HOME AUTOMATION SYSTEM

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1.OVERVIEW

1.1 Abstract

The consumption of electrical energy is highly increasing now -a- days due to our day - to- day requirements. This will create a huge demand on electrical supply. This project describes the design and construction of fan speed control according to the room temperature, light control according to light intensity and turned on/off control automatically with the human detection. The temperature sensor was carefully chosen to gauge the room temperature, LDR sensor was chosen to check the intensity of light and IR sensor was chosen for detect the human. Depending upon the detection of human the system will work which is controlled by the Atmega328.

1.2 Identifying features

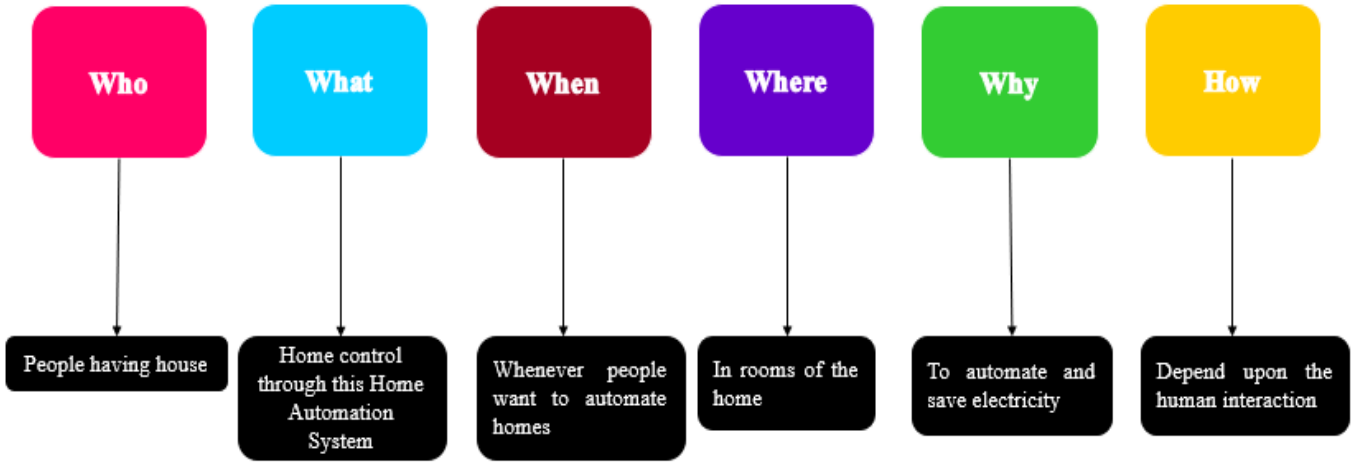
- Atmega328 controller shall be used for the control of the system.
- LCD Display shall be provided to display temperature, person count, status of the LDR, Light and Fan.
- This system provides complete automation of rooms in home.
- Considerable amount of electricity shall be saved.
- Blind people shall get benefited.

1.3 State of art

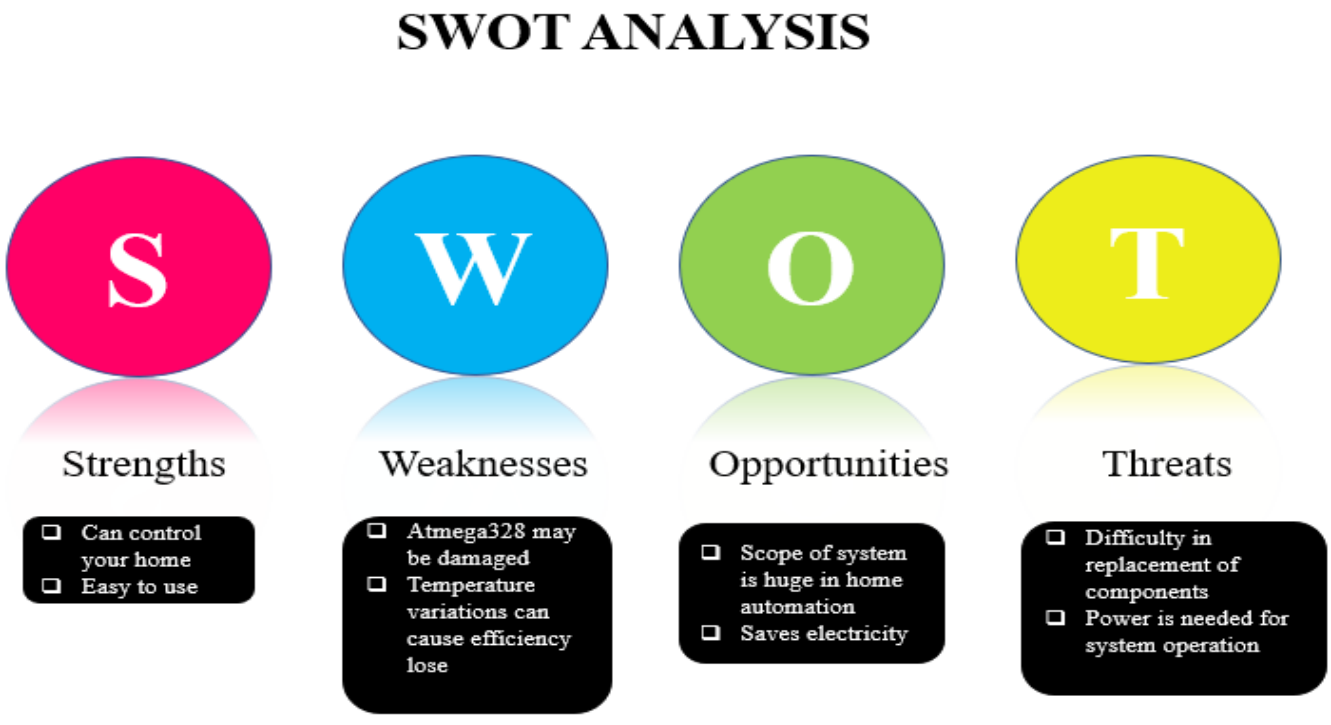
This project can automatically switch ON room lights and fan when at least one person presents in the room. If the room is empty, the lights and fan will automatically get switch OFF. It also displays count of persons present in the room. People are becoming so busy that they forget to turn off switches after leaving the room. The IR sensor would observe an interruption and provide an input to the controller increment or decrement depending

on entering or exciting of the person. The counting and temperature are displayed on 16*2 LCD through the Atemega328.

1.4 5W's 1H



1.5 Swot analysis



2.REQUIREMENTS

2.1 High Level Requirements

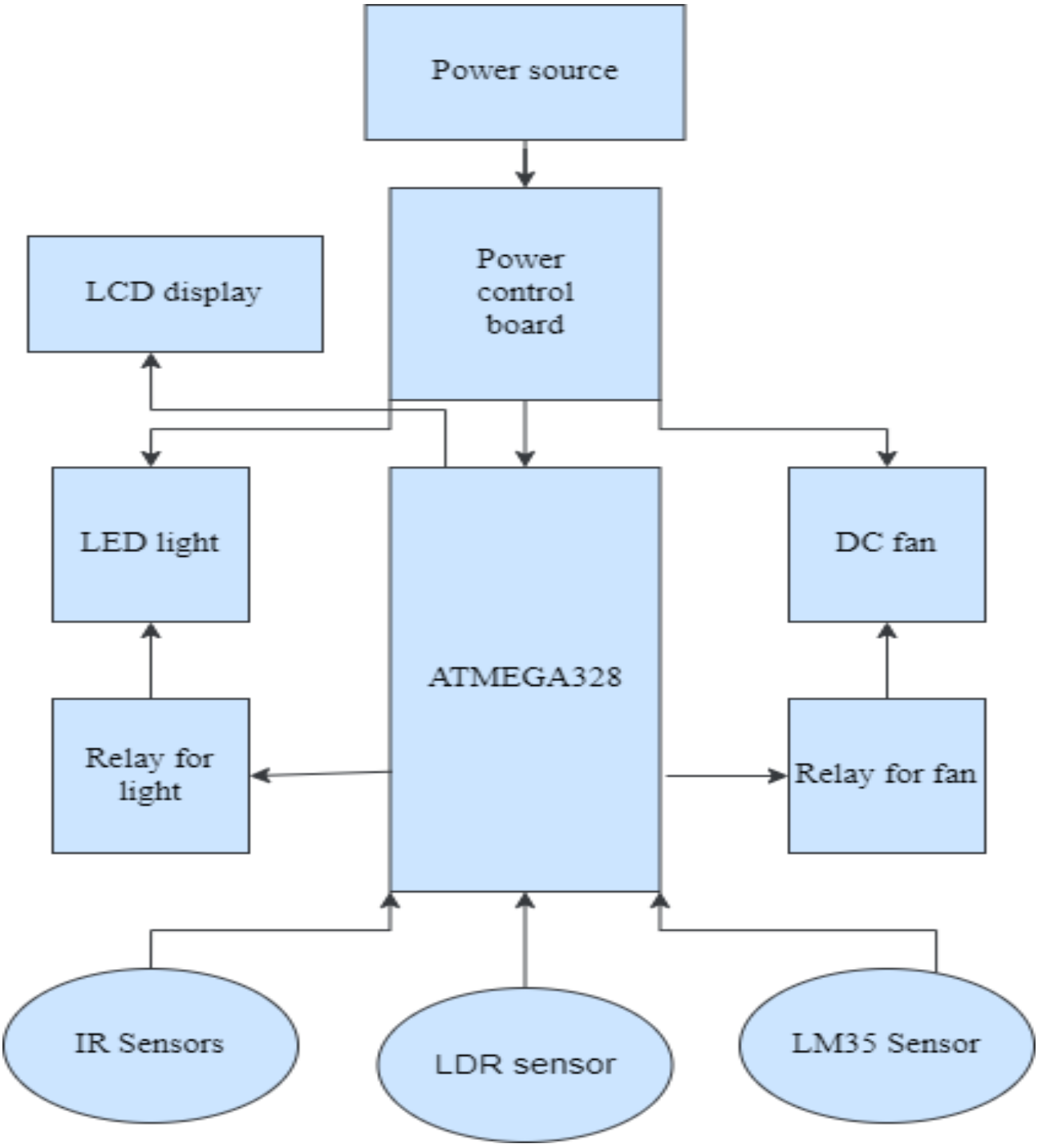
ID	High Level Requirements
HLR1	System shall control fan and light
HLR2	There shall be an LCD to display some contents
HLR3	Relay shall be used to turn on or off the light and fan
HLR4	System Shall detect temperature, motion and light intensity

2.2 Low Level Requirements

ID	Low Level Requirements for HLR1	ID	Low Level Requirements for HLR2
LLR1.1	According to sensor values, fan and light shall be controlled	LLR2.1	Temperature, person count shall be displayed
LLR1.2	The sensors shall be control by Atmgega328	LLR2.2	Fan and light status shall be displayed
ID	**Low Level Requirements for HLR3**	**ID**	**Low Level Requirements for HLR4**
LLR3.1	Relay shall be controlled by the Atmega328	LLR4.1	Temperature sensor detect the room temperature
LLR3.2	Relay opens or closes at certain time to operate the fan and light	LLR4.2	Motion sensor to detect the movement and light sensor to detect the light intensity

3. BLOCK DIAGRAM AND BLOCKS EXPLANATION

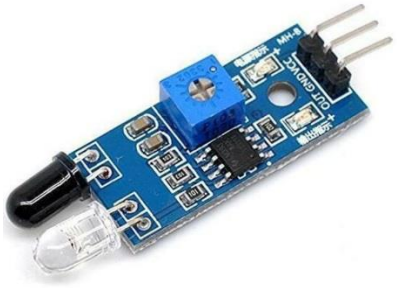
3.1 Block Diagram



3.2 Sensors

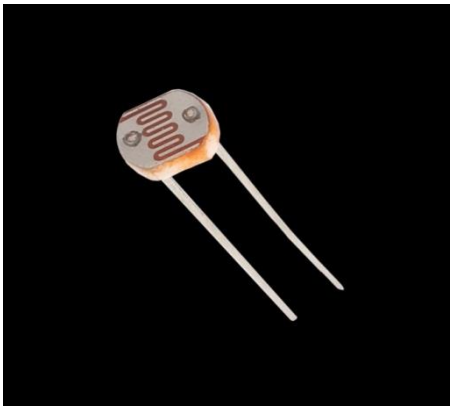
3.2.1 Motion Sensor (IR)

IR Sensor module has great adaptive capability of the ambient light, having a pair of infrared transmitter and the receiver tube, the infrared emitting tube to emit a certain frequency, encounters an obstacle detection (reflecting surface), infrared reflected back to the receiver tube receiving, after a comparator circuit processing, the green LED lights up, while the signal output will output digital signal(a low-level signal), through the potentiometer knob to adjust the detection distance, the effective distance range 2-10 cm working voltage of 3.3V-5V.



3.2.2 Light Sensor (LDR)

A Light Dependent Resistor (LDR) is also called a photoresistor or a cadmium sulphide (CDs) cell. It is basically a photocell that works on the principle of photoconductivity. LDR is a special type of resistor that allows higher voltages to pass through it (low resistance) whenever there is a high intensity of light and passes a low voltage (high resistance) whenever it is dark. This optoelectronic device is mostly used in light varying sensor circuit, light and dark activated switching circuits.



3.2.3 Temperature Sensor (LM35)

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor. It also possesses low self-heating and does not cause more than 0.1°C temperature rise in still air. The operating temperature range is from -55°C to 150°C. The output voltage varies by 10mV in response to every° C rise/fall in ambient temperature (Scale factor is 0.01V/°C).

3.3 Actuators

3.3.1 Led Light

LED (Light Emitting Diode) is an electric light where energy is passed through a semiconductor, lighting up the LED light bulb. LED lights have long life span and energy efficient. In this project 12V LED dc light is used.

3.3.2 Dc Fan

A DC ceiling fan works pretty much on the same principle as the DC motor. A DC motor uses an internal arrangement of magnets with opposing polarity. As current passes through the coil around this arrangement, a strong magnetic field is produced. This magnetic field then creates a torque that causes the motor to rotate. DC fans use less energy (70% of AC Fans),quiet and more speed options. In this project 12V DC Fan is used.

3.3.3 Relays

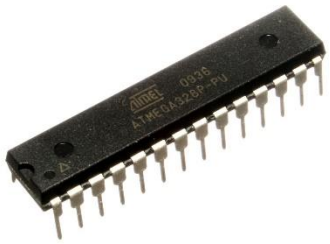
The Relay board is designed with two relay modules (one is for controlling dc fan and other is for controlling light), resistors and transistors. Relays are switches that control one electrical circuit by opening and closing contacts in another circuit. It works on the principle of the electromagnetic attraction.

3.3.4 Lcd Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16*2 LCD display is very basic module and is very commonly used in various devices and circuits. The data is the ASCII value of the character to be displayed on the LCD.

3.4 Microcontroller (Atmega328)

ATmega328 is an 8-bit, 28-Pin AVR Microcontroller, manufactured by Microchip, follows RISC Architecture, and has a flash-type program memory of 32KB. It has an EEPROM memory of 1KB and its SRAM memory is 2KB. It has 8 Pins for ADC operations, which all combine to form Port A (PA0 – PA7). It also has 3 built-in Timers, two of them are 8 Bit timers while the third one is 16-Bit Timer. It operates ranging from 3.3V to 5.5V but normally we use 5V as a standard. Its excellent features include cost-efficiency, low power dissipation, programming lock for security purposes, real timer counter with separate oscillator.



3.5 Subsystems and others

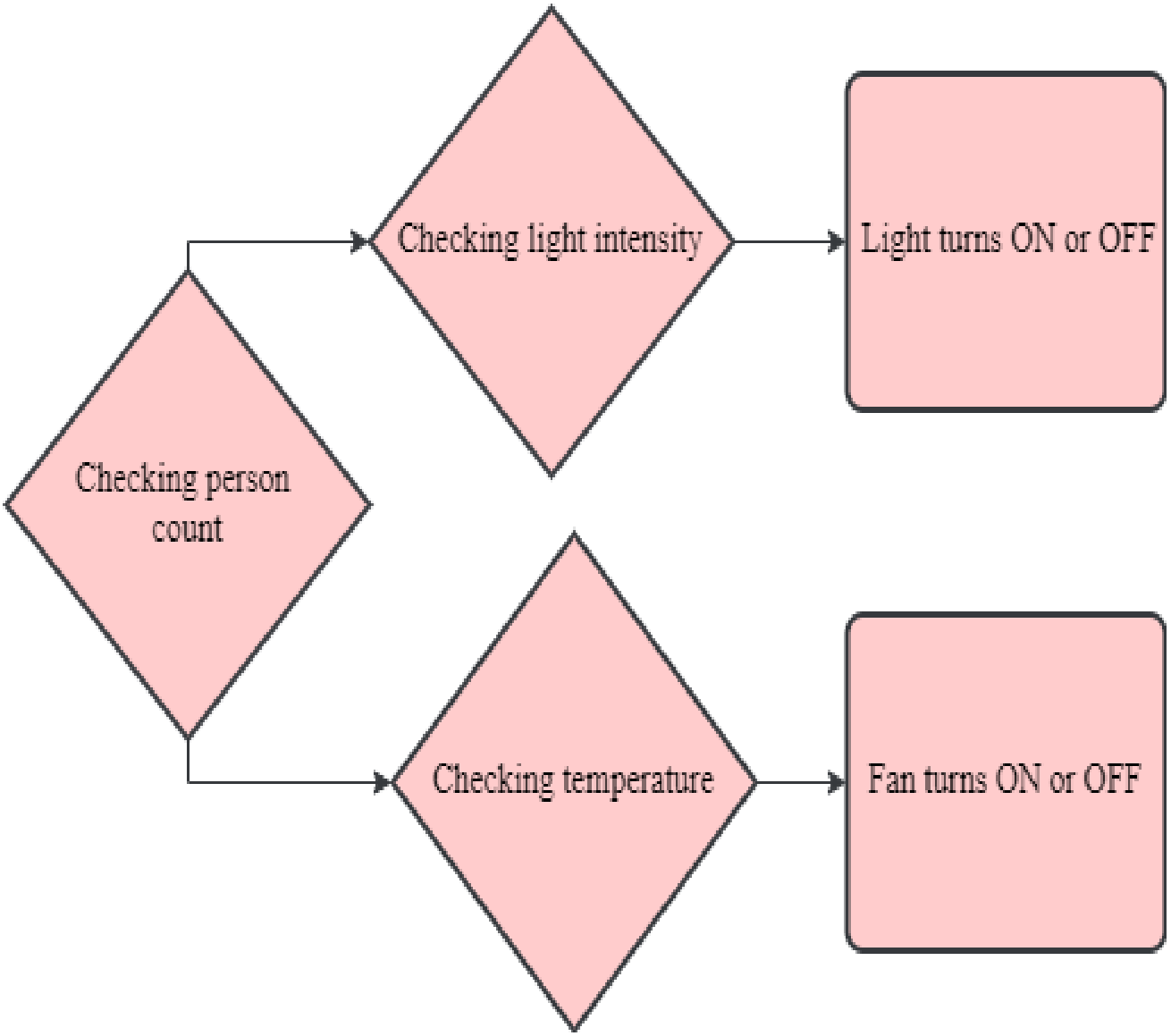
3.5.1 Power Control Board

The power supply board is designed with bridge rectifiers, resistors, capacitor, voltage regulators (IC 7805, IC 7812). This board regulates the power to the circuit.

4. ARCHITECTURE

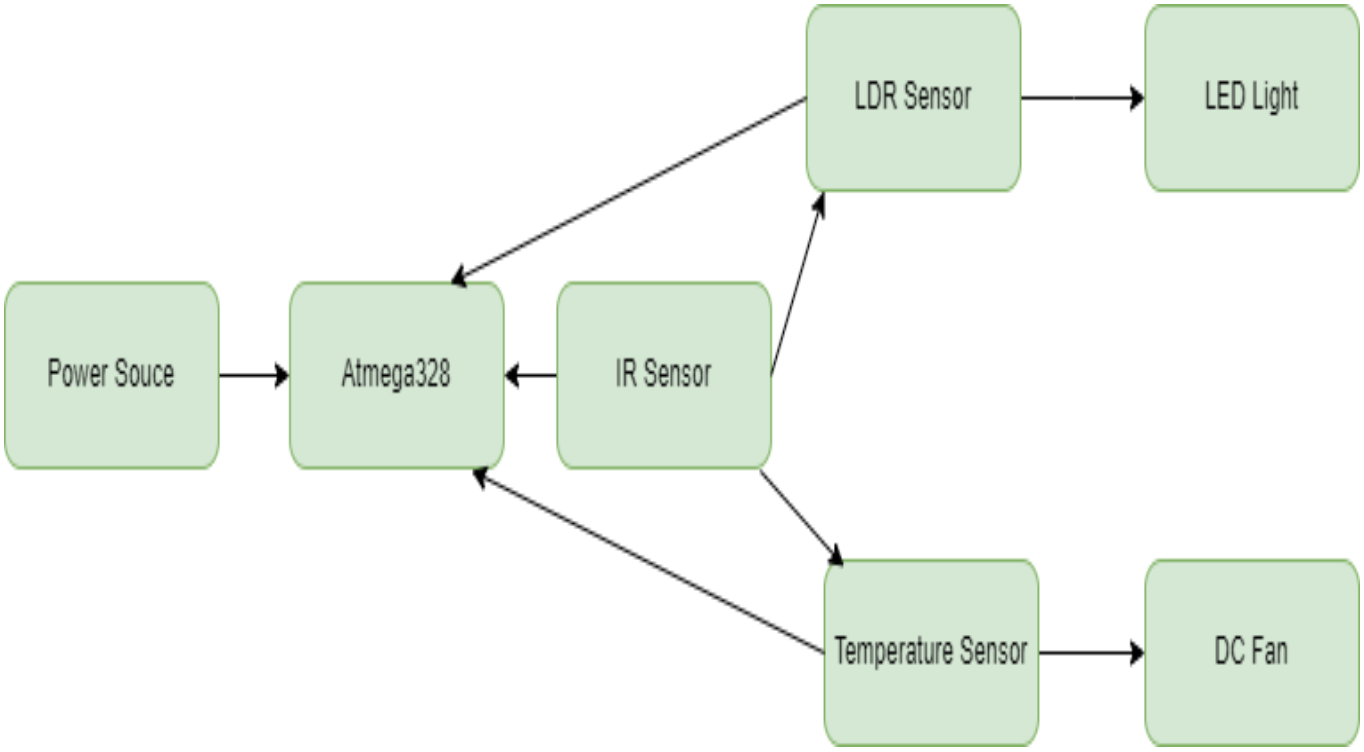
4.1 Behavioral Diagram

4.1.1 High Level Flow Chart Diagram



4.2 Structural Diagram

4.2.1 High level Use Case Diagram



5. WORKING

In this project Power source connected to a power supply board with a switch that controls the flow of current in the electric circuit whenever we need that system.

The power supply board consists of bridge rectifier, voltage regulators, capacitors, and resistors. Bridge rectifier provides the output for either polarity of input to prevent the circuit from damage. Voltage regulator (IC 7805) connected to the Atmega328 which requires 5V and regulator (IC 7812) connected to the relay board which requires 12V.

The Atmega328 is connected with LCD screen, IR sensor, LDR sensor, LM35 sensor and relay module. The outputs of the sensors are the analog inputs of the Atmga328. The output of the Atmega328 connected to the relay modules. The temperature, person counting, and fan speed are displayed in the LCD screen that gets information from the Atmega328. IR Sensor used to detect the person entering and leaving the room, LDR sensor used to detect the intensity of the room and LM35 sensor used to detect the temperature of the room. After supplying the voltage to the Atmga328 the system starts to work.

When there is movement in the room is detected by the IR sensor the system begins, LDR sensor detects the intensity of the room if the room is dark then the LED bulb glow that is controlled by one relay module, LM35 sensor detects the temperature and for different temperatures the DC fan run in different speeds that is controlled by another relay module gets signals from Atmega328 loaded with the program. The Atmega328 controls the relay module to make the circuit opened or closed.

6. APPLICATIONS

- This system controls the light and fan automatically, so it reduces manpower.
- This project can be implemented in industries, where they fail to switch off the fans and lights.
- It is very economical and easy to handle by the user.
- It is very helpful to disabled people.
- Save energy by slowing down its speed in low temperature.
- The fan designed in this project can also be used in small scale industries for cooling the electrical/mechanical equipment.
- The circuit can be used for car engine to reduce the heat

7.CONCLUSION

In this project, the Atmega328 can successfully controlling the DC fan and LED light using relay. Atmega328 was programmed using C language to compare temperature with standard temperature, detect the light intensity, set fan speed, and made light ON with their values displayed on the LCD. Moreover, the fan speed will be increased or decreased automatically based on the room temperature and light ON when room become dark. As Conclusion, the system which designed in this work will perform very well, for any temperature, light intensity and classified as automatic control. The total effective cost of proposed system is very low as compared to existing system for home and industries, so this project can be brought into a commercial product beneficial to the society.