HOME AUTOMATION

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ABSTRACT

- A smart home system is automation system that connects with your appliances to automate specific tasks and is typically remotely controlled. a smart home system can be used to program sprinklers, set and monitor home security system and cameras, or control appliances like a refrigerator or air conditioning and heating or fire alarm systems.

SYSTEMS AND HARDWARE PERIPHERALS

- The main hardware components of the smart home automation system are listed below along with detailed explanation.

Supply Unit

- To build a power supply unit, a 9V battery and a voltage regulator IC (integrated circuit) L7805 is used.
- The IC LM7805 belongs to the 78xx series of fixed linear voltage regulator ICs. The voltage regulator IC steps down the voltage from 9V to 5V for the MCU and provides a regulated output voltage of 5V to the microcontroller.

SECURITY SYSTEM

FLOWCHART FOR THE SECURITY SYSTEM
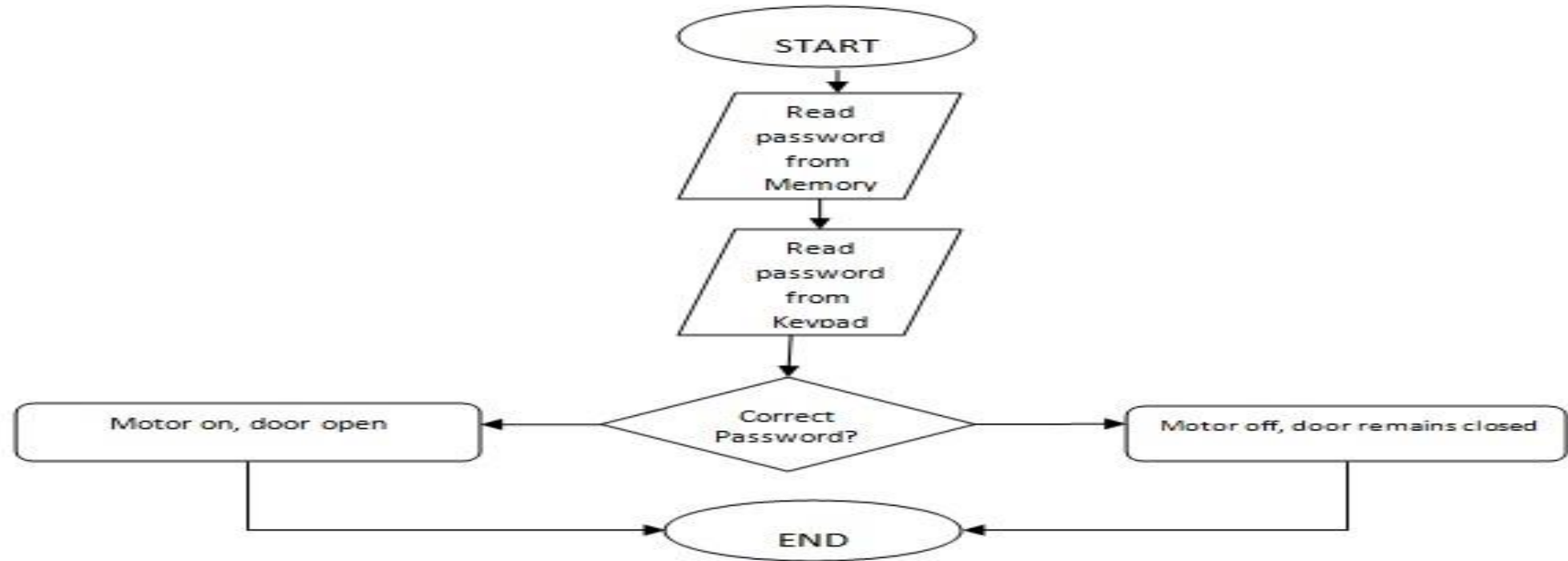
SECURITY SYSTEM
DASHBOARD

- The smart home automation system employs home security system to restrict the entry of any intruder into the house.

- A flowchart for the security system is given in the previous Fig 4x4 matrix keypad is connected to the microcontroller as an input and a Servo motor is connected as an output. The user must enter a password into the matrix keypad to enter the house. If the password entered is correct system will access and the LCD will disply 3 mode:

- (1- Show Temp.   2 –Light Control   3- Exit).

- the Servo motor rotates and the door opens for one second then close if password is true .

- If the password entered is incorrect, the Servo motor will not rotate and the door will not open.

LIGHTING SYSTEM
LDR

- lighting system senses the amount of ambient light in a room and qualitatively alters the brightness of the LED. The system incorporates a light sensor, an LED, and a microcontroller for this purpose. The light sensor (LDR) is connected as an input to the ADC of the

- microcontroller and the LED is connected as an output, The light sensor(LDR) senses the light levels and inputs them to the microcontroller. The microcontroller, that is the brain of the system, reads the values and varies the output current values to the LED, altering the brightness levels and thereby providing lighting automation. as a result, this mode of automation offers significant power savings.

HEATING
AND
AIR-CONDITIONING SYSTEM

- The smart home automation system provides a temperature control solution that serves to provide the switching on/off the fan and control its speed in accordance with the room temperature.

- This system makes use of a temperature sensor.

- The sensor is connected as an input to the microcontroller.

- A DC fan is connected as an output of the microcontroller via a relay.

- This mode is similar to the lighting mode of automation.

- The sensor senses the value of the ambient room temperature and inputs the value to the microcontroller.

- The LCD screen displays the ambient room temperature in Celsius.

- The microcontroller switches on/off the DC fan in accordance with the temperature range set by the user at the programming stage.

- This mode of home automation is employed to minimize energy waste and provide efficient energy consumption.

FIRE ALARM
AND
GAS DETECTION SYSTEM

• The smart home automation system also incorporates a fire detection system to alarm the user of a possible fire hazard.

• This mode uses gas and flame sensor.

• A buzzer is connected as an output to the microcontroller.

• The microcontroller will set the alarm (buzzer) according to gas and flame sensors then door will open with Buzzer Alarm, This mode of home automation ensures the safety of the occupants of the house.
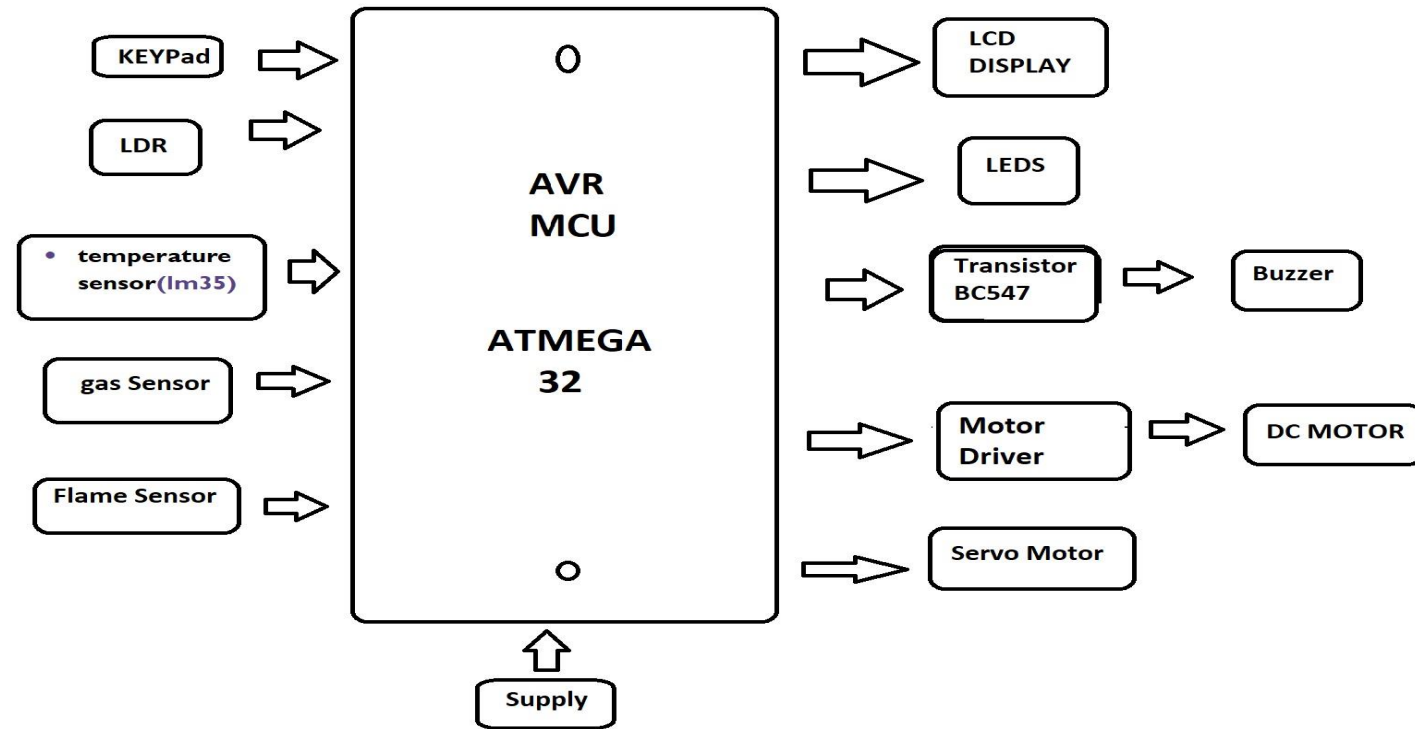
HARDWARE COMPONENT
AVR MCU ATMEGA32

INPUT COMPONENT

- 4*4 keypad
- LDR
- temperature sensor(lm35)
- Gas Sensor
- Flame Sensor

OUTPUT COMPONENT

- LCD
- LEDs
- Buzzer
- Servo motor (Door lock)
- DC Motor (fan)
- DC Motor Driver (L293D)

HARDWARE COMPONENT FLOWCHART

HARDWARE COMPONENT
DETAILS

AVR MCU

- A microcontroller is used to act as the brain of the home automation system. A microcontroller is a highly integrated chip where all the peripherals like CPU, timers, counters, RAM, ROM, registers, I/O pins, clock circuits, etc. are built in. Therefore, a microcontroller is a combination of a microprocessor and peripherals.

- Microcontrollers are small, and powerful and are used in embedded applications for specific tasks. In the smart home automation system, one ATmega32 microcontroller is used. It belongs to Atmel's family of microcontrollers.

- Atmel AVR microcontrollers provide flexibility in terms of design and no other microcontroller offers better power efficiency than the AVR family. The megaAVR device family offers a good amount of memory and inbuilt peripherals and is suitable for general-purpose applications.

INPUT COMPONENT

- **Light Sensor**

- **A LDR (light dependent resistor) is used as a light sensor to measure the ambient light levels and input them to the MCU. An LDR is a light-controlled variable resistor. It exhibits photoconductivity. The resistance value of the LDR increases with decreasing incident light intensity levels and vice-versa. This photo-detector is ideal for lighting automation.**

- **Temperature Sensor**

- **The IC LM35 is used as a precision temperature sensor. It has an output voltage linearly proportional to the ambient temperature in Celsius and low output impedance.**

- **4*4 Matrix Keypad**

- **A 4x4 matrix keypad is used to input the password. If the password is correct, the door opens and the user can enter the house.**

- **Thus, the home automation system ensures safety of the home.**

INPUT COMPONENT

- **Gas Sensor**

- **Gas sensor is sensor that can detect the presence and concentration of various hazardous gases and vapors, such as toxic or explosive gases, volatile.**

- **flame sensor**

- **A flame sensor is a crucial safety component on your gas heating system. During the ignition cycle, your gas furnace goes through a process where a spark or a hot surface ignitor will actually ignite the gas. As the gas is ignited, the flame sensor creates a current of electricity to a micro controller.**

OUTPUT COMPONENT

- **LED**

- An LED is a p-n junction light emitting semiconductor diode. It emits light when current is passed through the two leads. It works on the principle of electro luminescence. An advantage of using an LED is high luminous efficacy.

- **LCD Display**

- LCD (liquid crystal display) is used as a basic electronic display screen. A 16x2 LCD means simply means that it can display 16 characters per line and there exist 2 such lines.

- **Buzzer**

- A small buzzer is used to alert the user in case of a possible fire hazard

OUTPUT COMPONENT

- **Servo motor and DC Fan**

- **The Servo motor is used for operating the opening of the door when the user enters the correct password. A small DC fan is used for demonstration of the system's ability to provide air conditioning, Since the current requirement for driving a DC motor is more than the current available at the I/O pins of the microcontroller, a motor driver IC L293D is used.**

SIMULATION