CS253-Assignment 6 (SRS)

Home Surveillance System

1-Introduction:

- **1.1-Purpose:**
  - The SRS is a document that provides a comprehensive description of specific functional and non-functional requirements, specifications, external behaviour, design enumeration, and other important information and a complete description of the product to be made.
  - Home Security System has one main goal: to provide security and safety functions for the homes installed. To list some significant functions: It should alert the house people if there is an incident like theft, fire, outside animals, etc.
  - This document contains the details of the problem and the need for the home security system. It will also include the solutions to specifications and what we expect from it. It will be wholly unambiguous and holistic. All the information the following groups will need to make the other documents are contained in this doc.
  - It will also include external interface requirements, functional and non-functional requirements, an overall description of the System features, etc.

- **1.2-Intended Audience and Reading Suggestions:**

  - This SRS will help the organisation make this software and write the system design and Test Doc. This document will help in understanding and teamwork among team members. It will also help the three individuals who will design the other documents relevant to this software.

2-Overall Description:

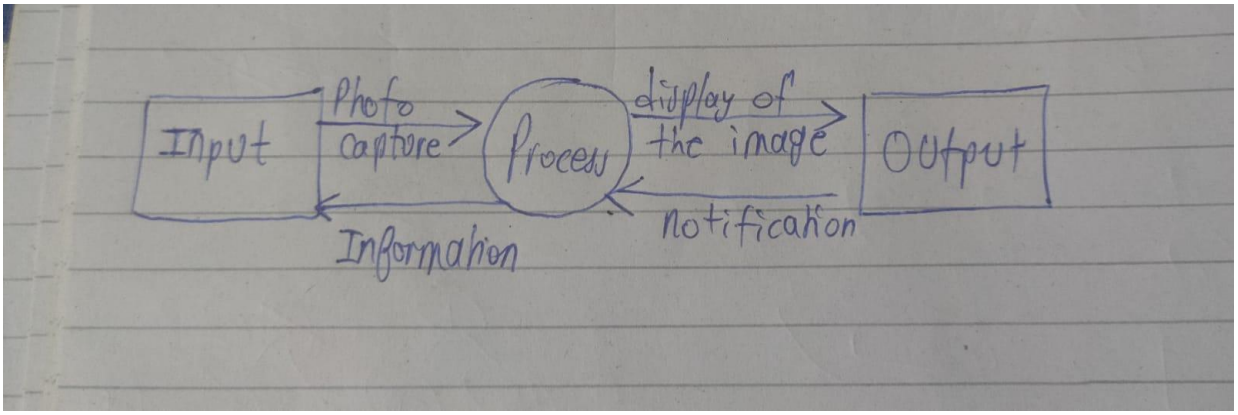
2.1-Product description:

- Safe home will be a novel system composed of an innovative wireless box and a central processing unit.
- The wireless boxes will be attached to every hardware device to secure a network connection around the whole house.
- The software inside the central processing unit should be a control software responsible for performing all the system functions. The web server should store the information and data, providing a web interface and remote control interface.
- The software's central theme is the software of the Safehome, that is, the central processor.
- It focuses on home security features. These features include having a window, door, and other motion sensors to detect any unauthorised access, monitor fire and smoke, and modify the camera/sensor settings via the internet.
- The home surveillance system also includes connecting to a network of cameras, further recording the video streams.

2.2-Product Features:

- Reports(of any alarming situation mentioned before) should be notified via a pop-up phone call or messages. It should trigger this notification with a max of 2 seconds of latency.
- It should be internet-enabled so that we can operate it remotely and it can send notifications to the phone via the internet.
- It should have low latency; that is, the recorded video transmission should be super fast >= 5 Mbps.
- It should be easy to install and Set up, should have less than 10-sec installing time and have a user manual as soon as the app or website start's to guide the user with an option to disable it for the next time.
- Some More application's it will perform:
    - It should be able to report an Alarm Signal.

- It should send a notification to house people on the phone or application if it starts losing connection.



2.3-User and Class Characteristics:

- **Homeowner**: He has access to the control panel password to perform all the security functions available in the Home Safe System.
- **Web User**: The web user with a valid user id and password should perform all the system functions remotely or locally from the same house. And They can also become the administrator to change the settings of the Safe Home System. (by using another Special password and 2-way authentication via their google account to do so).

2.4- Passwords:

- Authentication of those who wish to access the security control system is done through passwords by users, security specialists and administrators.
- A strong password has to incorporate numbers and other special characters along with the letters for optimum security.
- Those who wish to gain access by defeating the password security system try to use commonly used passwords or hack the password system.

2.5-Biometrics:

- The identity of the person requesting access is detected through biometrics.
- In HRS, the system uses fingerprint scans to detect the identity of the person before allowing access. In

2.6-Operating Environment:

The system is simply a network of wireless connections from a wireless box to hardware devices(e.g .:sensors), all connected through a physical control panel or virtually through the internet, regardless of the OS. All the devices in the system must communicate via wireless protocols.

- The web interface will work with the following browsers :
  Internet Explorer version 11 and chrome version 89.0.4389.114
- The web server is MySQL version 8.0
- The windows application interface stimulates the web interface for simplicity.
- A soft copy of the user manual will be delivered along with the system to the users. Manuals of hardware shall also be provided

2.7-Assumptions and dependencies:

- Wireless boxes are well defined and in usable condition
- An interface to receive alarming messages and to reply with an off of the alarming system's function is already present with the monitoring company
- Two or more users cannot request access at the same time through the web interface.
- The owner or the monitoring company holds the responsibility of house security in case of alarming.
- The performance and preciseness of the off-the-shelf devices decide the performance and accuracy of the system.

2.8-User Documentation:

Each product will be packaged with a user manual for the customer. All the product versions can be viewed on the website, and the manual can be downloaded. Also, some dedicated videos showing tutorials regarding various aspects of the control panel and the remote control can be accessed on the website.

3- System Features:

After verifying his user-id and password, the system owner can toggle between modes, turn on or turn off all the sensors/alarms, using the web-based interface or a remote controller. Some of the other key features which we like to implement are mentioned below:

- **3.1-Functional Requirements:**

1) **Remote Access**- The user must check the status of the system through a remote link.

2) **Control lights, fans, etc.**- The system will switch off or switch on electrical appliances like lights, fans, or any alarms to deter intruders. This is a particularly appealing feature for those who are travel freaks and often leave their house vacant.

3) **Alert the security company-** Whenever there is an alarm, the security company should be informed after some set period of delay. This alarm might be due to various stimuli, like intrusion and fire. The company should resolve the alarm events and accept requests to turn the alarm off if the requesting user is valid.

4) **Control and monitor all sensors-** The system should have access to and should be able to watch the current working status of all detectors and alarms. Even if some sensor is disabled, the system should be able to check on it anytime.

5) **Ambulance-** The emergency button will trigger the panic mode, where the system should be able to dial a pre-defined number for ambulance services automatically. This might turn out to be a lifesaver.

6) **Contact law enforcement authorities/fire department-** The system must automatically inform the law enforcement authority in case of some breach. In case of smoke detection/fire alarm, the system should inform the fire department after some specified delay.

7) The system shall ask for the password only once. Tasks can be performed without any password request for 30 minutes. The session time-out is set to be 30 minutes.

8) Only five consecutive wrong passwords are allowable. Otherwise, the interface should be blocked for 30 minutes. Also, this log should be sent to the homeowner as well as the security monitoring company.

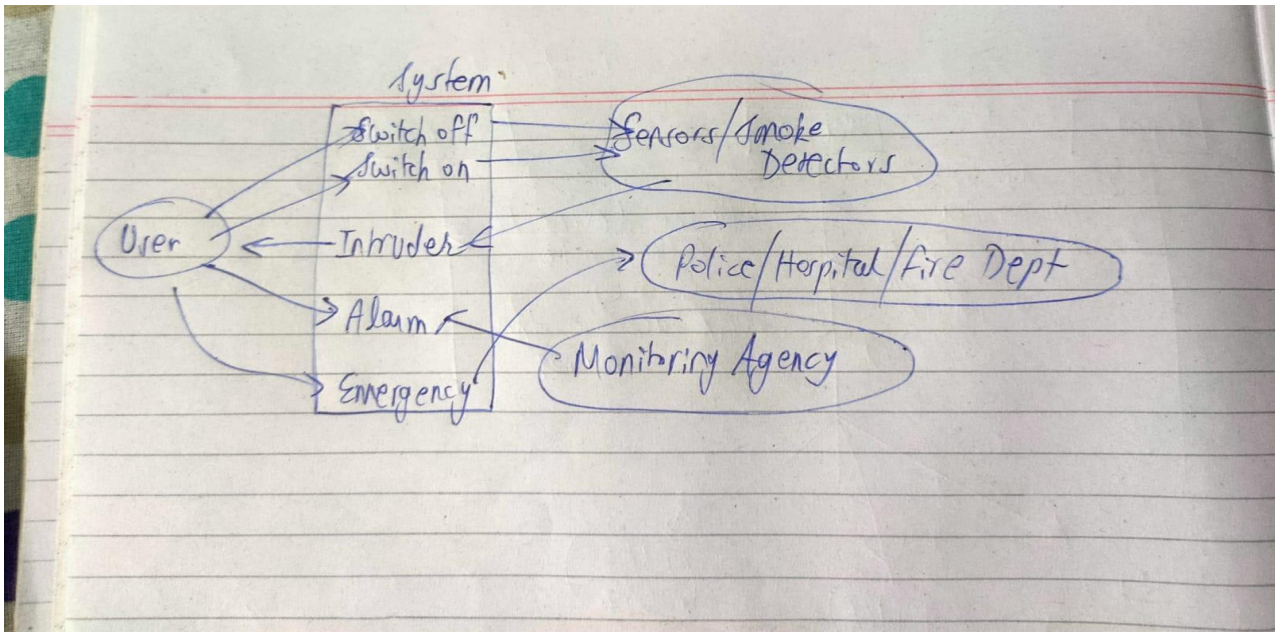
9) The system should encrypt the image during transmission.

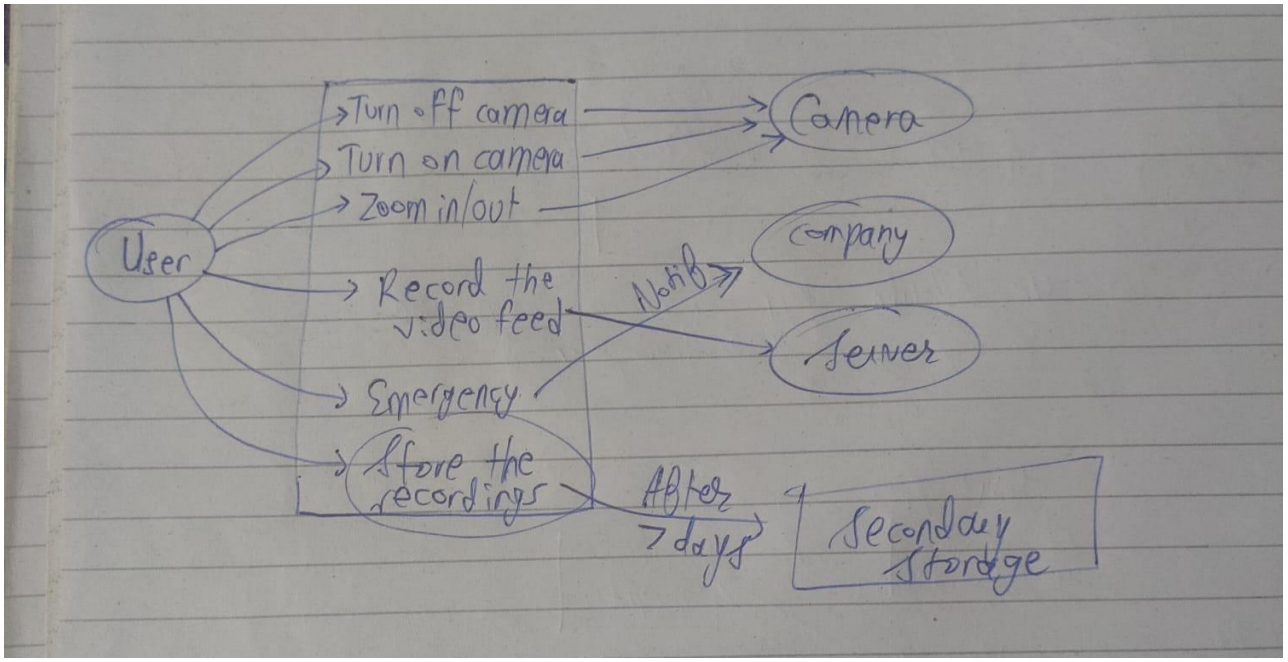
10) The system should allow the user to record multiple camera screens separately and concurrently.

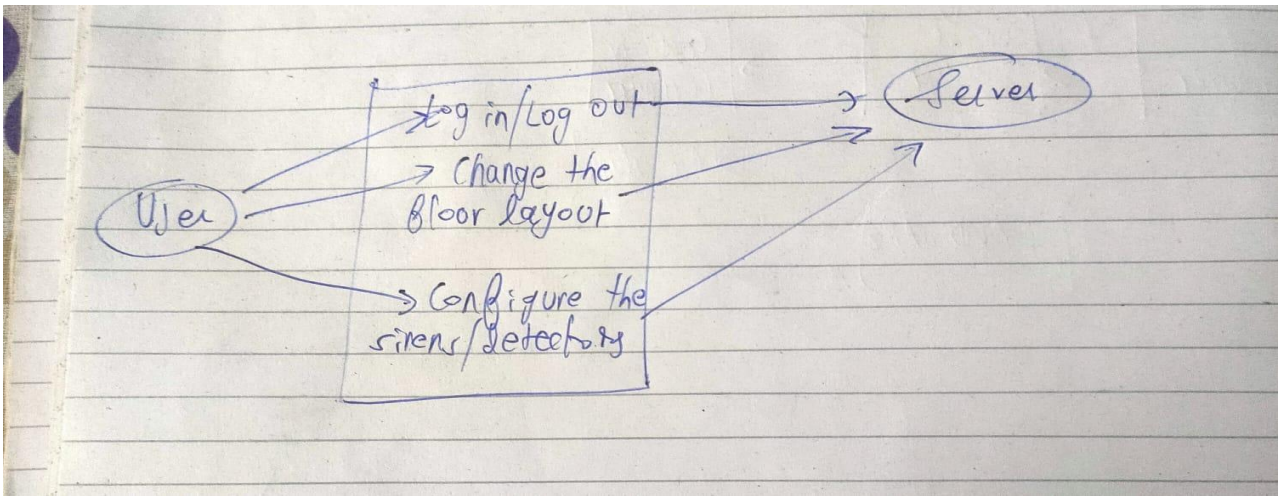
11) Whenever there is an alarm, which the user resolves, the system should send a log of all such warnings to the monitoring company. Also, the source/reason of caution should be displayed on the LCD Panel for all alarms.

12) To change the password, the web interface should ask the user for the previous password and only then allow the above change. In case the user has forgotten his password, the only way out should be to contact the monitoring company, who should then verify the user's identity manually before assigning him/her a new password.

Diagrammatic representation of the interaction between user, server, hardware and the monitoring agency:


System
Switch off
Switch on
Intruder
Alarm
Emergency
User
Sensors/Smoke Detectors
Police/Hospital/Fire Dept
Monitoring Agency


Turn off camera
Turn on camera
Zoom in/out
Record the video feed
Emergency
Store the recordings
User
Camera
company
Server
Notify
After 7 days
Secondary Storage



3.1.1-Motion Sensor Monitoring:

Each door has a magnetic switch attached to it. If this switch is separated and the monitoring doors option is on, an alert is issued to the user via the Internet, displaying which door has been opened.

3.1.2-Outside Movement Monitoring:

Suppose the outdoor motion detector senses some motion and figures out that the object is a human. In that case, the central processor should immediately initiate a voice alarm, notifying the user that someone is approaching their house, along with a video feed of the outside of the house.

3.1.3-Fire and Smoke Monitoring:

The central processor's control software will notify the required authorities immediately if the smoke detector detects a significant fire.

3.2.1-Logging into the website:

If the user enters a wrong password five times consecutively, the login page is disabled for 30 minutes.

3.2.2-Panning the cameras:

The control panel's sides will have four buttons--two of which are left and right, to pan the cameras. When the user presses and holds the left button, the camera keeps rotating to the left and similarly to the right.

3.2.3-Zooming in/out:

The other two buttons on the side of the control panel are zoom in/zoom out. These do exactly what the name suggests.

3.2.4-Recording the camera output:

The software provides the user with the option to record the camera streams separately.
Whenever a camera stops recording, the current recording is saved to the primary storage. If some recording is more than seven days old, it is discarded to the secondary storage.
The user can, of course, delete the recordings at any time. the

3.2-5:Activating/Deactivating the sensors:

The user can toggle the status of all the sensors via the portal.

4-External Interface Requirement:

- ## 4.1-User Interface:

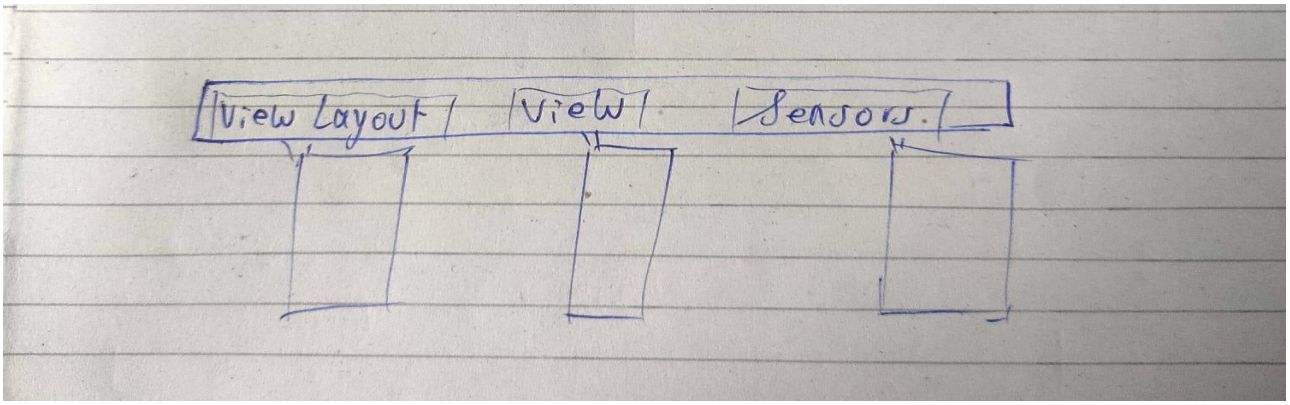
The first interface is the log-in screen. First, the user clicks on the menu, and then a pop-up window opens where the user is required to enter his user-id and password. If the user has entered a valid id and a valid password, he/she can connect to the home security system and get access to the database. In case the user puts in a wrong user-id or a wrong password, the interface will ask him to enter his ID and password again.

The menu bar should also have some other options. In the “View Layout” option, the user can see the sensor locations, camera locations and the floor plan.

If the user clicks on the “View” option in the menu bar, a window containing the video display will open. Here, the user can watch the surveillance zone. In this window, we can also have the controllers zoom and pan the camera lens.

The user can toggle the modes of some of the sensors according to his needs. In the “Sensors” option in the menu bar, the states of all available sensors can be toggled easily. Not only the sensors, but the user can also turn on or turn off the surveillance camera. This is a crucial step, keeping in mind privacy concerns.

Here is a picture of the menu bar:



To take advantage of all the functionalities of the system, the homeowner must connect to the web interface via his user-id and password. If one logs into the service, a new session is created, automatically timed out after 30 minutes of inactivity.

- ## 4.2-Hardware Interface:

Note that this section and the following software interface section will be abstract since we have not implemented this.

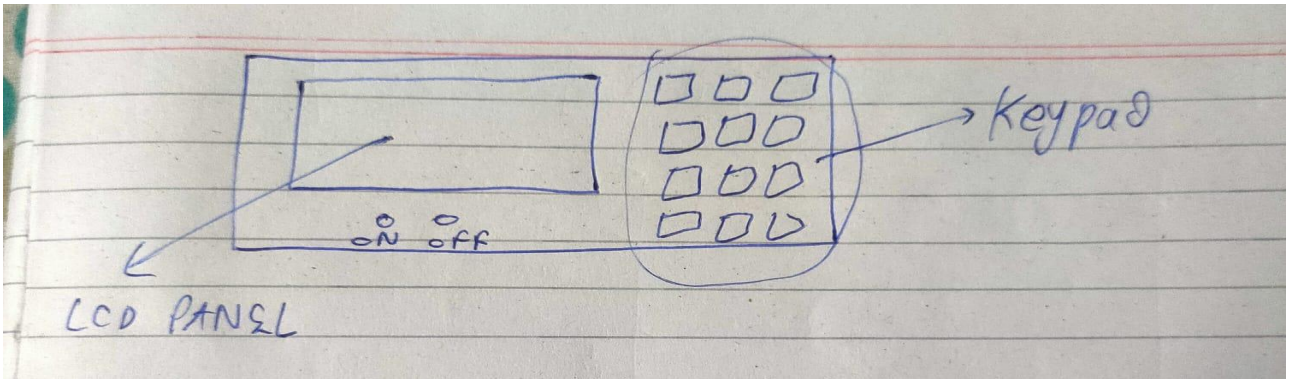
There will be a box, inside which we will have an LCD Panel for display purposes. Below this panel will be a keypad, with keys numbered from 0 to 9. Some of the keys might have an alternate functionality, specified on top of the keys, engraved on the box.

There will also be two modes: user indoor/user outdoor. In the indoor user mode, the surveillance system will disable all motion sensors inside the house. Only those sensors will be activated, which has been set as outdoor. This mode should be used when the user is indoors and does not want his/her motion to be tracked inside the house. This mode also switches off all cameras inside the house.

The outdoor user mode should be used when the user is not present in his house. In this mode, all cameras and sensors are activated. Motion is tracked both along the perimeter of the house, as well as in the interior. Then in the list of hardware, we have a few sensors:

1. Motion Sensors
2. Smoke Detection Sensors
3. Flame Sensors
4. Proximity Sensors

We also have IP cameras, which takes the images and videos of different areas and sends the server and the device's updates.
We also have a siren. Whenever the system notices some kind of theft/anomaly, the siren will be activated, alerting people in the neighbourhood.



4.2.1-Central Processor:

This box is the central processor, which is attached to the customer's PC. It should work like a wireless internet base station for communicating with various devices in the network. It should use the PC's internet connection to communicate with the company officials. It is recommended that a dedicated PC be set up for this purpose.

4.2.2-Sensors:

Various market sensors and alarms can communicate with the central processor directly when appropriately configured. The range of the configurable devices can be altered.

4.2.3-Control Panel:

This panel provides a simple user interface to enable or disable essential functions of the system. Each customer can have multiple control panels

installed at various locations throughout the area of concern. To prevent a clash of instructions from different control panels simultaneously, whenever one control panel is in use, other panels will be disabled. In this period, whatever instruction is put in through any other control panel is ignored—this guarantees the atomicity of instructions.

● 4.3-Software Interface:

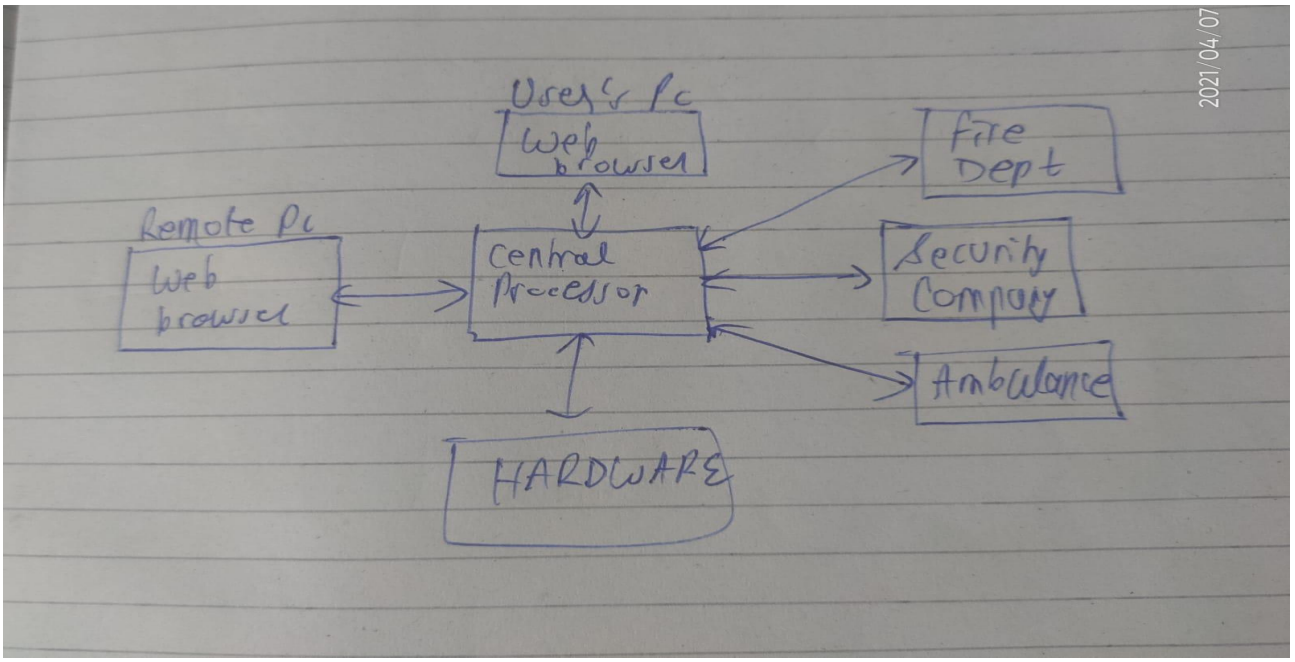
Microsoft SQL Server(2012/2014/2016/2017/2019): Relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested by other software applications. This application might run on the same computer or another computer across a network.
SQL Server also includes support for structured and semi-structured data, including digital media formats for pictures, audio, video and other multimedia data. It also natively supports hierarchical data.

SQLite: It is a relational database management system contained in a C library. SQLite is not a client-server database engine; instead, it is embedded into the end program. It is a popular choice as embedded database software for local/client storage in application software.

Windows 7/10: One or multiple PCs having an internet connection and running Windows 7/10 is required. These PCs must have a minimum RAM of 4GB and an additional 20GB of available disk space.

● 4.4-Communication Interface:

The system uses a Wi-fi connection to connect to the database.



5-Other Non-functional Requirements:

- ## 5.1-Performance Requirements:

  Security-related tasks have the highest priority. Thus, whenever the system detects any anomaly, the event shall be reported immediately to the user.

2) Ideally, considering a fully-functional internet connection, working sensors, and no power cuts, the system should be able to work 24 hours a day, seven days a week.

3) The video feed displayed on the LCD should be as close to real-time as possible.

4) The latency between detecting an anomaly and informing the customer should be as low as possible, typically less than 5 seconds.

5) Whenever the user switches any mode or toggles any sensor, the system should perform the required action within a few seconds.

● 5.2-Security Requirements:

1) Infrared motion sensors

2) Security Camera-Should be installed at the front door, along with a video phone, which will allow the customer to see who is outside without opening the door.

3) All standard security protocols should be used while communicating.

4) Connection via remote control should be led through a proxy server provide some reliable company provides motion on the web access to the system should be stored and monitored to prevent any form of hacking,

6) Keeping in mind privacy concerns, all the data should be encrypted before transferring on the network lines.

7) Because homeowners can control settings of the central processor remotely, special care in security should be implemented to prevent outsiders from hacking into the system.

● 5.3-Software Quality Attributes:

1) The web interface should be easy to use and should provide a convenient interface to the customer.

2) System must be connected to a device that can contact authorities. It should be directly connected to the phone lines.

3)System must have a backup power supply. This is required to thwart any attempts of bypassing the security system by messing with the power system.

4) The sensors and the LCD panel should be durable and tamper-proof.

5) User should be able to request service for any hardware/software malfunction. Customer care should look into it as soon as possible.

6) The main interface should be kept at such a place, from where it will be easily accessible. Reduced accessibility implies reduced benefit from the security system.

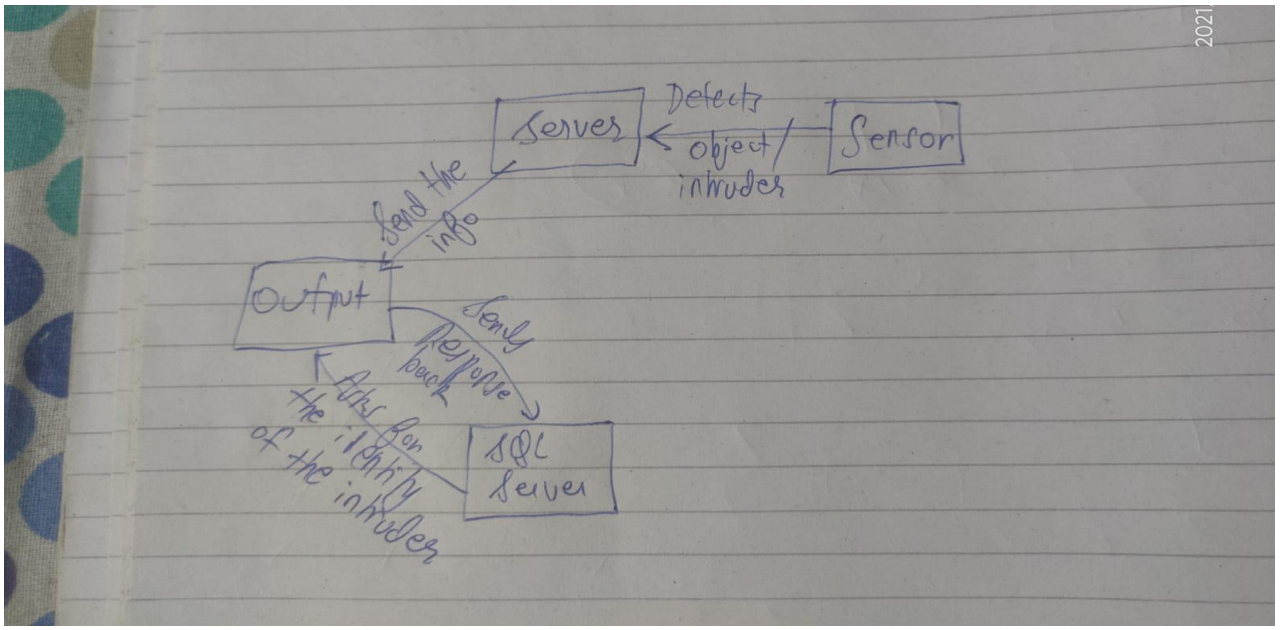
- ## 5.4-Storage Requirements:

1) The system should store video footage worth a week in the primary storage region. This means approximately around 170 hours of footage.

2) Secondary storage should always be free to move out the old records whenever the user intends to. The system should also backup the camera records every week to the secondary storage, preferably be stored carefully.

- ## 5.5-Safety Requirements:

1) All alternate doors/hidden doors/garage doors should be well locked.
2) The sensors and smoke detectors should be tested once every few months to ensure they are in working condition.
3) Besides fire alarms, the customer should have a dedicated fire escape plan in the building premises, which should be rehearsed in the form of mock fire drills.
4) If the installation area has multiple floors, fire alarms should be installed on every floor.



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