Project Title : Smart Room

Digital lock and automatic lighting control

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1 Abstract

The aim of this project is to build a digital door lock and automatic lighting system. The digital door lock helps in providing high security, as one can only open the door if correct password is entered and if user enter an incorrect password a message will be displayed and the door will not open. When the door is opened and user enters the room, the entry of the user is detected along with it the intensity of the light in the surroundings is measured in order to determine if its day or night and accordingly the light is turned ON and OFF.

2 Requirements

2.1 High Level Requirement

ID	Description
HLR_1	Password shall be verified based on which user will be allowed to enter.
HLR_2	User entry shall be detected and the light will be controlled.
HLR_3	The intensity of the light shall be measured and will turn the light ON and OFF accordingly.

2.2 Low Level Requirement

H-ID	L-ID	Description
HLR_1	LLR_1.0	The password shall be set as 2022 in the program.
	LLR_1.1	User shall be asked to enter the password using the keypad.
	LLR_1.2	User entered password shall we verified with the set password.
	LLR_1.3	Message shall be displayed on the LCD, if password is correct "Welcome", else "Incorrect Password".
	LLR_1.4	If the password is correct the movement in the servo motor shall indicate the opening of the door.
HLR_2	LLR_2.0	User entry shall be detected with the help of PIR sensor.
	LLR_2.1	Sensor value shall be used to turn the light ON.
HLR_3	LLR_3.0	Intensity of the surrounding shall be detected using LDR sensor.
	LLR_3.1	If the intensity is high light shall be turned OFF and if intensity is low light shall continue in the ON state.

3 Block Diagram

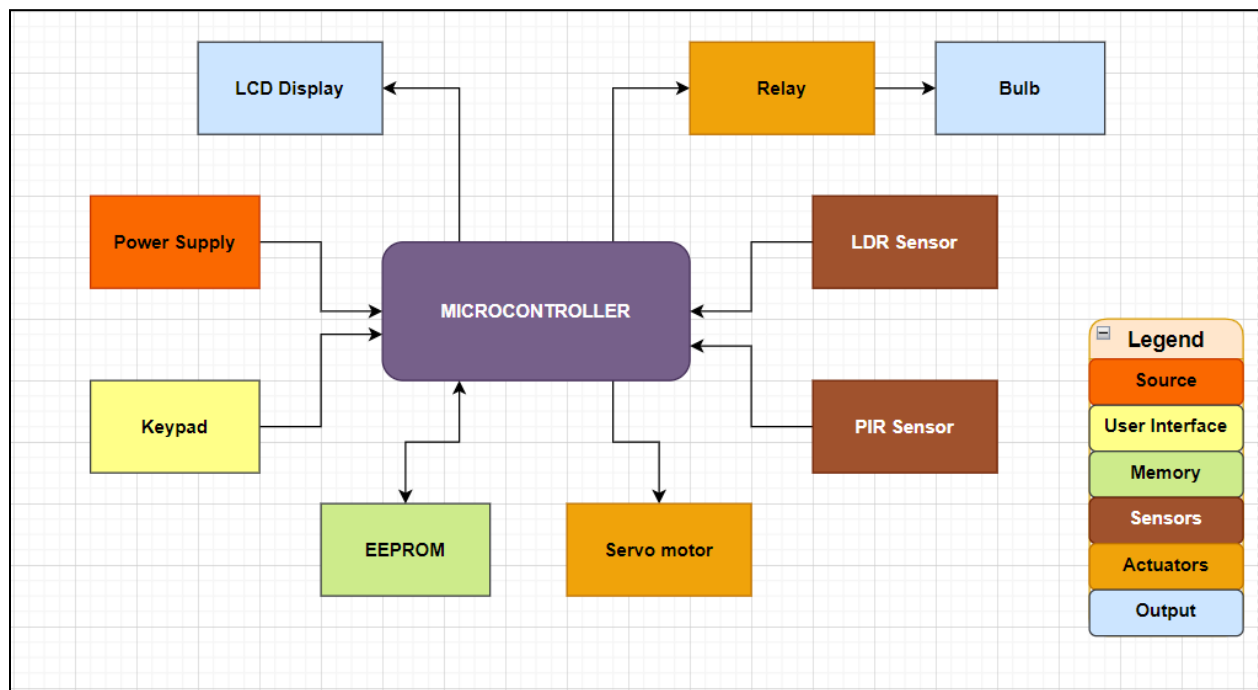
Fig. 3.1 Block diagram of the system

4 Components Description

I. **Microcontroller**: Arduino Uno is a microcontroller board based on the ATmega328P.It has 14 digital input/output pins which include 6 PWM outputs. It also has 6 analog inputs, a reset button and is powered by AC to DC adapter.

II. **Keypad**: Keypad is used as input which has 16 keys in parallel. The keys of each row and column are connected through the labeled pins as mentioned on it.

III. **EEPROM**: Electrically erasable programmable read-only memory is a memory which can be erased and reprogrammed by the user for a certain number of times.

IV. **Servo motor**: It is a rotary actuator which helps in the precise control of angular or linear position, velocity, and acceleration. It is an electromechanical device which follows closed-loop mechanism that uses position feedback to control its motion and final position.

V. **LCD Display**: Liquid Crystal Display uses a panel display technology used to display data which has 16 Columns & 2 Rows so it can display 32 characters and each character will be made with 40 Pixel message.

VI. **PIR Sensor**: Passive Infrared sensor is used to sense motion, usually used to detect the movement of user, if user has moved in or out of the sensors range. When motion is detected it gives digital high pulse and when motion is not detected it gives digital low pulse.

VII. **LDR Sensor**: Light Dependent Resistor is a photocell which works on the principle of photoconductivity i.e., the resistance of the resistor decreases along with the decrease in the intensity of the light.

VIII. **Relay**: It is an electrical switch which is used for controlling the high voltage or current using devices which are connected to microcontroller, it also protects the microcontroller from high voltage and current.

IX. **Bulb**: Light which require high power source.

5 Application

i. **Microcontroller**: Arduino Uno is the main component of the project to which the program is dumped in order to control all the sensors and actuator as per the requirement.

ii. **Keypad**: It is used to take the input from the user, here user has to enter the password using the keypad.

iii. **EEPROM**: It is a memory which is used to store the set password and it also allows the user to change the password whenever required.

iv. **Servo motor**: Change in the position of the servo motor is used as indication of opening the door when the password entered by the user is correct.

v. **LCD Display**: It is used to display the message, either "welcome" if the entered password is correct or "incorrect password" if the password is wrong.

vi. **PIR sensor**: It is used to detect the movement of the user through the door.

vii. **LDR sensor**: It is used to measure the intensity of the light in the surrounding and switch the light ON during night i.e. the intensity of the light is low and turn the light OFF during day i.e. the intensity of the light is high.

viii. **Relay**: It helps to control the high current/voltage that is required to power the bulb.

ix. **Bulb**: It is used as indication of the values detected by the sensors.

6 References

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