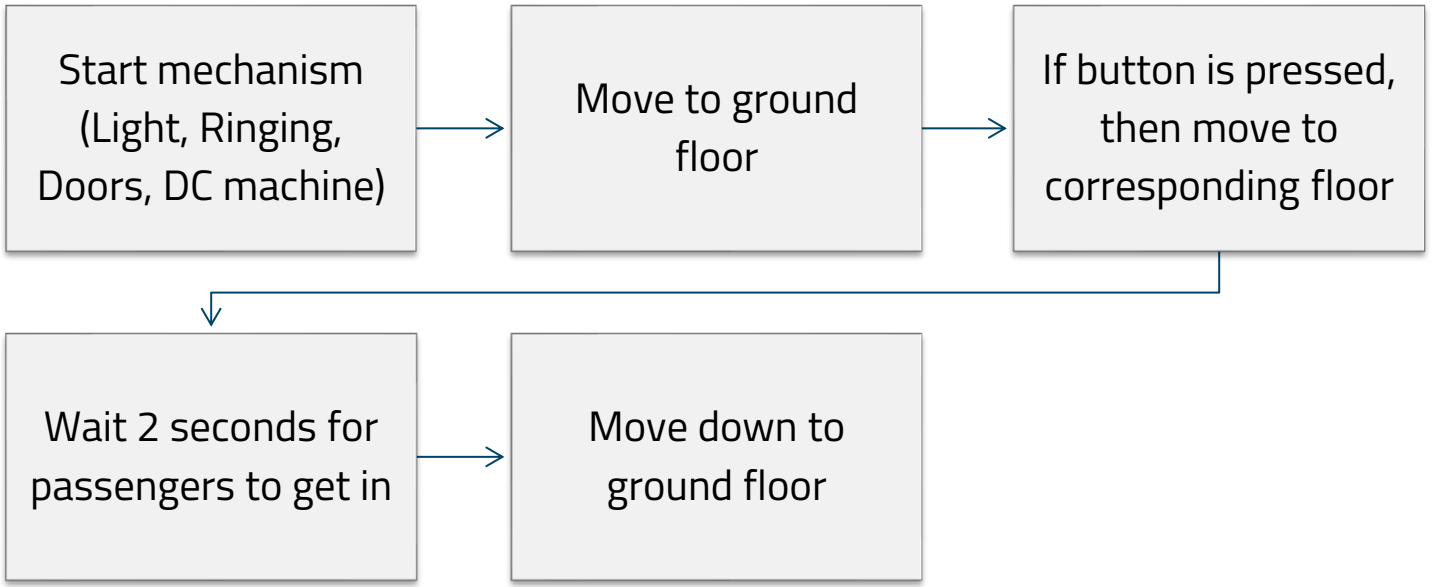
Programming

- C++ language offers relatively easy syntax and fast response
- 250+ lines of code
- Using modular code for easy debugging and testing
- The code is simulated before implemented on the hardware for error prediction
- Low storage usage



Prototype Electronics

Operating Mechanism Steps



Prototype Electronics

Motor

- 1:1 Mounting mechanism
- Speed controllable
- Small size and weight
- No gearbox required
- Low noise or vibrations

Prototype Electronics

Sensors and Actuators

Ring buzzer for alarms when closing and opening doors

Infrared sensor for car detection

LED lights for floor indication

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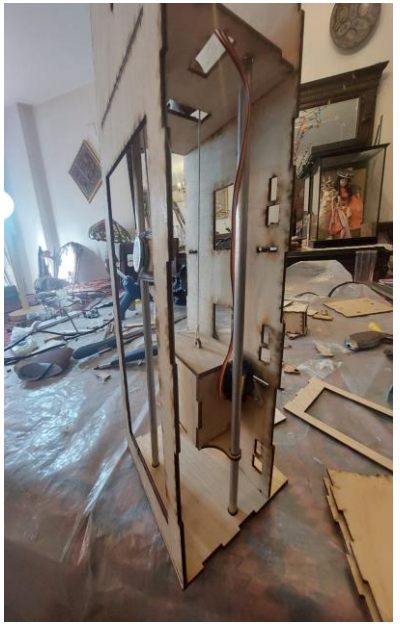
Manufacturing



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Testing & Results

Door mechanism

Conclusion

Work experience

The training help us to increase our work experience

Model Selection

Select real model elevator to real application

Hardware implementation

Increase technical skills by implement this prototype


Thank you !