DESIGN OF AUTOMOBILE AIR CONDITIONING AUTOMATIC DETECTION SYSTEM USING PLC

Submitted in partial fulfillment of the requirements

of the degree of

Bachelor of Engineering

(Electronics and Telecommunication Engineering)

By

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2019-20

CERTIFICATE

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This is to certify that the project entitled "**Design of automobile air conditioning automatic detection system based on PLC"** is a bonafide work of **Danish Patel (15DET113) , Shaikh Mohd. Toukir (15DET126), Hussain Shaikh (16DET124), Mohd. Sadare Alam Siddiqui (16DET101)** submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of Bachelor of Engineering in Department of Electronics and Telecommunication Engineering.

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Supervisor Examiner

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HeadofDepartment Director

Project Report Approval for Bachelor of Engineering

This project entitled **"Design of automobile air conditioning automatic detection system based on PLC "** by **Danish Patel ,Shaikh Mohd. Toukir**, **Hussain Shaikh** & **Mohd. Sadare Alam Siddiqui** is approved for the degree of **Bachelor of Engineeringing in Electronics and Telecommunication** .

Examiner

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Supervisor

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Date;

Place:

Declaration

WE declare that this written submission represents my ideas in my own words and where others ideas or words have been included, WE have adequately cited and referenced the original sources. WE also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. WE understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

The detection equipment is responsible for the quality monitoring task in the process of industrial production and maintenance, and determines the quality of the product. In this paper, automobile air conditioning automatic detection system is designed on the background of automobile air conditioning detection. First of all, this paper introduces the theoretical basis of the detection of automobile air conditioning system, and puts forward the detection scheme of automobile air conditioning system. Finally, the controller of automobile air conditioning automatic detection system is designed by using PLC. The hardware circuit and software program of the control system were designed, and debugged on the platform of the automobile air conditioning automatic detection system. The system runs normally and achieves the expected design goal.

Contents

List of Figures

Keywords

Keywords : Automatic detection, PLC, WPL Soft Software, temperature dependent Automobile air conditioning system.

Chapter 1

Introduction

1.1 Statement of Project

In this report, the automobile air conditioning automatic detection system is designed. Realize automatic detection in production detection, and meet the requirements of user, recipe and data management in the production process. The main research contents are designs system temperature detection scheme and blower detection scheme & Designs the system controller based on PLC.

1.1.1 Project Architecture

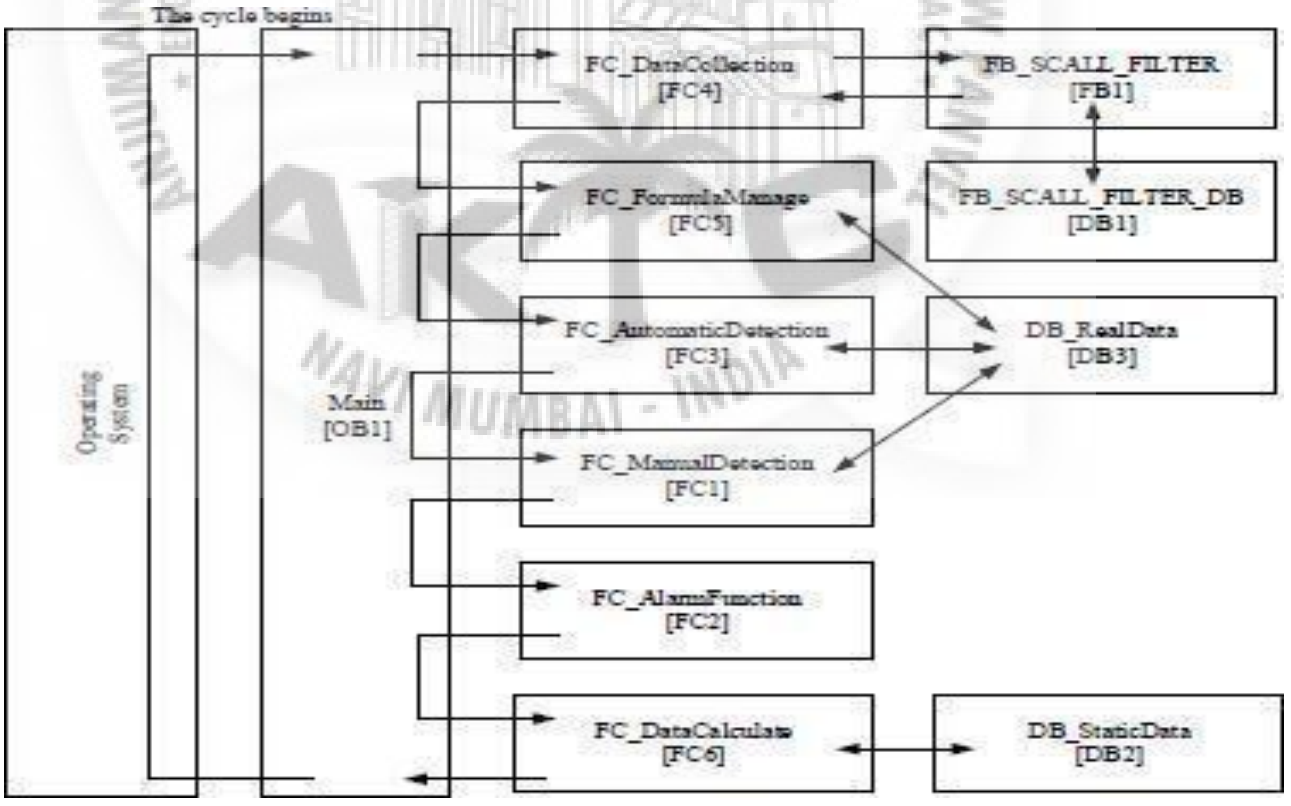


Fig 1.1.1

1.1.3 Motivation

As one of the most basic activities in the process of industrial production and maintenance, detection can not be ignored for the development of industry. Automatic detection technology is the product of the development of computer technology, information theory, cybernetics, measurement technology, sensing technology and so on. It is the combination of these disciplines in solving the technical problems of system equipment, component performance detection and fault diagnosis

1.2 Objective and Scope

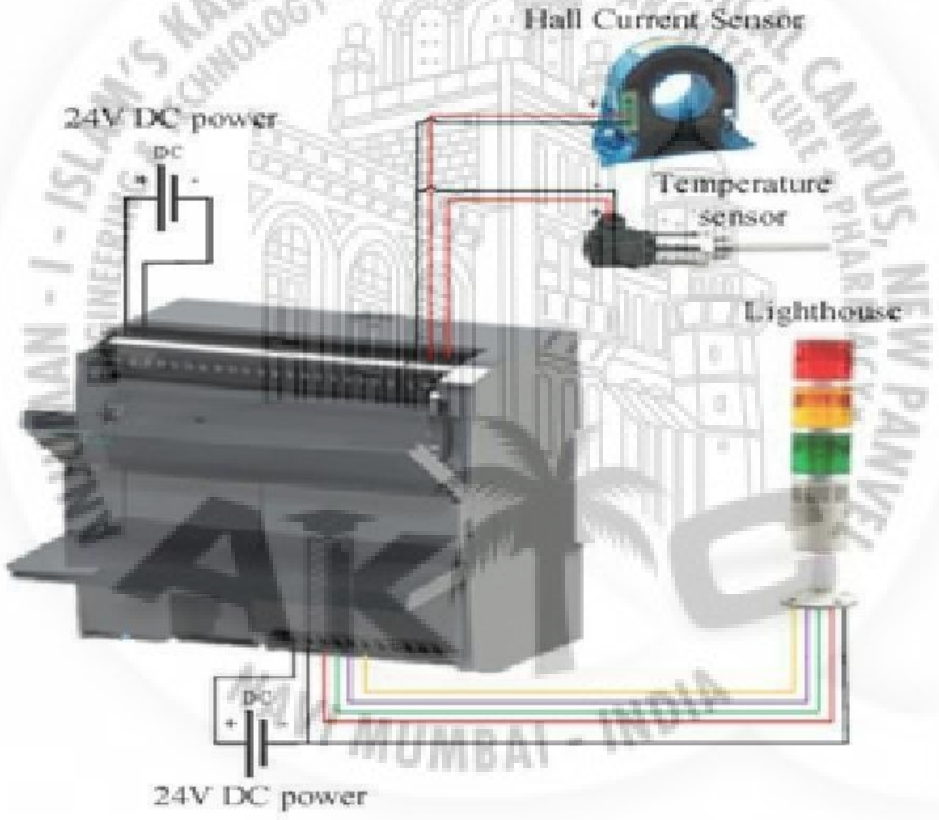


Fig 1.2

Chapter 2

Literature Review

As one of the most basic activities in the process of industrial production and maintenance, detection can not be ignored for the development of industry. Automatic detection technology is the product of the development of computer technology, information theory, cybernetics, measurement technology, sensing technology and so on. It is the combination of these disciplines in solving the technical problems of system, equipment, component performance detection and fault diagnosis [1]. The use of automatic detection technology can promote the rapid development of industry.

Air conditioning system provides the human comfort environment by controlling suitable range of air temperature and humidity in the living environment. The history of air conditioning system is over one century since 1902. In 1939, the world first air conditioning system for automobile was developed by Packard Motor Car Company. In 1969, more than 50% automobile sold in US are equipped with automobile air conditioning system. Nowadays, automobile air conditioning system becomes necessity equipment in the automobile industries, especially for the great markets in tropical and subtropical geographical areas such as South China

Automobile air conditioning detection is the research, development, improvement and appraisal of air-conditioning unit performance and automobile air conditioning matching performance, guarantee the important link of the vehicle comfort, which make the car air conditioning plays an important guarantee of the maximum utility [2]. Therefore, it is very necessary to detect the performance of the automobile air conditioning. Now automotive air conditioning detection technology is very backward, and mainly adopts manual detection method, the low test efficiency, poor stability and low accuracy of the detection, can not adapt to domestic automobile air conditioning industry rapid development and the requirements of product detection in large quantities [3]. Therefore, it is necessary to develop and popularize automobile air conditioning automatic detection technology.

Two major In this paper, the automobile air conditioning automatic detection system is designed. Realize automatic detection and manual detection in production detection, and meet the requirements of user, recipe and data management in the production process. The main research contents are as follows: Section II designs system temperature detection scheme and blower detection scheme. Section III designs the system human machine interaction based on MCGS configuration software. Section IV designs the system controller based on PLC. Section V summarizes the work of this paper and points out the research content in the future.

A THE SYSTEM DETECTION PRINCIPLE

i The Detection Principle of Blower

In the automobile air conditioning blower system, mainly adopts the DC motor, the performance of the blower is mainly reflected in the internal DC motor speed regulation performance of the blower.

The PWM speed regulating module is adopted to speed the DC motor, and the irreversible PWM converter with brake current path is adopted [4]. Considering its mechanical properties, there exists the following equation

$$n = \frac{\vartheta U_S}{C_e} - \frac{R I_d}{C_e} = n_0 - \frac{R I_d}{C_e} \qquad (1)$$

In formula (1), n is the motor speed; J is the PWM voltage coefficient.; C_e is the electromotive force coefficient of the motor under the rated flu.

The mechanical properties of DC PWM speed regulating system is shown as Fig.1.

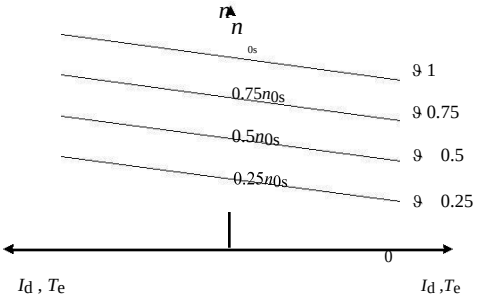


Fig. A(i) Mechanical properties of dc PWM speed regulating system.

In production detection, the use of PWM speed control module to speed regulating of air blower, air blower to the detection of inner dc motor speed control performance, due to the speed of the blower is not easy to detect, the mechanical characteristics of DC PWM speed control system shows that the working current of blower by detecting obtains the blower speed characteristics.

ii Principle of Temperature Detection

Automobile air conditioning as refrigeration and heating element of the car, the driver output through internal control button set car air conditioning cold and hot air and the degree of refrigeration and heating, detect for a qualified automotive air conditioner production, one of the most important is to detect the car air conditioning refrigeration and heating effect.

To detect the cooling and heating effects of automobile air conditioning, we need the automobile air conditioning automatic detection system to detect the output temperature of the automobile air conditioner, and input the detect results into the controller to complete the detection. Considering the accuracy and economy of the detection, the automobile air conditioning system selects the platinum thermal resistance temperature sensor to detect the output temperature of the automobile air conditioning.

B SYSTEM CONTROLLER DESIGN

I External Wiring of The Controller

The controller of the system is the core of the automatic detection system [6]. The controller selects SIEMENS S7-1200 series PLC, its CPU type is 1212C, and its external wiring is shown as Fig.13.

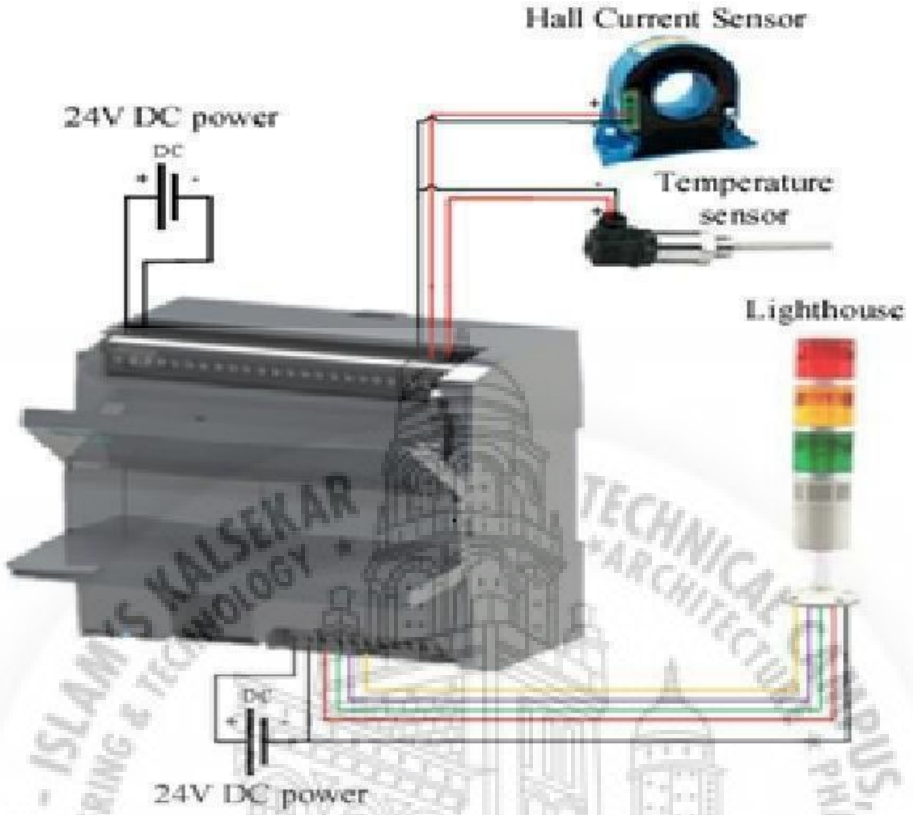


Fig. B(i). External wiring of the controller

C Controller programming

Controller PLC block call hierarchy as shown in Fig.14. Only a Main OB1 organization block is used in the PLC control program, and six program blocks are contained in the Main organization block. Each program segment calls a different function and implements different functions.

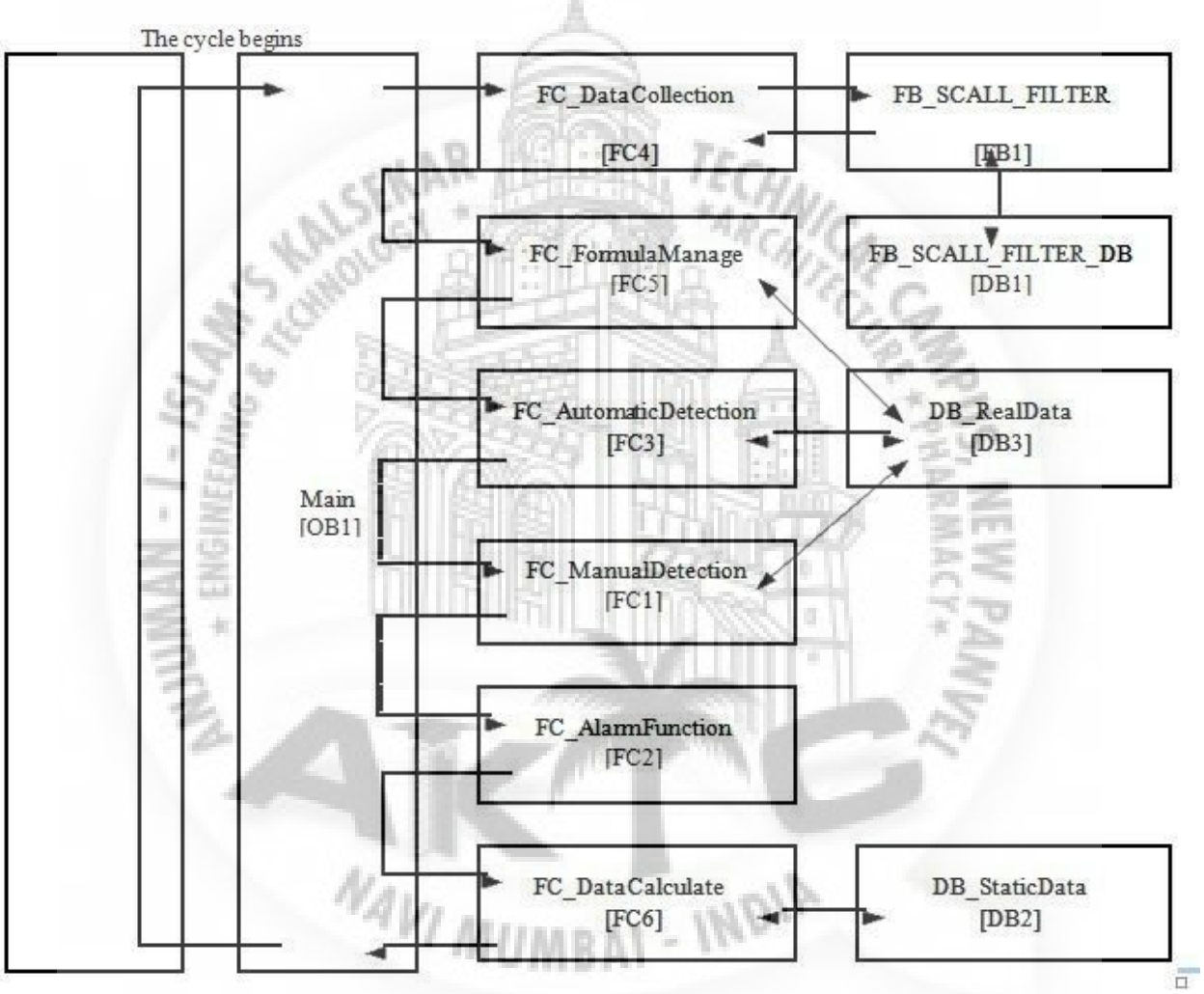


Fig. C

In the function FC_DataCollection, it contains 4 program segments. In the program section 1 and program section 2 of the function, the function block FB_SCALED_FILTER is used to collect the
analog quantity. The data collected from the analog input point is converted into a standard 0-10V and stored in a specified variable. In the function section 3 and the

program section 4, the collected data are assigned to the detection variables of the automatic detection part and the detection variables of the manual detection part respectively. In order to complete the collection and processing of the analog quantity

Chapter 3

Technical Details

3.1 Methodology

Types of A/C systems are used in the vehicles: RD-TXV and AD-OT. In these systems the primary function of the compressor is to compress and pressurize gaseous cool refrigerant from the evaporator outlet with minimum compressor power, and deliver maximum amount of high-pressure high-temperature gaseous refrigerant to the condenser. These objectives are measured by isentropic and volumetric efficiencies. The compressor is powered by a drive belt from the engine. The compressor has an electrically operated engagement clutch to either turn the A/C system off or on. Next is the condenser; the condenser is located in front of the radiator. In automotive A/C systems, the condenser is typically a crossflow heat exchanger that uses air through the fins and the refrigerant through the tubes. Through the use of cool airflow provided by the engine condenser fan or ram air, the condenser cools the high-pressure hot refrigerant gas and converts it to liquid with generally a small pressure drop. The exiting liquid (subcooled in many cases) is sent via a small tube (liquid line) to a receiver-drier (RD) (applies only to an expansion valve system). The RD is a metal can with a desiccant bag inside. It is usually located near the condenser outlet pipe. Now-a- days, the RD bottle is an integral part of the condenser, and condenser is referred to as an integral receiver-drier condenser (IRDC).

This air conditioning system was designed for working for at least 30 minutes in Mode 2. Additional two 12V 150Ah deep cycle lead acid batteries are used in the prototype instead of using the existing 12V car battery. The batteries are connected in series to provide 24V nominal voltage to the motor drive. The total voltage range of the batteries is from 19.2VDC to 28.8VDC. Forward converter topology is used in the prototype of this air conditioning system. Because the input voltage of the battery charger depends on the speed of the BLDC machine and the output rms voltage range of the BLDC machine is very wide which is from 0V to 16.37V, the battery charger cannot operate under full from of the speed of the BLDC machine.

The battery charger operates only when the speed of the BLDC machine between 500rpm to 2400rpm. Avoiding very high input current when the speed of the BLDC machine is low, charging current of the battery charger is varied with different machine speed. The specification of the battery charger is shown in Table The relation between the charging current and the speed ofmachine

Fig. A shows the diagram of the basic structure of a traditional automobile air conditioning system. Similar to typical air conditioning systems, a typical automobile air conditioning system consists of an air condition (A/C) compressor, a condenser, a valve and an evaporator. Refrigerant flows in the tube to the parts of the air conditioning system. Evaporated refrigerant (low side) is compressed by the A/C compressor and discharged out (high side) with high gas pressure in the results of higher heat energy generation. Heat generated to the refrigerant will be dissipated by the condenser with forced air cooling. When the temperature of the refrigerant decreases, a phase change (in gas to liquid phase) of the refrigerant is condensed and the liquefied refrigerant is fed into the evaporator with pressure release action. During pressure release, the phase change (from liquid to gas phase) of the refrigerant absorbs energy from the environment, and the cooling effect takes place. This series of actions repeats to the low side to complete the refrigeration cycle [1-2]In automobile air conditioning system, the A/C compressor is driven by the engine of the vehicle[3].

The clutch in is an electromagnetic clutch which is integrated in most A/C compressors. A/C temperature control relies on switching the on and off position of the clutch. This structure is simple and easy for maintenance. However, the speed of the engine changes frequently in a wide range of speed when the vehicle is running on the road. The speed of the compressor changes independently with the A/C temperature and hence the A/C temperature fluctuates. Another disadvantage of the traditional air conditioning system is that the air conditioning system has to be shut down when the engine is shut down (vehicle off).

A newly designed automobile hybrid air conditioning system is introduced in this paper. The concept of this air conditioning system is combining the technology of electric and traditional automobile air conditioning systems.

The compressor of this system is driven by the internal combustion engine when the engine is running as a typical automobile air conditioning system. When the engine is shut down, the A/C compressor of this system is driven by an electric machine powered by a 24V rechargeable battery. When the battery voltage level is low, it is recharged by the electric power generated from the same electric machine driven by the engine. Since the speed of the electric machine is under control, the A/C temperature can be controlled with much less temperature fluctuation.

A STRUCTURE OF AUTOMOBILE AIR CONDITIONING SYSTEM

Like a traditional automobile air conditioning system, the structure of the automobile hybrid air conditioning system includes an A/C compressor integrated with an electromagnetic clutch, a valve, a condenser, an evaporator, belts and belt pulleys. The compressor in this system can be electric driven so that the system also consists of an electric machine, a motor drive, a 24V rechargeable battery, a battery charger, and a control unit. Clutches are also used for switching the mechanical power sources to the A/C compressor between the combustion engine and the electric machine. The diagram of structure of the automobile hybrid air conditioning system is shown in Fig. A

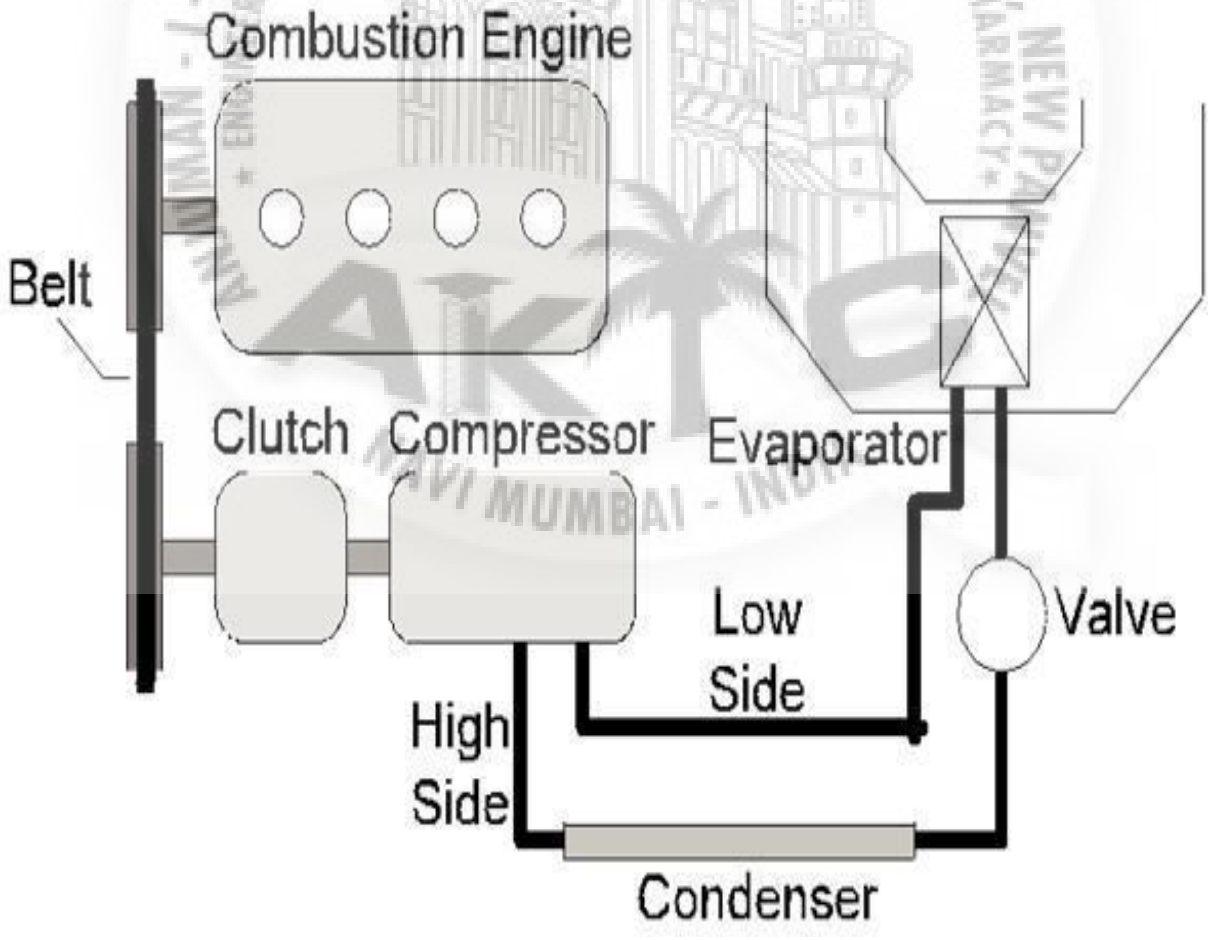


Fig. A: Basic structure of traditional automobile air conditioning system

The electric machine of this air conditioning system is a brushless DC (BLDC) machine. This kind of machine is used because of its fast response, high power density, robust and high reliability. This BLDC machine is for both driving the compressor and for generating electric power for charging the battery. The BLDC machine is driven by a motor drive system.

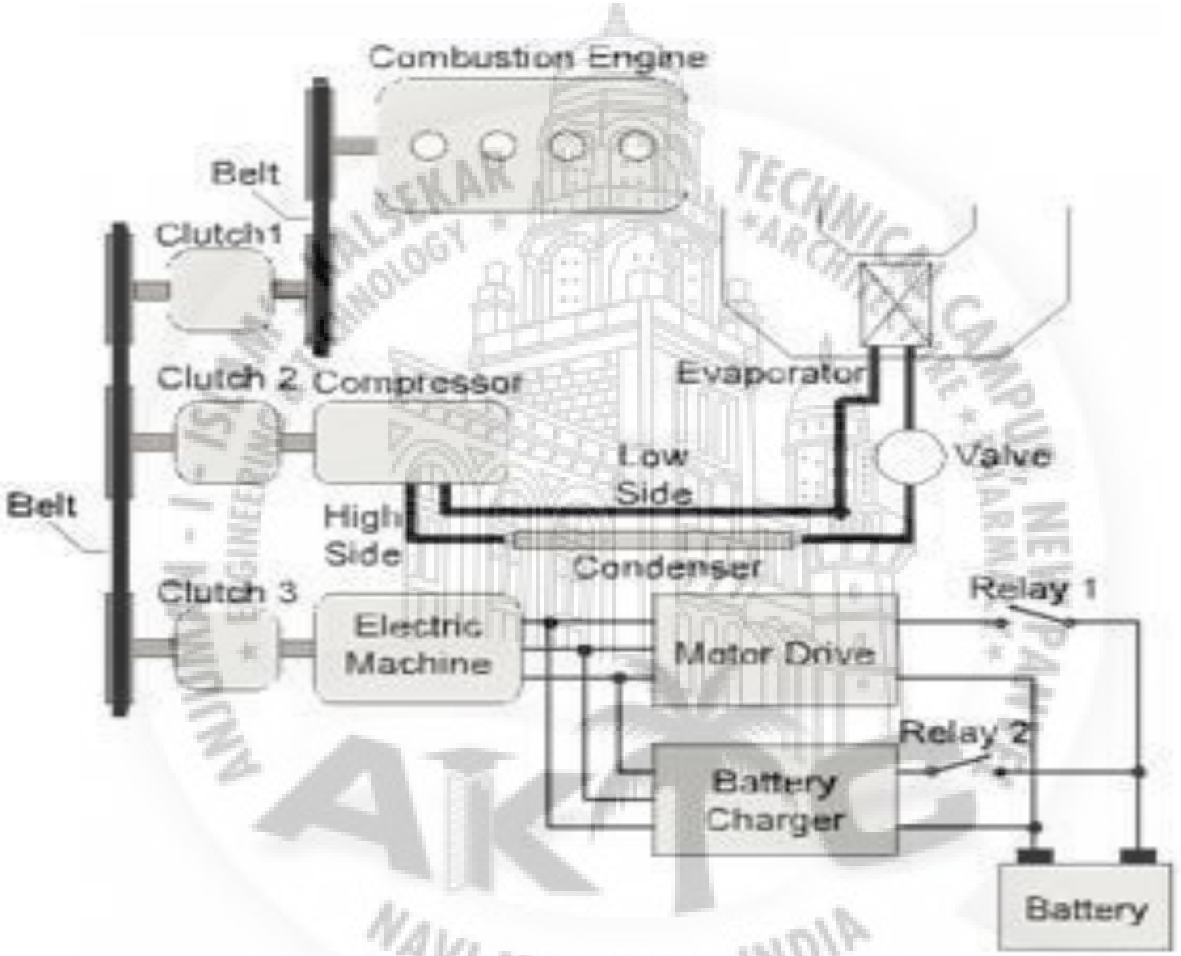


Fig A(i)

B OPERATION OF AUTOMOBILE AIR CONDITIONING SYSTEM

The operation of the automobile hybrid air conditioning system is classified to 5 modes of operation. The equivalent diagrams of the modes of operation of the air conditioning system are shown in Fig 3. The modes of operation are described in the following:

I Mode 1

The combustion engine is running in Mode 1. The vehicle is on and the air conditioning system is on. The battery is fully charged. Clutch 1 is close. Relay 1, Relay 2 and Clutch 3 are open. The combustion engine drives the A/C compressor. The electric machine is not operated. The battery is not recharged. The room temperature is controlled by switching on and off Clutch 2, i.e., switching on and off of the A/C compressor.

II. Mode 2

The vehicle is stop in Mode 2. The combustion engine is not running in this moment but the air conditioning system is on. Clutch 1 and Relay 2 are open. Clutch 2, Clutch 3 and Relay 1 are close. The battery produces electric power to the motor drive to drive the electric machine, and the electric machine drives the A/C compressor. The room temperature is controlled by controlling the speed of the electric machine by the motor drive and the control unit. This obtains stable temperature and saves compressor starting energy. The electric machine stops when the voltage of the battery reaches its lowest discharge voltage.

C Equivalent diagrams of operation of the automobile air conditioning system

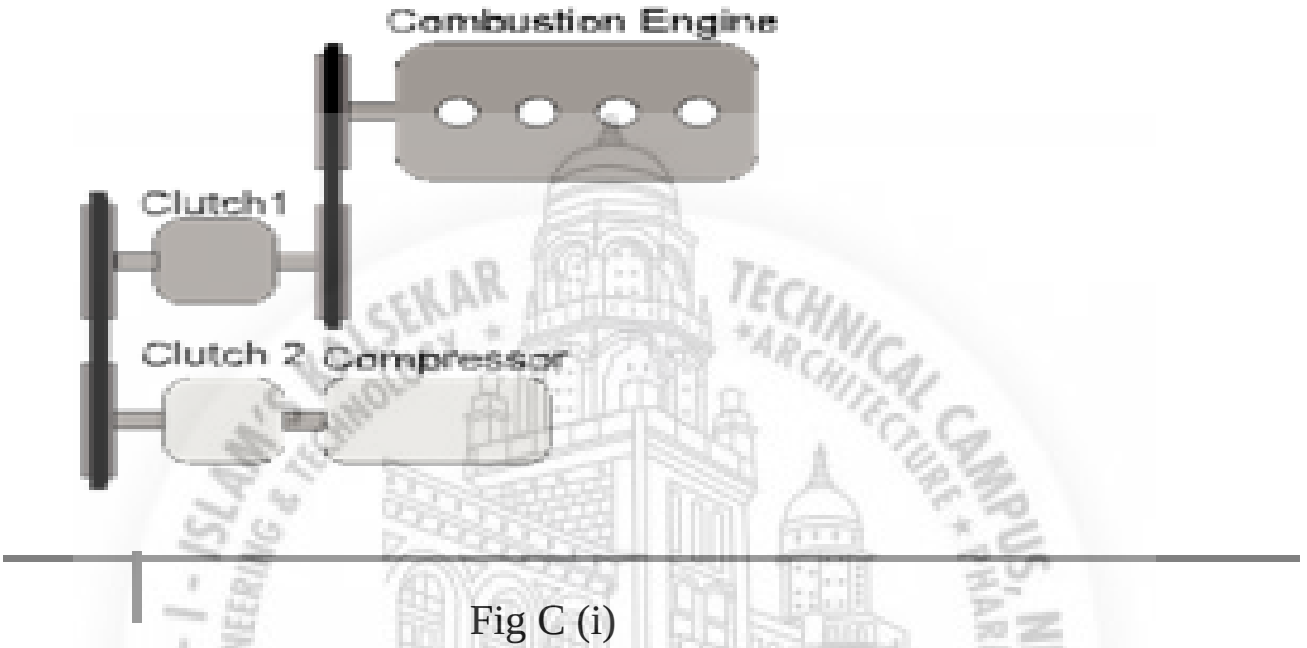


Fig C (i)

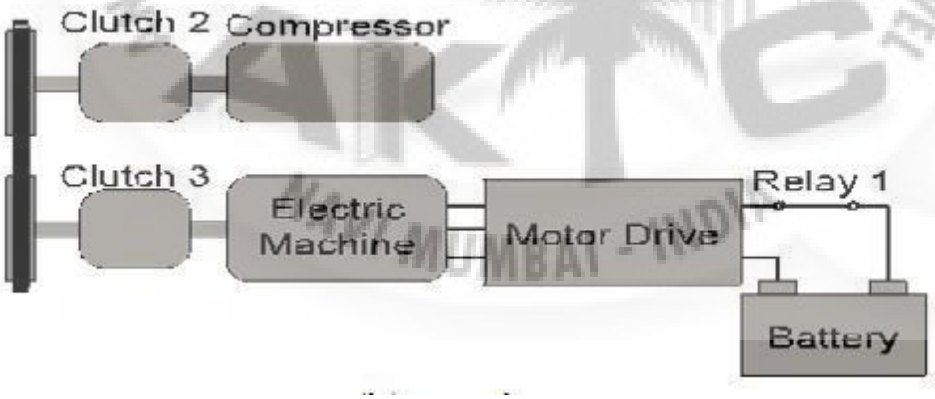


Fig C (ii)

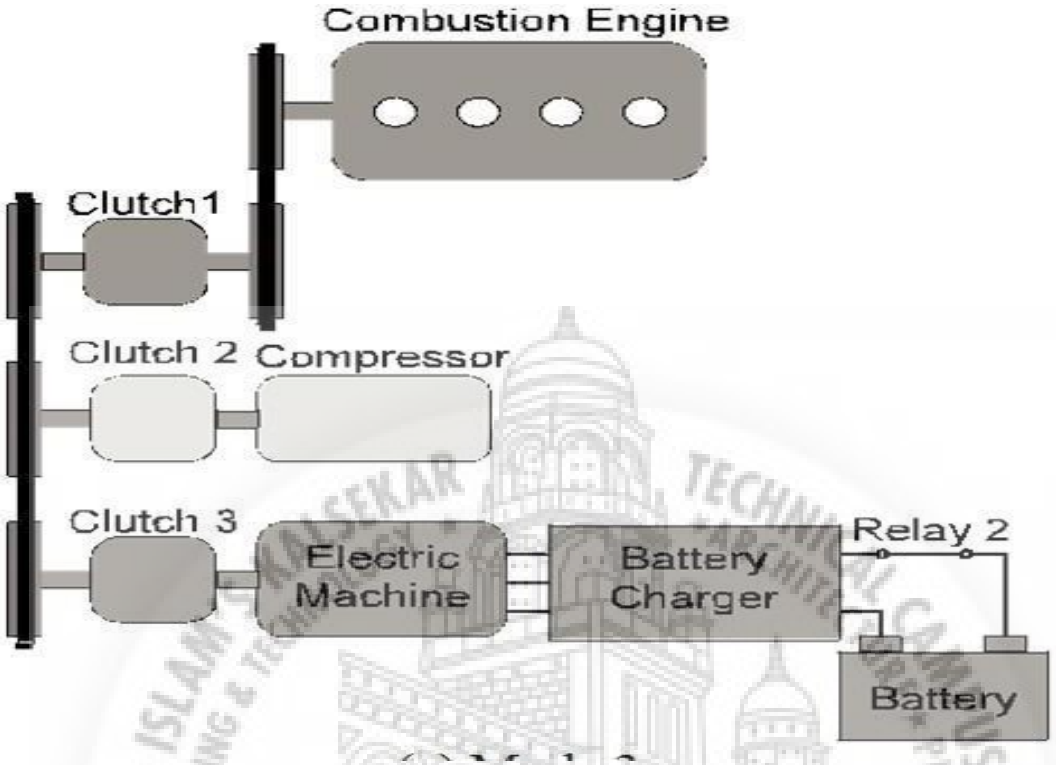


Fig C (iii)

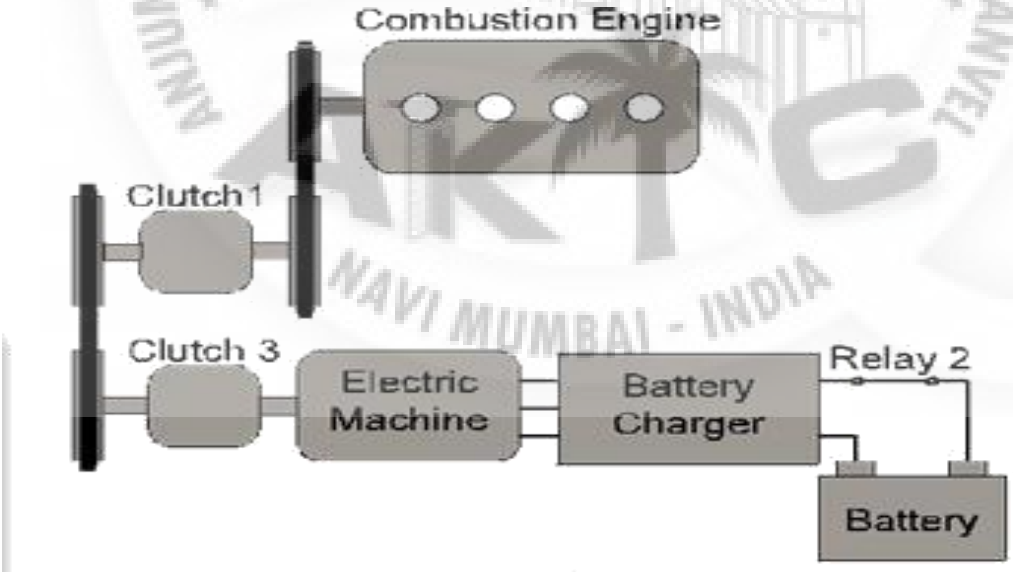


Fig C (iv)

3.2 Project Requirements

1. PLC
2. Sensor
3. Automobile AC

3.2.1 Software Requirements

- LX Soft SOFTWARE

3.2.2 Hardware Requirements

(a) Orifice Tube Do in an A/C Syste

FiAn orifice tube is similar to an expansion valve, with both performing an important function in a vehicle's A/C system. The valve helps control the flow of refrigerant through the evaporator, which is the main cooling component of the system. An expansion valve controls this flow directly through a modulating rod, which opens and closes to various levels depending on cooling demand. It also contains a sensing bulb which detects temperature within the evaporator. An orifice tube has no moving parts and contains a permanent restriction within the system. The orifice tube systems control the refrigerant flow through other means, such as cycling the compressor on and off, or the use of a refrigerant regulating valve within the compressor itself.The orifice tube allows for a higher flow of R-134 refrigerant during times when more cooling is needed, and a smaller flow of refrigerant when less cooling is needed. This balance of cooling flow is critical for the A/C to operate effectively.Too much refrigerant flow results in the evaporator running too cold, which causes moisture to freeze on the evaporator coils. This freezing restricts airflow through the coils and eventually results in a loss of cooling for the vehicle.

The evaporator and refrigerant lines should be cold to the touch when running properly, but they should not be frozen. If freezing does occur, it may indicate a problem with the orifice tube, or even too much refrigerant in the system. Many vehicles come with a “sight glass” which can be used to see if there are air bubbles present in the refrigerant stream. A sight glass can help determine whether the problem is within the orifice tube,the refrigerant itself.

Fig. 3.2.2 (a)

(b) A/C accumulator

The accumulator is an air conditioning system component located at the outlet of the evaporator inside the engine compartment of your car. It resembles a metallic can or a tank with some hoses or lines connected to it. A/C Accumulators are similar in appearance to a receiver/drier but are usually larger and they never contain a sight glass.A/C accumulators keep the moisture inside the air conditioning system,under control.It is always a good idea to replace it after the system has been open for any repair. A leaking or open system will expose the dessicant bag inside the accumulator to the atmosphere making the accumulatorineffective.

Fig. 3.2.2 (b)

(c) Condenser

In systems involving heat transfer, a **condenser** is a device or unit used to condensea gaseoussubstance into a liquid state through cooling. In so doing, the latent heat is released by the substance and transferred to the surrounding environment. Condensers can be made according to numerous designs, and come in many sizes ranging from rather small (hand-held) to very large (industrial-scale units used in plant processes). For example, a refrigeratoruses a condenser to get rid of heatextracted from the interior of the unit to the outside air.

(d) Expansion devices in car

The expansion valve's place in the system is at the evaporator inlet. Like any other valve, its job is to control flow; in this case, the amount of refrigerant entering the evaporator. Since system operating conditions vary (sometimes high cooling demand, sometimes low cooling demand) it is necessary to be able to adjust the amount of refrigerant entering the evaporator. For any given operating condition, if we were to allow too much refrigerant to enter the evaporator, it would get too cold, and the moisture collected on it couldfreeze.

Chapter 4

Market Potential

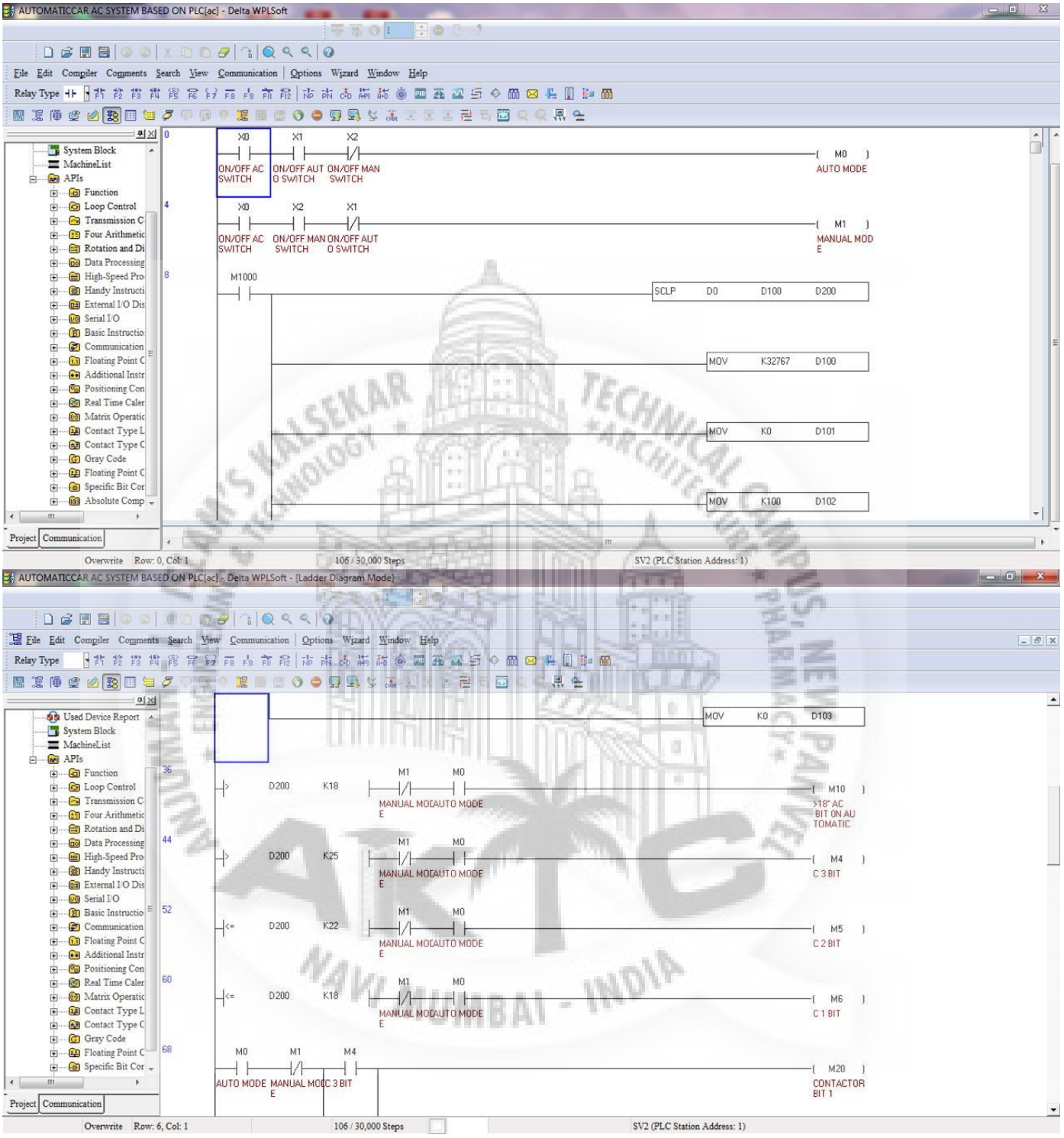
Carbon dioxide emissions rose another 2% in 2018, the fastest pace in seven years. That increase was alarming in its own right, given what we know about the unfolding climate emergency. But the proximate cause was especially troubling: Extreme weather led to more demand for air conditioning and heating in 2018, BP Plc explained in it annualreviewofenergysector. It's not too hard to imagine a vicious cycle in which more hot weather begets ever more demand for air conditioning and thus even more need for power. That in turn means more emissions and even hotter temperatures. That feedback loop exists at a local level too. Air-conditioning units funnel heat outside, exacerbating the so-called "urban heat island" effect, which makes cities warmer than the countryside. BNEF expects electricity demand from residential and commercial air conditioning to increase by more than 140% by 2050 – an increase that's comparable to adding the Indian Union's entire electricity consumption. Air conditioning will represent 12.7% of electricity demand by the middle of the century, compared to almost 9% now, it thinks.

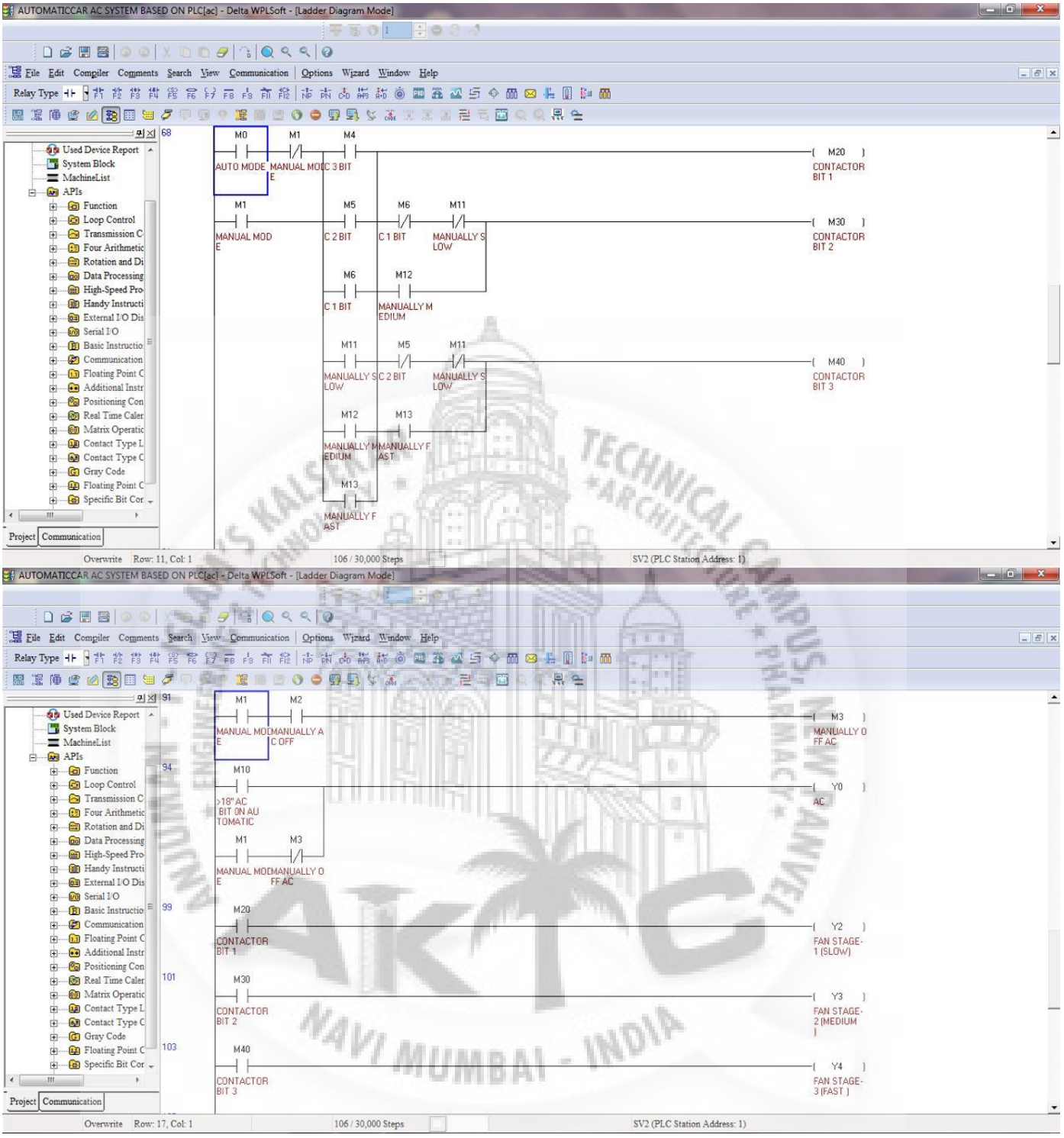
Thankfully, much of that extra requirement will be met by solar power (the need for cooling is highest during daylight hours). But because temperatures don't always return to comfortable levels when the sun goes down, there's a danger that some of the additionalelectricitywillbesuppliedbyfossilpower. Buildings have long been a blind spot in climate discussions even though they account for about one- fifth of global energy consumption. The inefficiency of air-conditioning systems or badly designed homes and offices simply aren't as eye-catching as electric cars and making people feel ashamed about flying.AtleastGermany's"passivhaus"movement, a way of building homes that require very little heating or cooling, shows some people are starting to recognizethzperil.

Competitive Advantages of Project

Its reduce the use of power & fuel

PLC PROGRAMMING :
STOP MODE

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M6
C 1 BIT
M11
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CONTACTOR BIT 2
M6
C 1 BIT
M12
MANUALLY M EDIUM
M11
MANUALLY S LOW
M5
C 2 BIT
M11
MANUALLY S LOW
M40
CONTACTOR BIT 3
M12
MANUALLY M EDIUM
M13
MANUALLY F AST
M13
MANUALLY F AST
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AUTOMATICCAR AC SYSTEM BASED ON PLC[ac] - Delta WPLSoft - [Ladder Diagram Mode]
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94
M10
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Y0
AC
M1
MANUAL MOD E
M3
MANUALLY O FF AC
99
M20
CONTACTOR BIT 1
Y2
FAN STAGE-1 (SLOW)
101
M30
CONTACTOR BIT 2
Y3
FAN STAGE-2 (MEDIUM)
103
M40
CONTACTOR BIT 3
Y4
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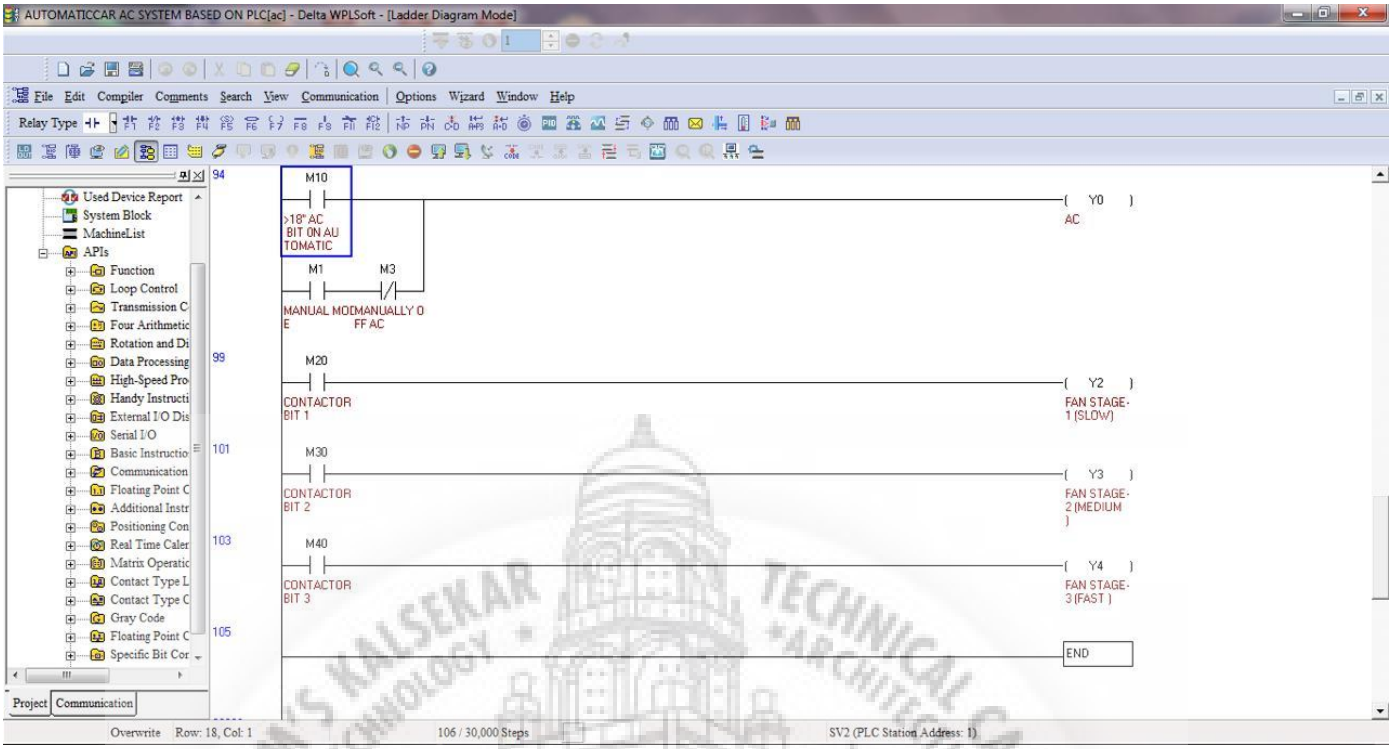
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Relay Type
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Function
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Four Arithmetic
Rotation and Di
Data Processing
High-Speed Pro
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Serial I/O
Basic Instructio
Communication
Floating Point C
Additional Instr
Positioning Con
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Matrix Operatic
Contact Type L
Contact Type C
Gray Code
Floating Point C
Specific Bit Cor
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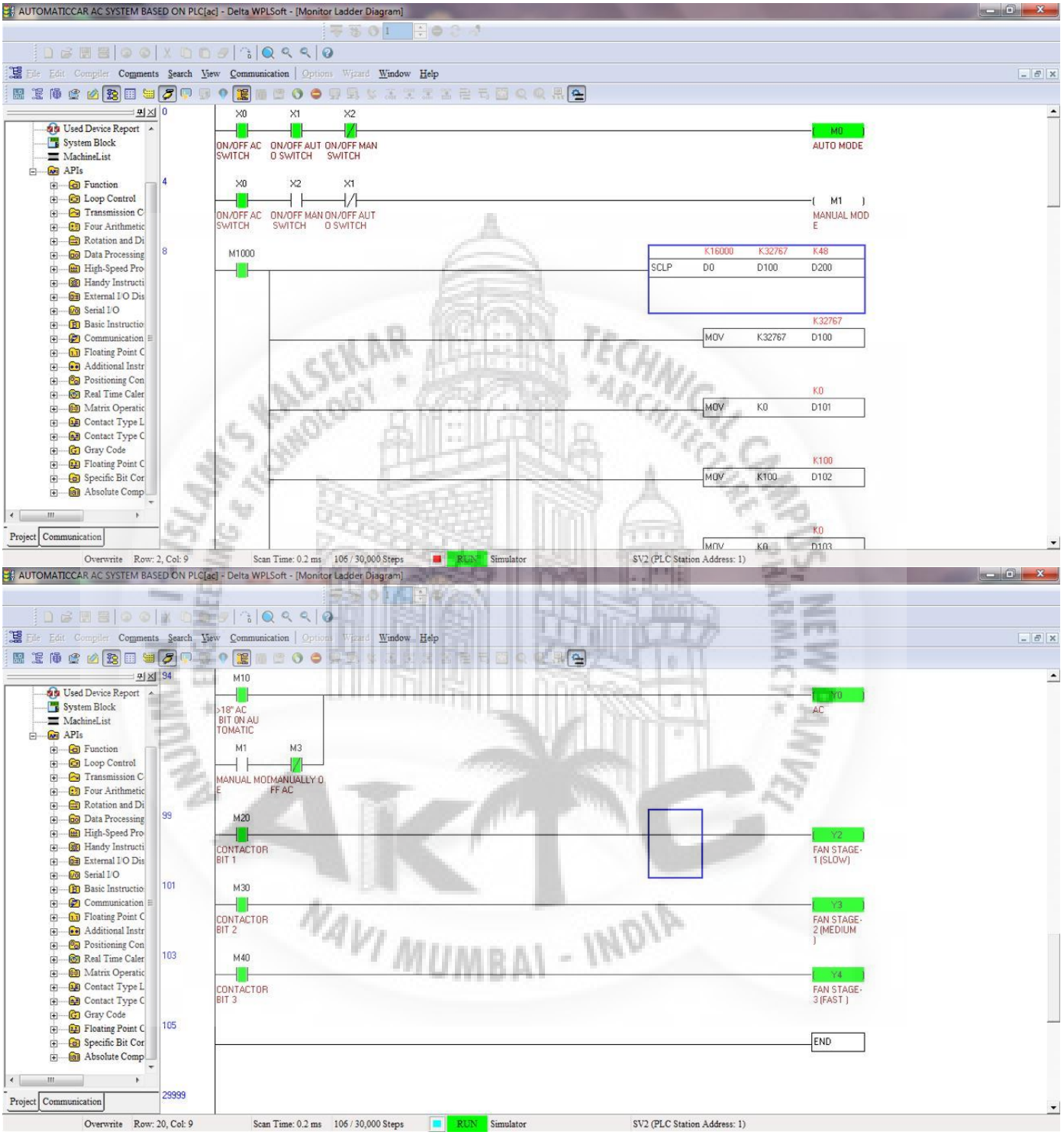
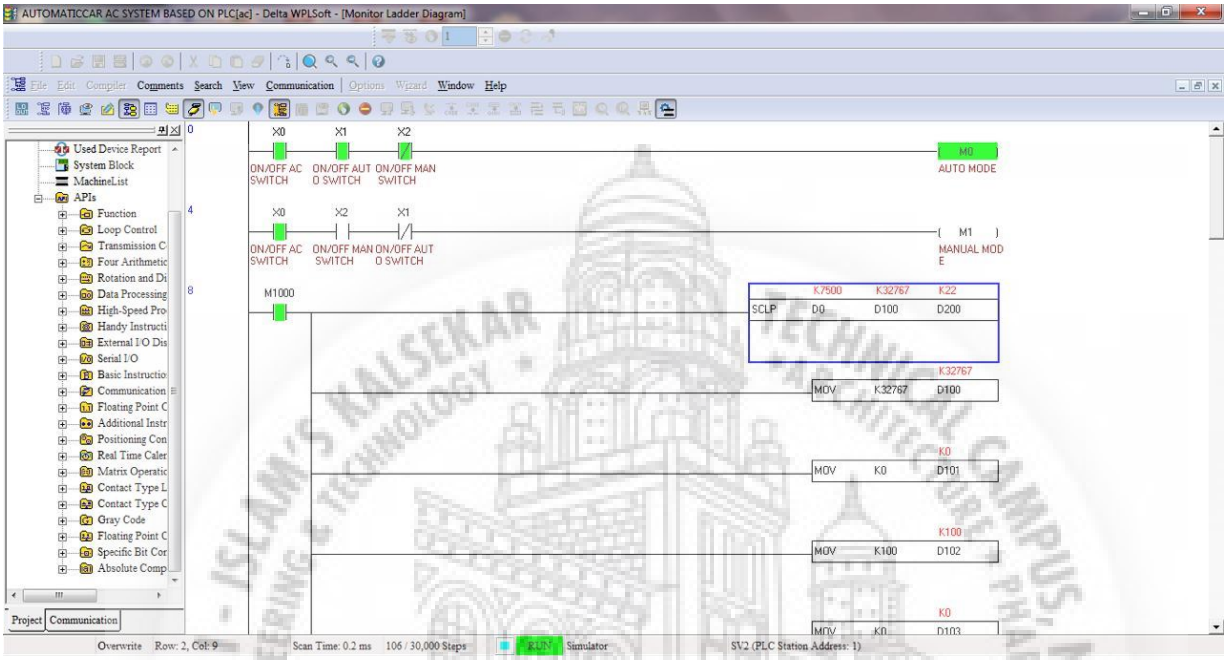
M10
>18° AC
BIT ON AU
TOMATIC
Y0
AC
M1
M3
MANUAL MOD
E
MANUALLY O
FF AC
99
M20
CONTACTOR
BIT 1
Y2
FAN STAGE-
1 (SLOW)
101
M30
CONTACTOR
BIT 2
Y3
FAN STAGE-
2 (MEDIUM
)
103
M40
CONTACTOR
BIT 3
Y4
FAN STAGE-
3 (FAST)
105
END
Overwrite
Row: 18, Col: 1
106 / 30,000 Steps
SV2 (PLC Station Address: 1)

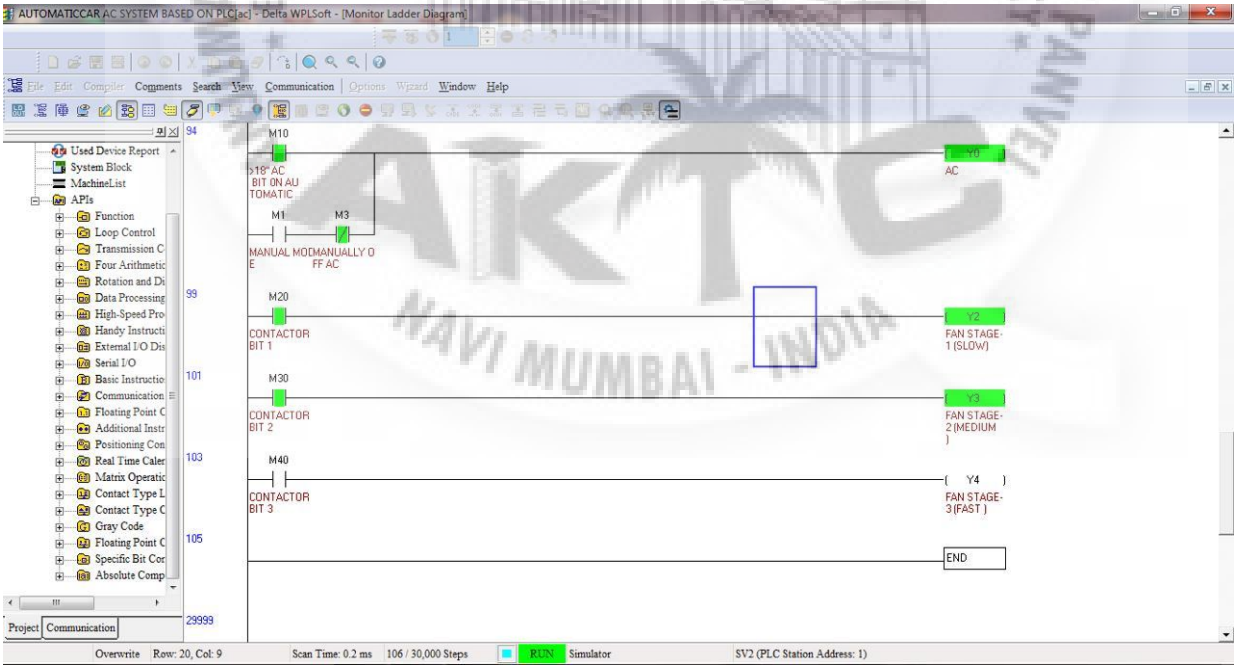
RUN MODE:- AUTO MODE

CONDITION 1: Greater than 22 *.temp. : AC ON , Fan ON in 3rd stage (Speed Fast)

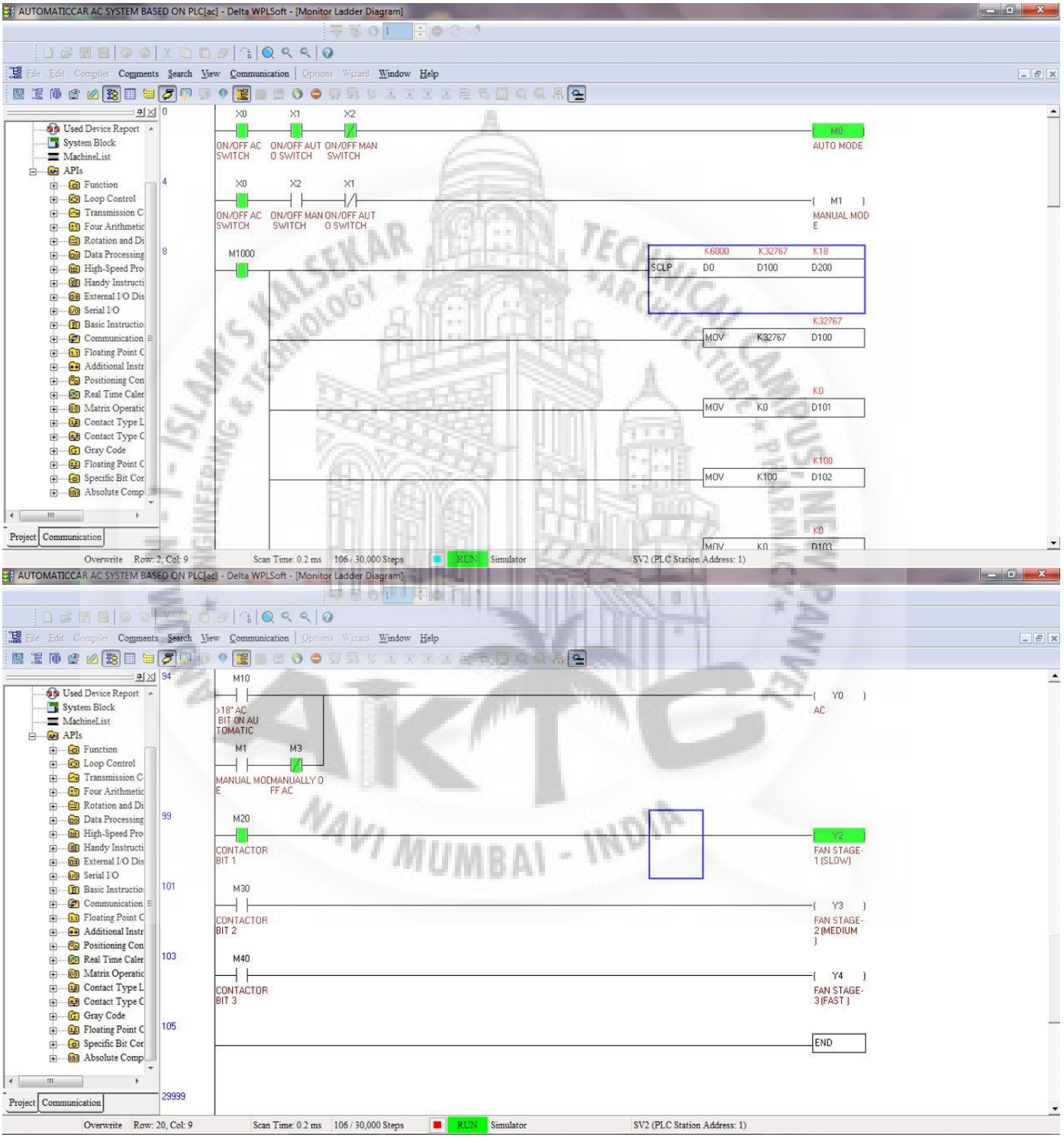


CONDITION 2 : Less than 22 temp : Fan in 2nd stage (Speed Medium)

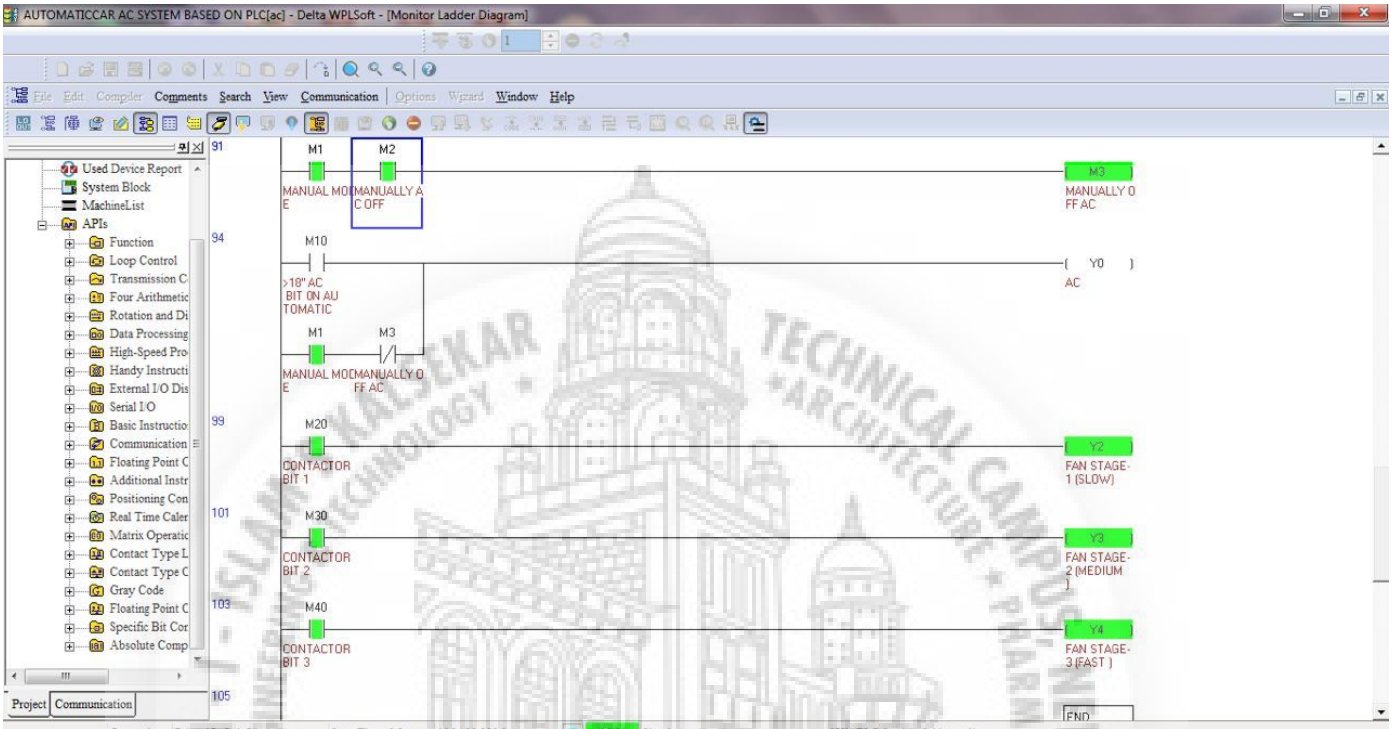


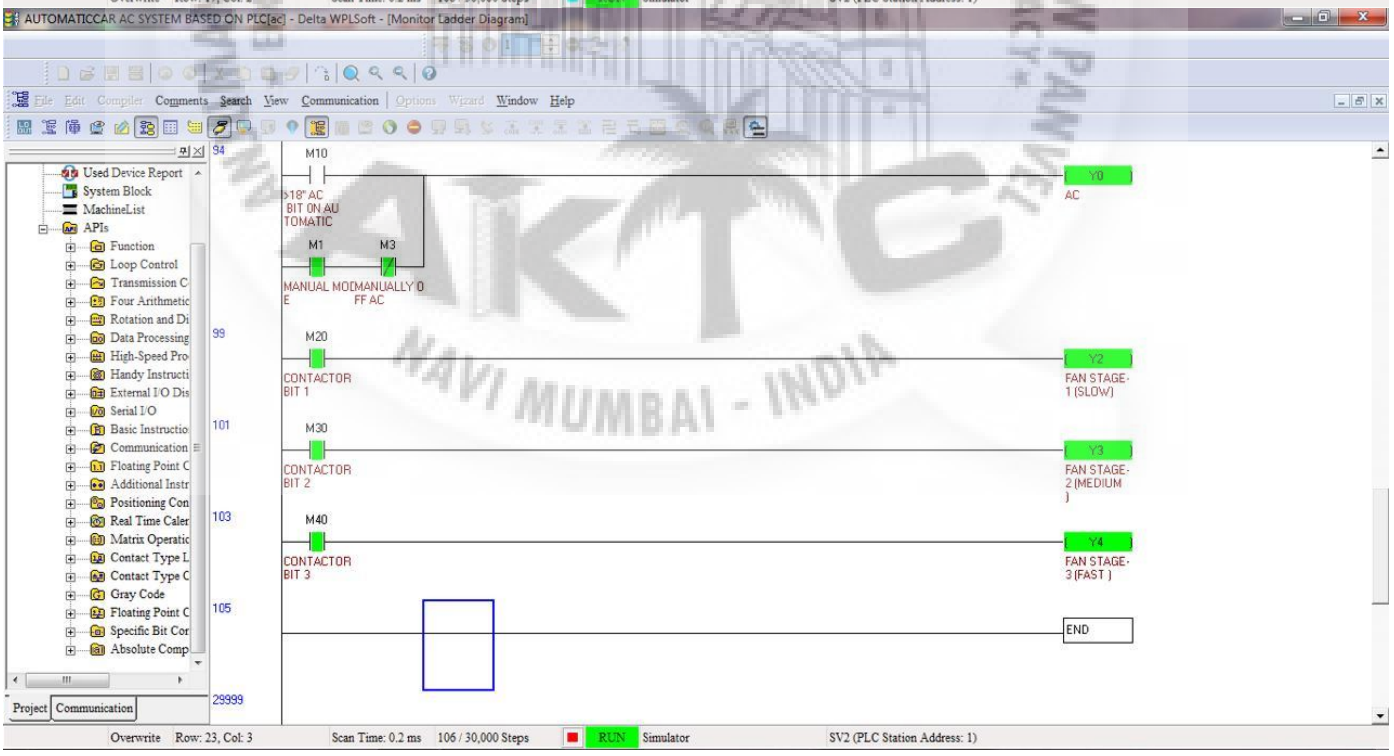


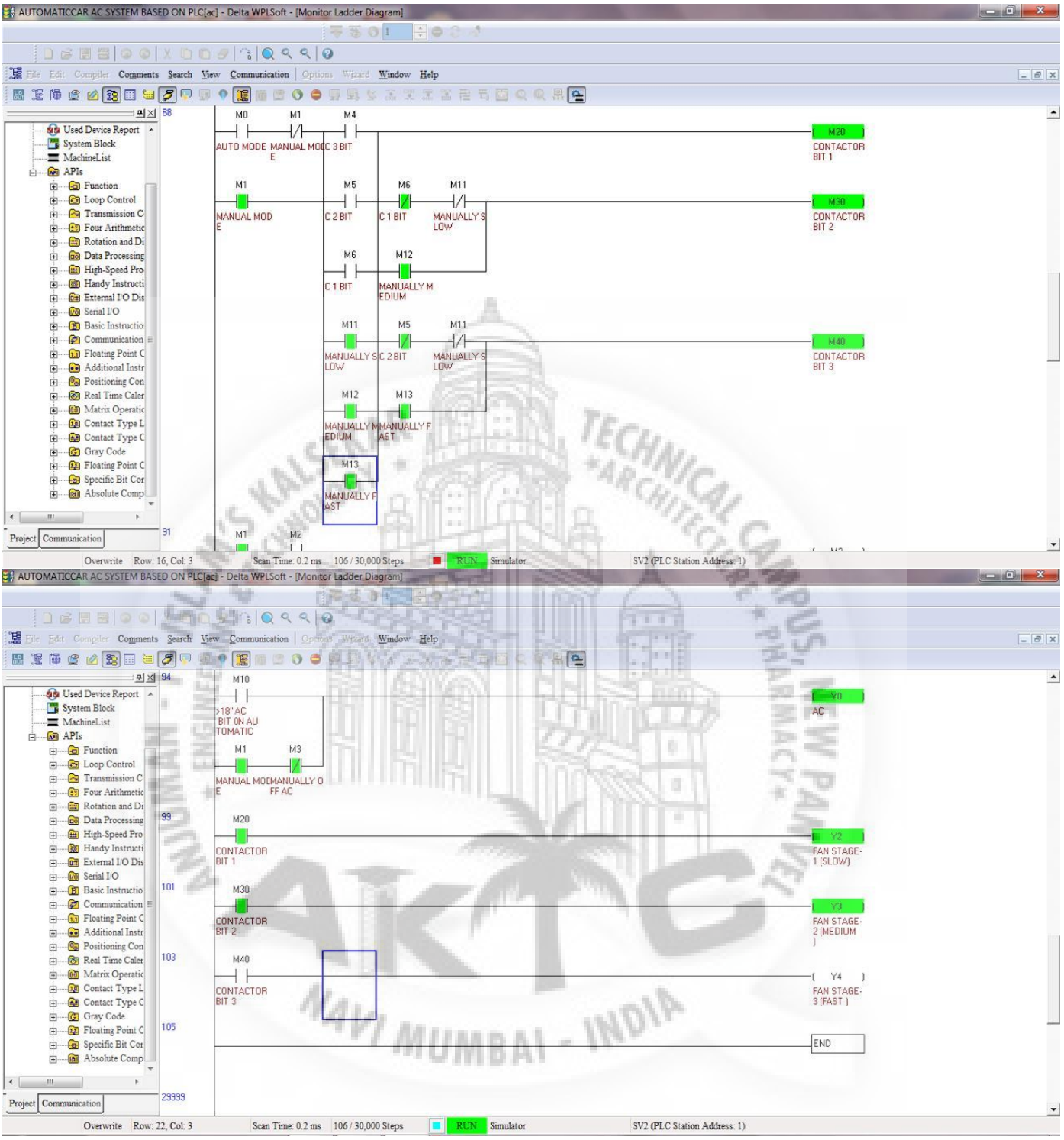
CONDITION 3 : Less then 18 temp. : AC OFF and Fan in 1st Stage (Speed slow)



RUN MODE : MANUAL MODE
In manual mode AC and FAN both are controlled by manually






AUTOMATICCAR AC SYSTEM BASED ON PLC[ac] - Delta WPLSoft - [Monitor Ladder Diagram]
File Edit Compiler Comments Search View Communication Options Wizard Window Help
Used Device Report
System Block
MachineList
APIs
Function
Loop Control
Transmission C
Four Arithmetic
Rotation and Di
Data Processing
High-Speed Pro
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Basic Instructio
Communication
Floating Point C
Additional Instr
Positioning Con
Real Time Caler
Matrix Operatic
Contact Type L
Contact Type C
Gray Code
Floating Point C
Specific Bit Cor
Absolute Comp
Project Communication
68
M0 AUTO MODE
M1 MANUAL MOD E
M4 C 3 BIT
M20 CONTACTOR BIT 1
M1 MANUAL MOD E
M5 C 2 BIT
M6 C 1 BIT
M11 MANUALLY S LOW
M30 CONTACTOR BIT 2
M6 C 1 BIT
M12 MANUALLY M EDIUM
M11 MANUALLY S LOW
M5 C 2 BIT
M11 MANUALLY S LOW
M40 CONTACTOR BIT 3
M12 MANUALLY M EDIUM
M13 MANUALLY F AST
M13 MANUALLY F AST
91
M1
M2
Overwrite Row: 16, Col: 3 Scan Time: 0.2 ms 106 / 30,000 Steps RUN Simulator SV2 (PLC Station Address: 1)

AUTOMATICCAR AC SYSTEM BASED ON PLC[ac] - Delta WPLSoft - [Monitor Ladder Diagram]
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Transmission C
Four Arithmetic
Rotation and Di
Data Processing
High-Speed Pro
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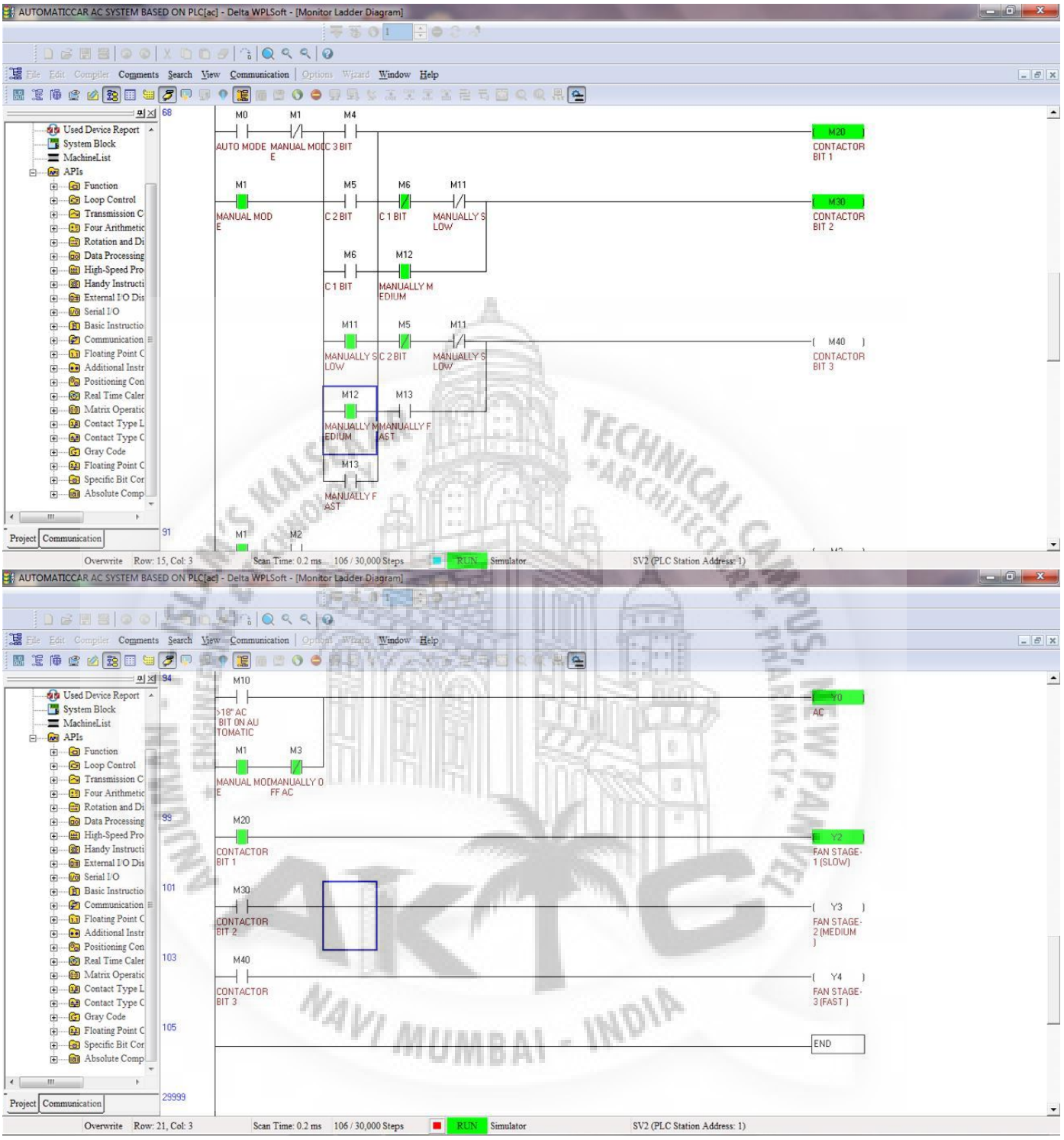
Floating Point C
Additional Instr
Positioning Con
Real Time Caler
Matrix Operatic
Contact Type L
Contact Type C
Gray Code
Floating Point C
Specific Bit Cor
Absolute Comp
Project Communication
94
M10 >18° AC BIT ON AU TOMATIC
Y0 AC
M1 MANUAL MOD E
M3 MANUALLY O FF AC
99
M20 CONTACTOR BIT 1
Y2 FAN STAGE-1 (SLOW)
101
M30 CONTACTOR BIT 2
Y3 FAN STAGE-2 (MEDIUM)
103
M40 CONTACTOR BIT 3
Y4 FAN STAGE-3 (FAST)
105
END
29999
Overwrite Row: 22, Col: 3 Scan Time: 0.2 ms 106 / 30,000 Steps RUN Simulator SV2 (PLC Station Address: 1)


AUTOMATICCAR AC SYSTEM BASED ON PLC[ac] - Delta WPLSoft - [Monitor Ladder Diagram]
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Used Device Report
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Transmission C
Four Arithmetic
Rotation and Di
Data Processing
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Communication
Floating Point C
Additional Instr
Positioning Con
Real Time Caler
Matrix Operatic
Contact Type L
Contact Type C
Gray Code
Floating Point C
Specific Bit Cor
Absolute Comp
Project Communication
68
M0
M1
M4
AUTO MODE
MANUAL MOD E
C 3 BIT
M20
CONTACTOR BIT 1
M1
MANUAL MOD E
M5
C 2 BIT
M6
C 1 BIT
M11
MANUALLY S LOW
M30
CONTACTOR BIT 2
M6
C 1 BIT
M12
MANUALLY M EDIUM
M11
MANUALLY S LOW
M5
C 2 BIT
M11
MANUALLY S LOW
M40
CONTACTOR BIT 3
M12
MANUALLY M EDIUM
M13
MANUALLY F AST
M13
MANUALLY F AST
91
M1
M2
Overwrite Row: 15, Col: 3
Scan Time: 0.2 ms 106 / 30,000 Steps
RUN
Simulator
SV2 (PLC Station Address: 1)

AUTOMATICCAR AC SYSTEM BASED ON PLC[ac] - Delta WPLSoft - [Monitor Ladder Diagram]
File Edit Compiler Comments Search View Communication Option Wizard Window Help
Used Device Report
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MachineList
APIs
Function
Loop Control
Transmission C
Four Arithmetic
Rotation and Di
Data Processing
High-Speed Pro
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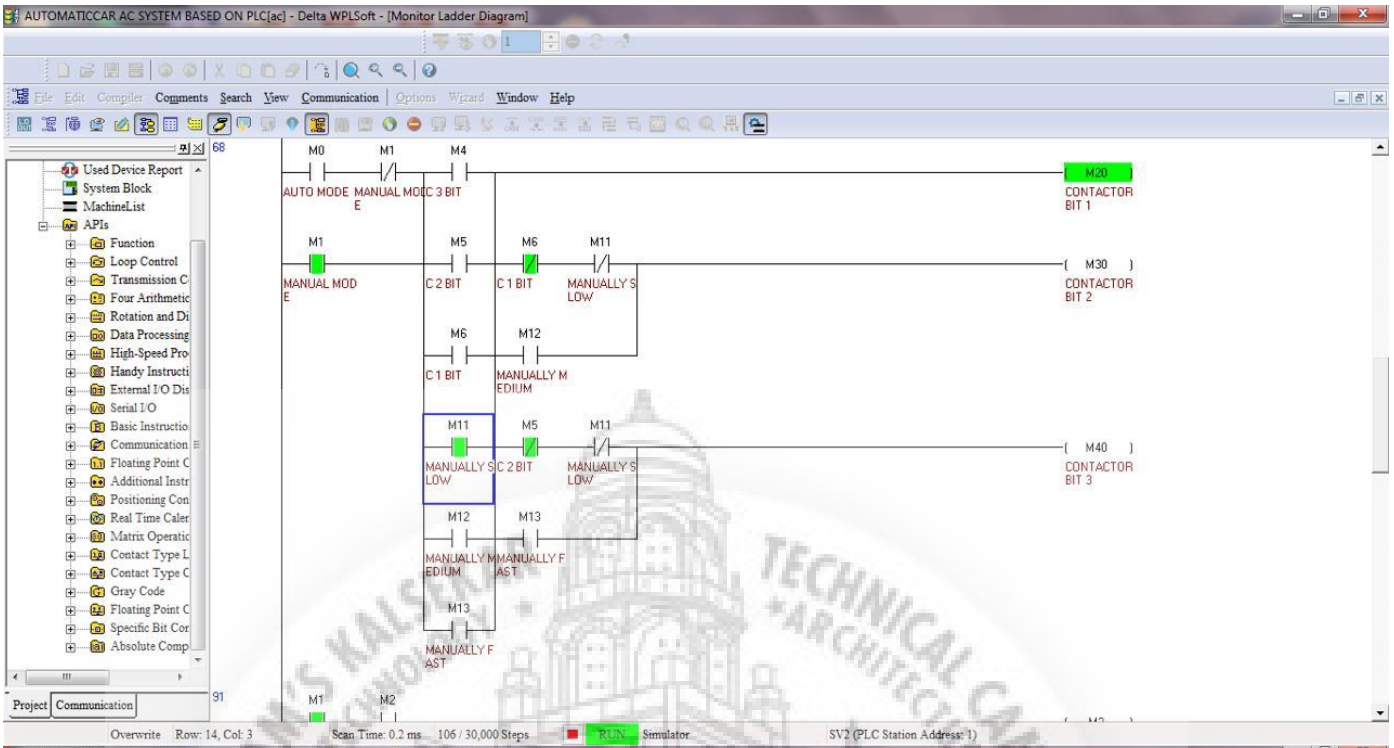
Communication
Floating Point C
Additional Instr
Positioning Con
Real Time Caler
Matrix Operatic
Contact Type L
Contact Type C
Gray Code
Floating Point C
Specific Bit Cor
Absolute Comp
Project Communication
94
M10
>18° AC BIT ON AU TOMATIC
Y0
AC
M1
MANUAL MOD E
M3
MANUALLY O FF AC
99
M20
CONTACTOR BIT 1
Y2
FAN STAGE 1 (SLOW)
101
M30
CONTACTOR BIT 2
Y3
FAN STAGE 2 (MEDIUM)
103
M40
CONTACTOR BIT 3
Y4
FAN STAGE 3 (FAST)
105
END
29999
Overwrite Row: 21, Col: 3
Scan Time: 0.2 ms 106 / 30,000 Steps
RUN
Simulator
SV2 (PLC Station Address: 1)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Data Processing
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Floating Point C
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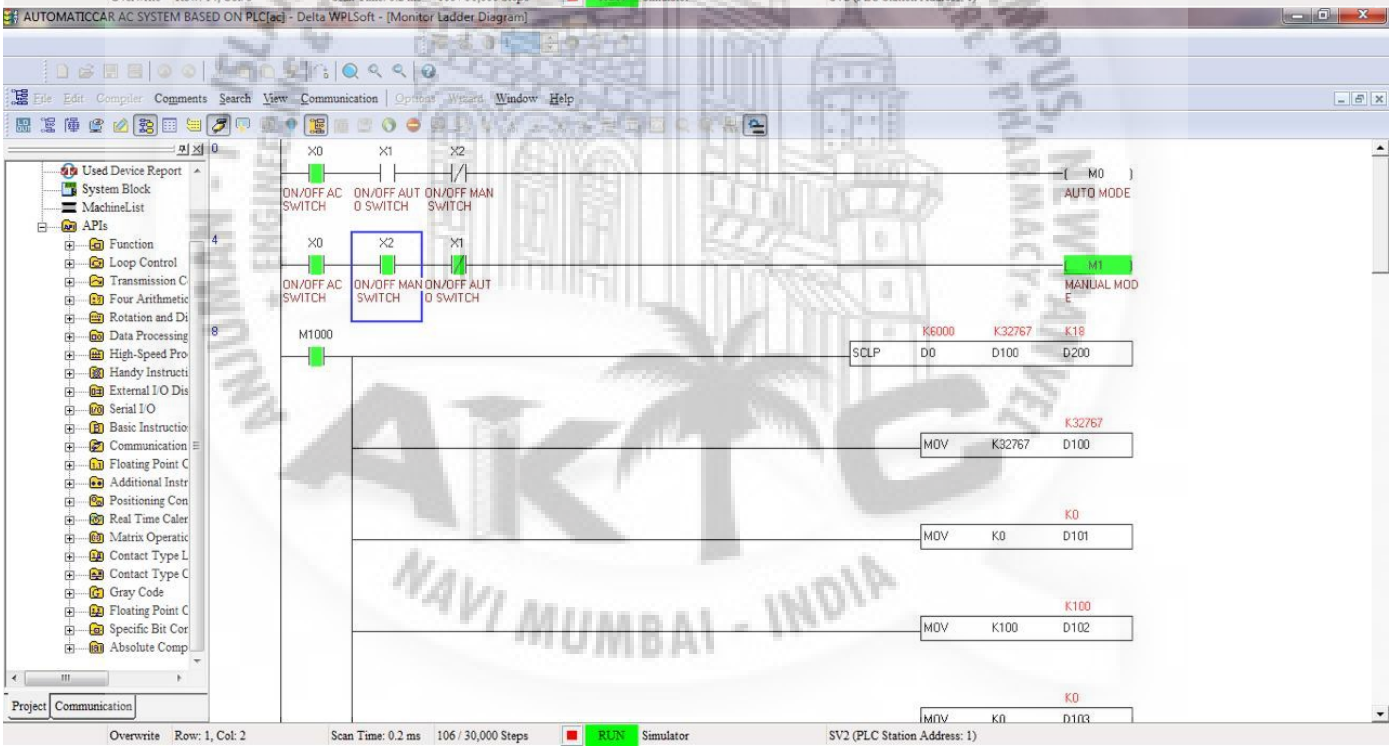
Positioning Con
Real Time Caler
Matrix Operatic
Contact Type L
Contact Type C
Gray Code
Floating Point C
Specific Bit Cor
Absolute Comp
Project Communication
M0 M1 M4
AUTO MODE MANUAL MODE C 3 BIT
M20 CONTACTOR BIT 1
M1 M5 M6 M11
MANUAL MOD E C 2 BIT C 1 BIT MANUALLY S LOW
M30 CONTACTOR BIT 2
M6 M12
C 1 BIT MANUALLY M EDIUM
M11 M5 M11
MANUALLY S LOW C 2 BIT MANUALLY S LOW
M40 CONTACTOR BIT 3
M12 M13
MANUALLY M EDIUM MANUALLY F AST
M13
MANUALLY F AST
M1 M2
Overwrite Row: 14, Col: 3 Scan Time: 0.2 ms 106 / 30,000 Steps RUN Simulator SV2 (PLC Station Address: 1)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Contact Type L
Contact Type C
Gray Code
Floating Point C
Specific Bit Cor
Absolute Comp
Project Communication
X0 X1 X2
ON/OFF AC SWITCH ON/OFF AUT O SWITCH ON/OFF MAN SWITCH
M0 AUTO MODE
X0 X2 X1
ON/OFF AC SWITCH ON/OFF MAN SWITCH ON/OFF AUT O SWITCH
M1 MANUAL MOD E
M1000
K6000 K32767 K18
SCLP D0 D100 D200
K32767
MOV K32767 D100
K0
MOV K0 D101
K100
MOV K100 D102
K0
MOV K0 D103
Overwrite Row: 1, Col: 2 Scan Time: 0.2 ms 106 / 30,000 Steps RUN Simulator SV2 (PLC Station Address: 1)

Chapter 5

Conclusion and Future Scope

Conclusion

This paper focuses on the design of automobile air conditioning automatic detection system. First, the principle of temperature detection and blower detection in automobile air conditioning is studied. The detection methods of blower and temperature are studied, and the detection scheme is determined. Finally, the controller of the system is designed by PLC, and the control program of the system is written. The control of the acquisition and detection of the detection data is realized.

Future Scope

- This project will reduce the fuel consumption of the vehicle, as the plc associated with the project will automatically turn off the cooling system of the a/c
- Initial step towards eco friendly, car a/c refrigerant system, it will reduce hazardas emissions
- Compact and easy handling process
- User friendly

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