CS253-Assignment 6

Home Surveillance System

1. Introduction

a. Purpose :

i. This is the SDS document which highlights the architectural design of software which will satisfy the requirements received from the SRS team.
ii. This provides programmers through high level details of implementation to satisfy the clients needs.
iii. It provides algorithmic details in the implementation.

b. Intended Audience :

This SDS will help the developers to make this software and
write test documentation. This document will
help in understanding and teamwork among developers help them to divide the tasks between them.

2. Overview :

a. UI :

We have to design UI for User on Box, User remote login and for administrators to do certain tasks manually. Interface will remain common to web and Box based displays.

b. Features:

i. User login and authentication features
ii. Video storage Features
iii. Anomaly Detection Features
iv. User action features

All communication will happen through the central CPU. The database will be implemented by MySQL. The API will be implemented in C with help of SQLite library. Overall Functional Programming Approach will be followed. The front-end of the application will be implemented using JavaScript and HTML for web and C for the embedded system considering its capabilities. This SDS is more focused towards implementing the API required for this software rather than the UI.

3. Features

1) User Login Features :

1. **Creating a User**
   This is implemented for the server team. For new customers while installing the system this process should be done from server side

   Function : `NewUser(user_name,password,product_id)`

   Creates a new user and adds this user entry on the server. Allocates the storage space on the server to store videos and update the credentials on a given product. This will be the master user for the system. At this time an key will be exchanged through RSA encryption and all data transfer will be done though the AES encryption.

2. **Adding user feature for adding**
   This is implemented on the remote and box interface. With permission of master user, new user can be added to given productid

   Function : `AddUser(user_name,password,master_password,product_id)`

   This function creates a new user and adds it to the corresponding entry on the server and product. It requires authentication by the master user. If this authentication is wrong ,for 5 times . `HandleWrongPassword()` will be triggered

3. **User Authentication**
   This is implemented for all interfaces
   It is simple user authentication

   Function : `Login(username,password)`

   This function validates users by checking against corresponding entries in the box.
   If this authentication is wrong ,for 5 times . `HandleWrongPassword()` will be triggered

4. **Change Password**

   Function : `ChangePassword(username,oldpassword,newpassword)`

   This function validates the user and changes its password to new password. This action must be taken when connected to network to keep passwords in sync

5. **User Home**

   It is implemented on Box interface. When the user is home, he/she must have logged in to the Box. In this case recording is stopped to protect the privacy of the user.

   Function : `UserHome()`

   Stop the video recording and motion-movement sensors

2) Video Features

1. **Starting Recording**

   This feature is implemented on all interface boxes and remote interfaces.

   Function : `StartRecord()`

   Video recording is started. Stored to Local storage. Automatically triggered when no user is at home.

2. **Sending recorded video to server**
   Videos are first stored to local storage to cater power outage and network problems
   When we have electricity and network connection we can send the recording to server

   Function : `SendRecord()`

   Videos are sent in chunks of 1hr recordings to the server

3. **Moving Recorded Videos to secondary storage**
   Implemented on server

   Function : `MoveRecord()`

   Records are moved to secondary storage after 1 week

4. **Viewing Recorded Videos**
   All interfaces

   Function : `ViewRecord(time,zoom)`

   This fetches the corresponding 1hr footage from the corresponding storage media.

5. **Viewing Live Videos**
   All interfaces

   Function : `ViewLive(direction,zoom)`

   This fetches live streams directly from the camera while it is simultaneously stored to local storage and then to server. Users can pan the cameras to see the video and zoom the video.

3) Anomaly Detection Features:

One in surveillance team can turn on any anomaly manually.

1. **Motion Sensor Monitoring**
   This is implemented on the box

   Function : `HandleMotionSensor()`

   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. Then user can decide action to take

2. **Movement Monitoring**

   Function : `HandleMovement()`

   When the system detects someone approaching the house and identifies it as human through Object-detection as human warning along with footage is sent to the user.Instant Alarm is raised

3. **Fire and smoke monitoring**

   Function : `HandleFire()`

   When the system detects smoke or fire corresponding authorities are informed along with the user and surveillance team.

4. **Wrong Password**

   Function : `HandleWrongPassword()`

   The device trying to login is blocked and information is sent to the user and surveillance team.

4) User Action Features

1. **Turn on/off the system**
   User can turn on off the system completely by this feature

   Function : `ToggleOnOff()`

   Turns the system on or off. This turns on/off all the active sensors.

2. **Configuration**
   With configurations user can decide which sensors to turn on and which to turn off.

   Function : `ToggleSensor(senso_rname)`

   Turns on or off the sensor

3. **Turning off false-alarms:**
   Users can take action on false alarms.

   Function : `FalseAlarm(alarm)`

   All the action taken by corresponding alarms like turning on the siren will be rolled back.
   If certain authorities are informed they are also informed about false alarm

4. User Interface

1. Authentication

a. Login interface will have fields to enter username and password and a login button on clicking the button `Login` function will be called.
b. Passwords change interface will have username two fields for new password and confirm new password more when these are matched and user clicks the button `ChangePassword` function will be called.
c. Similar interface is implemented for new users.
d. For the server side, the forgot password feature is implemented in a similar way.

2. View Layout

In View-Layout users will have the option to see current sensor location, camera-locations and floor plan.

3. View

Video containing a screen will open so the user can select to see live video or old videos.
Pan feature will be implemented for live videos only.
Zoom features will be implemented for both the videos.
These will change parameters in `ViewRecord(time,zoom) or ViewLive(direction,zoom)`

4. Sensors

In this sensor list is provided to get to which implement `ToggleSensor(sensor_name)` under the hood.

5. Alarm

The user gets notification with the option to see Live Video and mark it as a false alarm.