

,

Software Requirements Specifications (SRS)

SMART HOME PROJECT

Contents

<i>1.Introduction.....</i>	<i>3</i>
<i>1.1Purpose.....</i>	<i>3</i>
<i>1.2 Scope</i>	<i>3</i>
<i>2.Overall Description.....</i>	<i>4</i>
2.1 System Perspective.....	4
2.1.1Diagram	4
2.1.2Complete Description	5
2.1.3 Constrains	6
3. Specific Requirements	6
4.Modelling Requirements.....	7
5.State Machine.....	11

1.Introduction

A smart home refers to a convenient home setup where appliances and devices can be automatically controlled remotely from anywhere with an internet connection using a mobile or other networked device.

1.1Purpose

This SRS document will specify the overall description, specific requirements, modeling requirements.

This document is giving a fully understanding view of the components, key elements and key functions that are being used to implement the smart house project, such as Ultrasonic Sensor, Real Time Clock module (RTC), LM35 Temperature sensor, Light Dependent Resistor (LDR) sensor, Servo motor, Dc Motor, Electric Solenoid Lock and PIR Sensor.

The system developed is intended to give a fully automated control over the whole house. This document will provide a detailed outline Template of the requirements of the software system for developers intending to implement the system.

1.2 Scope

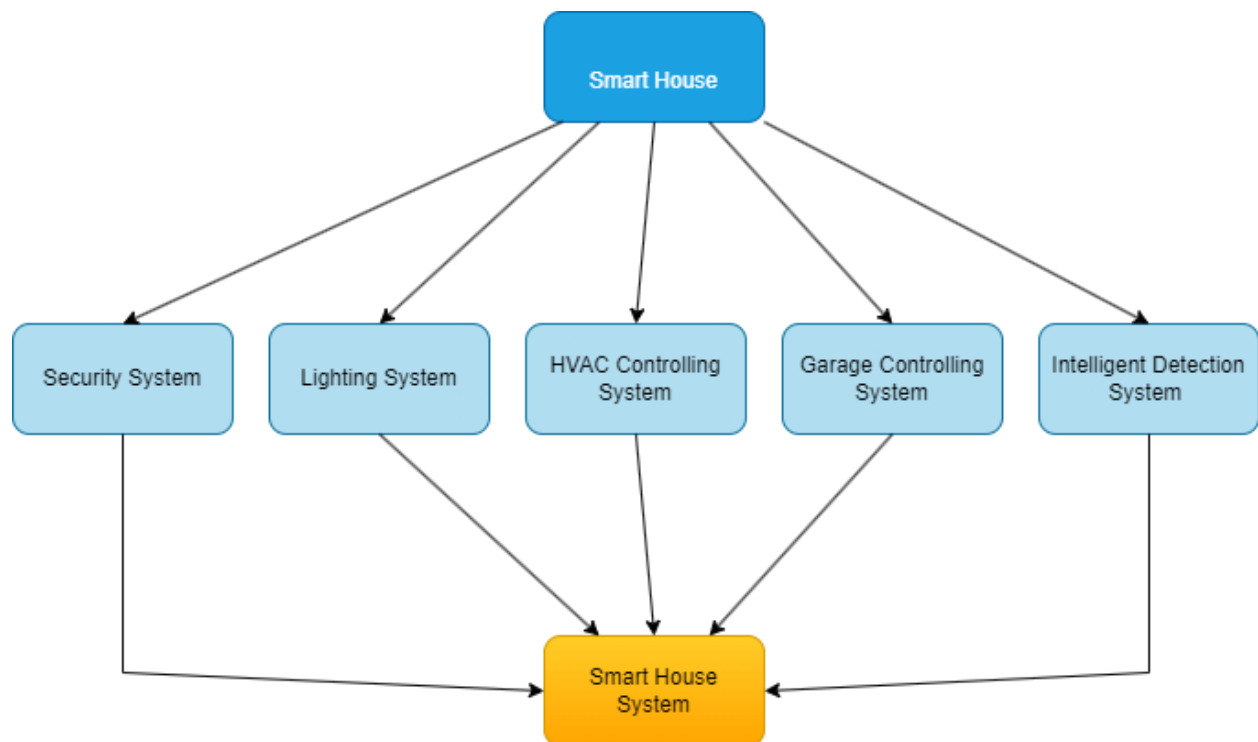
The product will give a fully automated control on the house, we are creating this application instead of any remote for automation because every person have their personal android phone and they can easily control their home appliances for their home. The user will be enabled to control and monitor various features of their home such as lighting, temperature, security, opening and closing door and garage using password.

2.Overall Description

This section will give description of Smart House System, the constraints of the system.

2.1 System Perspective

2.1.1Diagram



2.1.2Complete Description

The user will enter his own password to unlock all the smart home features, the system will display the data for the user such as the date, time, current temperature and the status of the rest component like if the garage door is opened or closed. In case of entering the password wrong three time the alarm will be enabled as a notification for security system, also if the status of the house is closed and there is motion detected the alarm will be enabled.

Using an ultrasonic sensor as an indication of motion to automatically turn on the light on the area in which the user is located, this effectively will enhance the power consumption of the whole house.

User will have complete control over the HVAC system to adjust the speed of the fan and turn it on or off, however it will be automated meaning based on the temperature the air-condition will be turned on and off in range greater than 28C, if the temperature is between 28 & 24 the fan will be running with full speed and air-condition is off, if temp. is between 20&24 the fan will be running with half of its speed, Temperature less than 20 then the fan will be stopped.

Regarding the Garage door, the user will be allowed to create its own password, so when he is nearly the garage he will access the system enter his password and the door will automatically open, then the door will be closed automatically after some specific time based on the user requirement.

Last but not least, we have an intelligent detecting system using PIR sensor to open or close curtains meaning of, if there is a motion detection in living room when it's AM curtains will be opened automatically, however if it's PM no action will be taken, otherwise there is a manual controlling by the user over the house.

2.1.3 Constrains

System Interface:

Smart home system basically includes sub-systems such as: Security System, Lighting System, HVAC Controlling system, Garage door system and intelligent detection system. If any of these subsystems having a problem or failed it doesn't affect the other sub-systems.

User Interface:

Only a user with valid password will have the access over the controlling system of the house.

Hardware Interface:

User will have the ability to control motors such as servo for opening and closing the garage door, dc motor for controlling the speed of the fan, Sensors will be controlled by the system meaning of based on some readings of these sensors the system will take some actions.

Software Interface:

User will have the ability to control the whole home system using mobile phone application supported by the developers and the data will be displayed on LCD screen inside the house.

3. Specific Requirements

1. Open door with a password.
2. Turning on and off the air conditioner based on the temperature and control it with a custom remote specific to the product.
3. Automatic opening and closing of window blinds.
4. Lights being turned on when I open the door.
5. Temperature monitoring system.
6. Garage door being controlled remotely using password to open and close
7. Smart home applications that controls all the internal features of the system
8. Can control it remotely from outside (ex: through phone app)
9. It can detect if there is someone inside the house
10. Can control house devices (turn it on and off)

4. Modelling Requirements

1.

Use case	Open door
Actors	user
Description	Opens the door if user entered the right password
Type	primary
includes	none
extends	none
Cross_refs	-----
Use cases	-----

2.

Use case	Controlling the fan
Actors	user
Description	Detect temperature of the room or home and control the speed of the fan and Adaptation control according to the temperature which is detected
Type	primary
includes	none
extends	none
Cross_refs	-----
Use cases	-----

Team X

3.

Use case	Adaptation control
Actors	User
Description	Detect temperature of the room or home and control the degree of the air conditioner according to the temperature which is detected
Type	primary
includes	None
extends	None
Cross_refs	---
Use cases	----

4.

Use case	Curtains control
Actors	None
Description	Open or close the curtains depending on light intensity
Type	Secondary
includes	None
extends	None
Cross_refs	---
Use cases	----

Team X

5.

Use Case:	Detection of someone entering/exiting a room.
Actors:	Resident
Description:	The ultrasonic indicates if someone entered the room, then it turns on the lights (LED), it also indicates when the person is leaving, therefore, it turns off the lights (LED).
Type:	Primary
Includes:	None.
Extends:	Turn ON LED, Turn OFF LED.
Cross-refs:	-
Use Cases:	None.

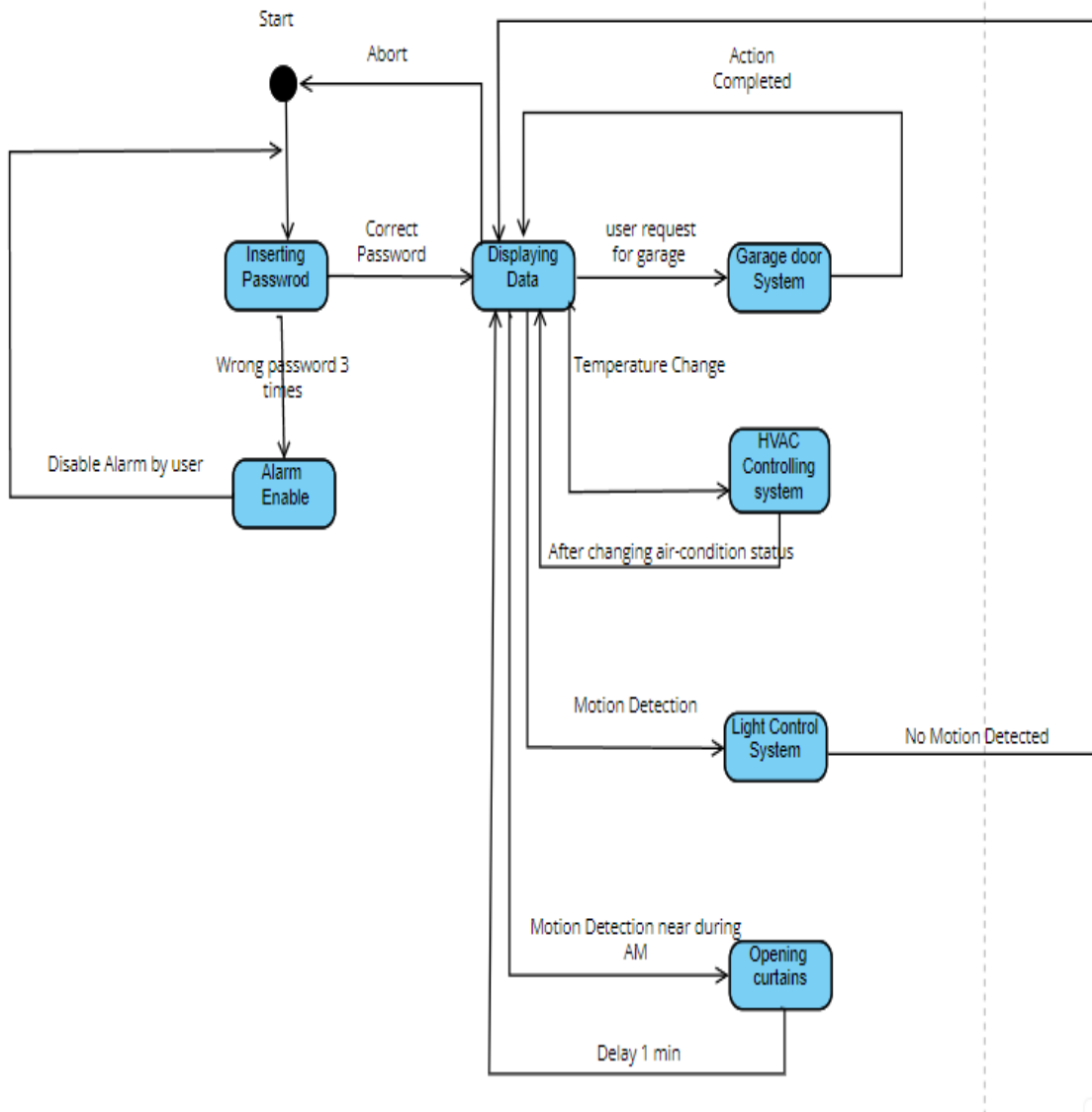
6.

Use Case:	Detection of someone entering/exiting a room.
Actors:	Resident
Description:	The ultrasonic indicates if someone entered the room, then it turns on the lights (LED), it also indicates when the person is leaving, therefore, it turns off the lights (LED).
Type:	Primary
Includes:	None.
Extends:	Turn ON LED, Turn OFF LED.

Team X

Cross-refs:	
Use Cases:	None.

5.State Machine



Team X

States:

Inserting Password:

The user will enter his password to access the home system only if it's a valid password, when some one tries to enter password wrong 3 time the alarm will be enabled for the security system and never be disabled except by the user.

Displaying Data:

Once the user enters his correct password he will access all the sub-systems included for the house and all the given data will be displayed to him such as temperature, Date, Time and the situation of the garage door.

HVAC Controlling system:

If there is a change over the temperature the system will act relative to this data and turn on or off the air-condition after a while of this action it will be returned to the displaying data state waiting for other actions to be handled or input by the user.

Garage Door:

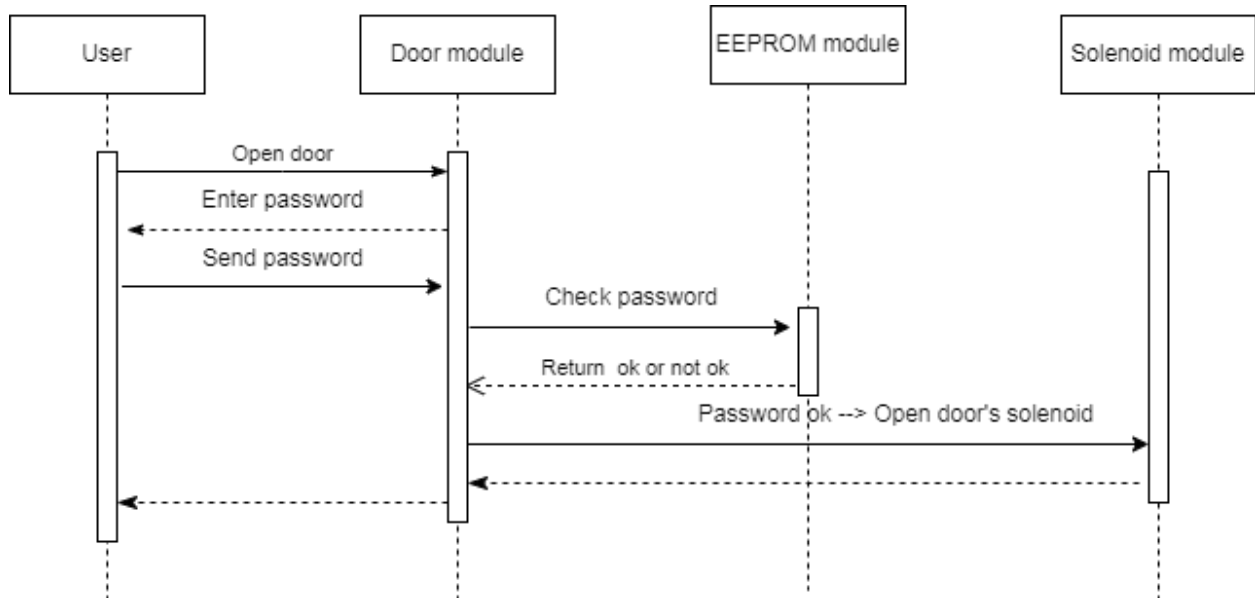
When user wants to open his garage door he will chose this option from his app and after action is completed it will be returned automatically to Displaying Data state.

Opening Curtains:

Based on the motion detection near to balcony or a window the system will decide either to open it or take no action based on the current real time.

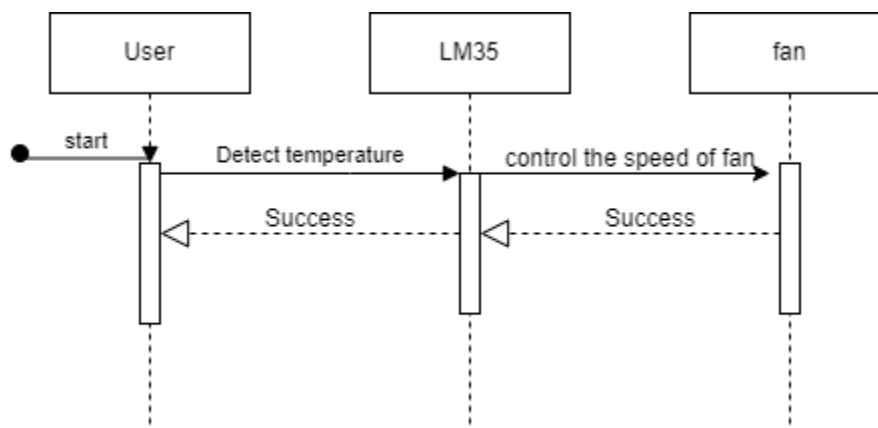
6. Sequence diagrams

6.1 Open Door:



When the user wants to open the door, it will ask him to enter the password, then checks if it is the right password, which is saved in the EEPROM. If it is the right password the door will open and if it is not, the door will not open.

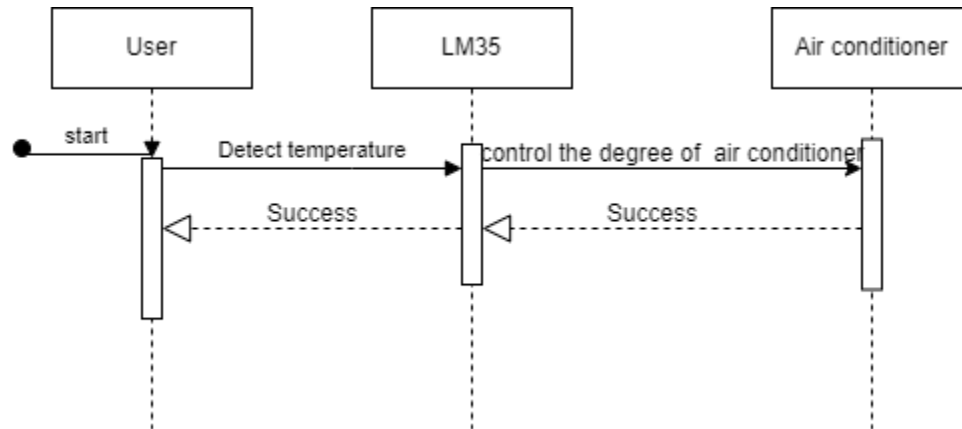
6.2 Controlling the fan:



Team X

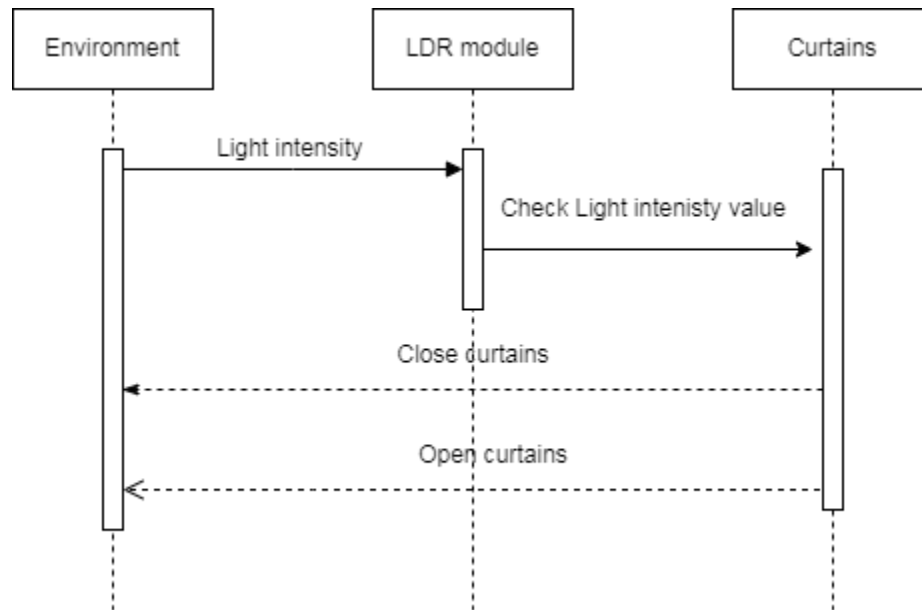
The user wants temperature sensor like LM35 to detect the temperature in his home to control the speed of the fan according to the current temperature. If the temperature is greater than the 25C and less than 30 C the speed of the fan will be hundred percent. If the temperature is greater than the 20C and less than 25C the speed of the fan will be fifty percent. If the temperature is greater than the 15C and less than 20C the speed of the fan will be twenty five percent.

4.3 Adaptation control:



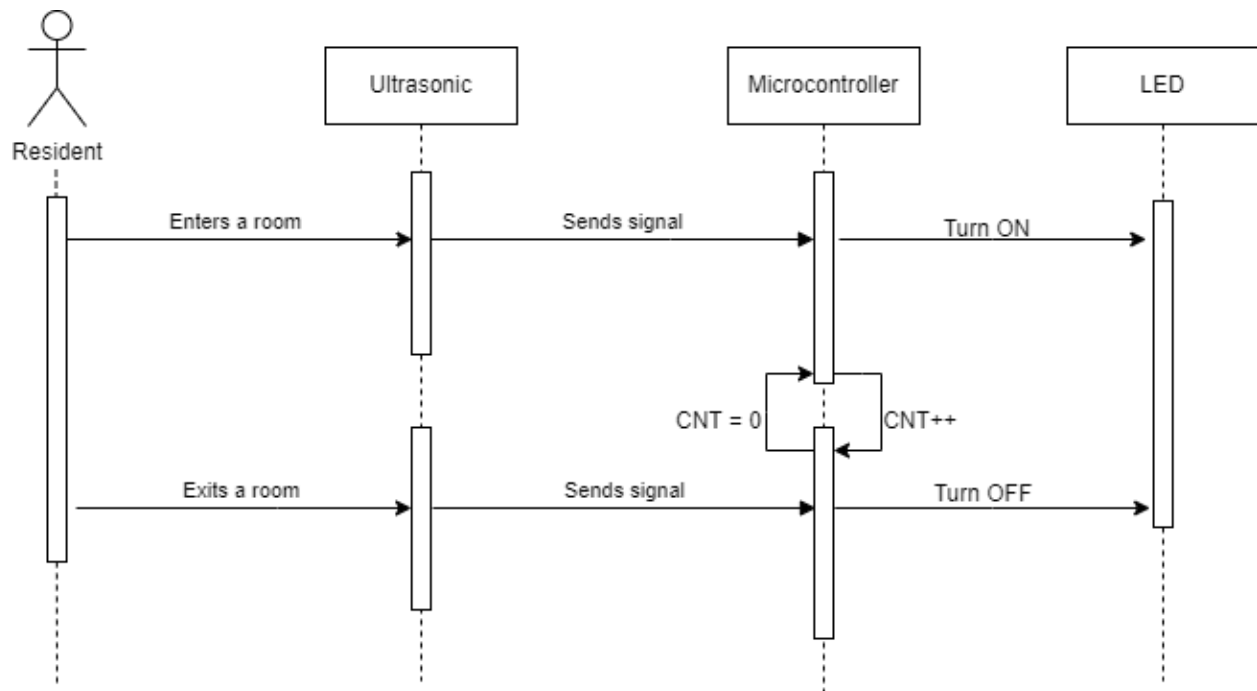
The user wants temperature sensor like LM35 to detect the temperature in his home to control the degree of the air conditioner according to the current temperature. If the temperature is greater than the 35C and less than 40 C the of the degree of the air conditioner will be 24C. If the temperature is greater than the 30C and less than 35C the degree the air of conditioner will be 26C.

6.3 Curtains control:



LDR will check the light intensity and depends on it, it will send a signal to curtains to open or close it.

6.4 Ultrasonic:



Team X

The ultrasonic is mainly used in a smart home system to indicate distance of a moving object, in our case, the ultrasonic is used to identify if someone entered/exited the room. It's mainly used for good purposes including power efficiency and saving electricity for the house owner. As when the ultrasonic receives a signal that someone is in a distance that is less than a specific value we set ($< \text{set_value}$), therefore, it send a signal to the microcontroller to turn on the lights (LED) , and then the microcontroller sends a flag that someone has entered the room, so when the person exits the room, the ultrasonic sends a signal, therefore, the microcontroller turns off the lights (LED).