Software Requirements Specification

for

Smart Curated Security System

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Table of Contents

Revision History

Name	Date	Reason For Changes	Version

1. Introduction

1.1 Purpose

This software requirements document specification provides complete information about the Smart Curated security System which will be developed by our project. The system is planned as a sensor with weight recognition and alarm sending mechanism with connected application for alerting the owner in times of burglary. In this section, we are going to give the definition of the problem, introduction of the purpose and scope of this document, definitions, acronyms and abbreviations, references and overview. In the following sections, we are going to introduce an overall description and features of the project, present the specific requirements, use cases, data models and behavioral models and their detailed description. Finally, as our development program, we are going to state planning, team structure, team schedule and conclusion of the project respectively.

This paper aims to describe a security alarm system using weight recognition techniques which helps to monitor and get alarms when motion is detected and sends information to a cloud server. The information is sent directly to a cloud server, when the cloud is not available then the data is stored locally on the Raspberry Pi and sent when the connection resumes. Therefore, advantages like these make this application ideal for monitoring homes in absence. The purpose of the project is to make a system, which would detect unusual weight and upload to an external server. It also include the buzzer alarm system in it. The major use of the 'Motion Detection' is at homes, buildings and also for surveillance for security for example of server rooms.

1.2 Document Conventions

Applying various techniques to this security device is one of the emerging AI trends. our idea is about how to develop a weight recognition-based identification system that will include a buzzer system and lots of features.

In order for the system to function, it's necessary to implement three steps. First, it must detect a weight. Then, it must recognize that weight of person nearly instantaneously. Finally, it must take whatever further action is required, such as if the weight that will be put on the window will be more than acquired weight then it will start buzzing because no person comes from window.

1.3 Intended Audience and Reading Suggestions

This software requirement specification document is stating the detailed explanation of the architecture, functionalities and specifications of the Smart Curated security System project. This document is going to serve as a guideline for the users as well the development team. Target audiences of this project will be people working in security systems development or people looking for new technologies for improving safety and security systems. The objective of the Smart Curated project is to develop a sensor with weight recognition and alarm sending mechanism with connected application for alerting the owner in times of burglary. There is a possibility that multiple versions of this document can be released. Therefore, some modifications and improvements can be done in order to satisfy the meet of adapting the changing requirements and specifications.

1.4 Project Scope

Over the last few decades, remarkable infrastructure growths have been noticed in security-related issues throughout the world. A smart security system basically censored the performance, happenings, or changing information usually in terms of human beings, vehicles or any other objects from a distance by means of some electronic equipment (usually digital camera). The scopes like prevention, detection, and intervention which have led to the development of real and consistent security systems are capable of security surveillance. In broad terms, the smart system could be described as an intelligent weight recognition technique designed to assist security personnel's by providing reliable real-time alerts and to support efficient analysis for forensic investigations. It is advantageous as it offers reliability and privacy on both sides. It is authenticated and encrypted on the receiver side; hence it offers only the person concerned to view the details. Necessary action can be taken in short span of time in the case of emergency conditions such as industries, offices, military areas, smart homes, elderly person falling sick etc. Another benefit is the real-time monitoring feature. As the future scope this system can be extended further by adding additional infrared emitting system to detect the people weight if they will try to come through window or any other part of home weight sensor will detect it and unusual weight more than the usual it will detect and will start making noise.

References

https://circuitdigest.com/microcontroller-projects/sending-sensor-data-to-android-phone-using-arduino-nrf24l01-over-bluetooth-ble

2. Overall Description

2.1 Product Perspective

In this project, we have a BLE and a sensor to collect data from the environment. The camera will be used for capturing the weight from the environment and sensor will be used for getting depth information. Data collected from these units will be sent to the server for further processing. Received weights will be processed on the server using processing techniques. This project also enables remote access of a relative or a friend of the user to the device. In order to assist the user, an alert sound will be made so that sound can be reached to relative or a friend and they will be able to help. To get the knowledge of user's environment direct video stream module will be used.

Product Features

This device will have various features like:

weight recognition

Buzzer alarm

Memory card to store information

Alert sound making technique

2.2 User Classes and Characteristics

1. **Bluetooth Low Energy (BLE**): The BLE was adopted due to its power consumption features as it was able to run for an extended period of time using just a coin cell. Compared to other wireless standards, the rapid growth of BLE has gone further faster because of its phenomenal applications in smartphones, tablets, and mobile computing. BLE send temperature readings from DHT11 to smartphone using Arduino and nRF module over BLE.

2. **Night Vision/Low-Light Cameras:** You should invest in night-vision or at least those that are capable of recording in low-light conditions. The more advanced systems use infrared or heat-vision for completely dark areas where simple night vision does not quite cut it. This option, however, is not necessary for every home but is definitely a good option for commercial spaces.

3. **Remote Access and Cloud Backup:** The security cameras will stop working when the power is out, whether it is for recording, motion detecting, or sending push. But battery powered security camera is an exception, which runs on battery power and will continue to record without electricity.

IP Cameras are normally power over Ethernet (PoE) technology using Cat5 or Cat6 cables

4. **Motion Sensors and Automation:** Another technology that has been glorified in the movies, motion sensors and motion-activated security camera systems are much more commonplace than most people believe. The primary advantage is that it cuts down the amount of information being recorded, saving you tonnes of storage space. It also helps save your internet data as it needs fewer backups to the cloud. More advanced motion detection systems come with movement tracking too. These sensors record weight of a person in their field of view. The motion sensors can also be used to trigger and judge weight, alerting you to intruders.

2.3 Operating Environment

With their wide range of styles and features, security systems are common in most industries around the world. These applications can range from theft and vandalism deterrence to traffic and weather monitoring and more.

By combining advanced features with sturdy outdoor housings or discreet security design. This makes them ideal for monitoring inside and outside of businesses and offices, recording in remote locations, or recording high qualitysecurity system to identify suspicious people.

2.4 Design and Implementation Constraints

Our system will be composed of two interconnected parts which will run concurrently. First part will be a device, expectedly a sensor. Second part will be a web server. The BLE and sensor will gather information from indoor and outdoor environments and transmit these data to the middle device, namely Raspberry Pi. There will be no data processing on the middle device, rather it will be used for transmitting the data to the web server. Device should decide priorly when to buzz alarm. First, sent sensor data will be preprocessed, likewise recorded weight will be processed using weight Processing Technology on the server in order to form a meaningful output. Second, recorded weight on the server can be monitored by a sensor.

As the device is software and hardware based. On-line help system becomes a critical component of the system which shall provide –

It shall provide specific guidelines to a user for using the system and within the system.

To implement online user help, link and search fields shall be provided.

2.5 Assumptions and Dependencies

There will be weight sensor which will help the user to know that there is someone trying to enter.

Below is the working .

If the thief will try to enter the home through window then there will be a weight sensor that will detect the weight which will be high than usual and it will send notification to owner and the buzzer will start ringing.

This device will be very efficacious for each and every home out there. Like we know that there are camera that detect weight or there is a button that sends alarm but this device will be helping to even catch thief at window by their weight.. It can be used anywhere whether it's office, home and most importantly banks where robberies are common.

3. System Features

This template illustrates organizing the functional requirements for the product by system features, the major services provided by the product.

3.1 System Feature 1

This device will be very efficacious for each and every home out there. Like we know that there are camera that detect weight or their is a button that sends alarm but this device will detect the weight of the person. It can be used anywhere whether it's office, home and most importantly banks where robberies are common. Applying various techniques to this security device is one of the emerging AI trends. our idea is about how to develop a weight recognition-based identification system that will include a buzzer system and lots of features. It will take whatever further action is required, such as allowing access for an approved user.

3.1.1 Description and Priority

Applying various techniques to this security device is one of the emerging AI trends. our idea is about how to develop a weight recognition-based identification system that will include a buzzer system and lots of features.
In order for the system to function, it's necessary to implement three steps. First, it must detect a weight. Then, it must recognize that weight of person nearly instantaneously. Finally, it must take whatever further action is required, such as if the weight that will be put on the window will be more than acquired weight then it will start buzzing because no person comes from window.
This device will have various features like:

Weight recognition

Night protection

Buzzer alarm

Memory card to store time and weight information

Alert message sending technique

Now, let's talk about the features of device in detail. The device is the sensor that will have weight recognition technique that can also detect weight during day or night. If any person will come from window side then it will detect and it will start making an alarming sound. With the help of buzzer, the sound will be made that will alert the neighbors

First priority will be:

Detecting the weight and telling the owner whether it's unusual activity or not so that person entering in house can be caught.

3.1.2 Stimulus/Response Sequences

Use Case	Description
Start processing	User can start processing by starting the device
Stop image processing	User can stop processing by pushing a button off.
Send signal to the authorities	Device can send signal
Storing information	Information will be stored in the memory

Receive response	User will get the response alert sound.
Start device	Start the device by switching on
Stop device	Stop device by switching off

Use Case	Description
Login	The helper has to login to connect device
View notification and calls	The helper can view the user's alerts.
View received weight	The user can view the eight of the thief
Send response	When the sensor will detect more weight it will start making alarm

3.1.3 Functional Requirements

This section describes major functional requirements of the system. It is divided into two subsections as APP device and web server.

3.1.1. App Device :

3.1.1.1. <u>Functional Requirement 1</u>
User should request processing result from server by pressing a command button.
3.1.1.2. <u>Functional Requirement 2</u>
User may be able to switch remote live help mode by holding pressed the command button yes/no.
3.1.1.3. <u>Functional Requirement 3</u>
Device should do minimal computations on its own.
3.1.1.4. <u>Functional Requirement 4</u>
Device should transfer sensor data and feed to the web server.
3.1.1.5. <u>Functional Requirement 5</u>
Device must be rechargeable and in case of unusual activity it will ring the alarm.
3.1.1.6. <u>Functional Requirement 6</u>
Device must be enabled or disabled by user.
3.1.1.7. <u>Functional Requirement 7</u>
Device should be able to record weight on mounted device
3.1.1.8. <u>Functional Requirement 8</u>
Device should check weight before send to the web server.
3.1.1.9. <u>Functional Requirement 9</u>
Device should check and inform user about the internet connection.
3.1.1.10. <u>Functional Requirement 10</u>
Device should be able to store the weight and time in memory.
3.1.1.11. <u>Functional Requirement 11</u>

Device should be able to send the device the information about weight and if found more than unsusal then ring the alarm.
3.1.1.12. <u>Functional Requirement 12</u>
Device should be able to identify whether weight is more or less and then buzz the alarm.
3.1.1.13. <u>Functional Requirement 13</u>
Device should give vocal feedbacks to the user about the environment.
3.1.1.14. <u>Functional Requirement 14</u>
Device should read sensor measurements.
3.1.1.15. <u>Functional Requirement 15</u>
Device should drive alarm according to sensor data and also have night feature.

3.1.2. Web Server:

3.1.2.1. <u>Functional Requirement 16</u>
Web server should handle multiple stream request and user inputs efficiently.
3.1.2.2. <u>Functional Requirement 17</u>
Web server should stream sensor without severely lagging.
3.1.2.3. <u>Functional Requirement 18</u>
Web server should accept user inputs and send it to remote device without any complication.
3.1.2.4. <u>Functional Requirement 19</u>
Web server should be able to start making alarm to the
3.1.2.5. <u>Functional Requirement 20</u>
Web server should keep username, password and permission data on database.
3.1.2.6<u>. Functional Requirement 21</u>
Web server should authenticate user connection request.

3.2 System Feature 2

There will be weight sensor which will help the user to know that there is someone trying to enter.

Below is the working .

If the thief will try to enter the home through window then there will be a weight sensor that will detect the weight which will be high than usual and it will send notification to owner and the buzzer will start ringing.
This device will be very efficacious for each and every home out there. Like we know that there are camera that detect weight or there is a button that sends alarm but this device will be helping to even catch thief at window by their weight.. It can be used anywhere whether it's office, home and most importantly banks where robberies are common.

4. External Interface Requirements

4.1 User Interfaces

There will be a user interface for the helper of the user. This interface will be responsible for the communication between the person and Weight sensor that will tell about the outsider. There will be one page for login, and one page to watch the people weight.

Hardware Interfaces

Hardware device which is a component consists of three main units: Raspberry Pi, BLE and sensors. BLE will be used for connecting the device to mobile and sensor will be used to get depth information about weight of someone who will be trying to climb through window from the environment. Raspberry Pi acts as an intermediate device for sending the data collected from these units to the server for further processing.
Hardware models are listed below:
Raspberry PI B+
HC-SR04 Ultrasonic Sensors
HX711 Weighing Sensor Module and Bluetooth Low Energy (BLE)
Raspberry PI is an intermediate device to communicate with web server and also acts as a hardware interface to be connected by various hardware components such asBLE, sensors and network adapter. While BLE and Network Adapter are connected via USB port of Raspberry Pi, sensors are connected on Raspberry Pi's general purpose input/output (GPIO) ports. The used hardware devices, their features are given in the table below:

Device Features:

<u>Raspberry Pi 2, Model B</u>
☐ Chip: Broadcom BCM2836 SoC
☐ Core architecture: Quad-core ARM
Cortex-A7
☐ CPU: 900 MHz
☐ GPU: Dual Core VideoCore IV®
Multimedia Co-Processor. Provides
Open GL ES 2.0, hardware-accelerated
OpenVG, and 1080p30 H.264 highprofile decode
☐ Memory: 1GB LPDDR2
☐ Operating System: Boots from Micro SD
card, running a version of the Linux
operating system
☐ Dimensions: 85 x 56 x 17mm
☐ Power: Micro USB socket 5V, 2A
<u>HX711 Weighing Sensor Module</u> <u>and Bluetooth Low Energy (BLE)</u>
☐ 24 high precision A/D converter
 low electric output of Load cells
BLE using nRF24L01
Temperature readings from DHT11 to smartphone using Arduino and nRF module over BLE.

<u>Ultrasonic Sensor HC-SR04</u> ☐ Power Supply :+5V DC
☐ Quiescent Current : <2mA
☐ Working Current: 15mA
☐ Effectual Angle: <15°
☐ Ranging Distance : 2cm – 400 cm/1″ –
13ft
☐ Resolution : 0.3 cm
☐ Measuring Angle: 30 degree
☐ Trigger Input Pulse width: 10uS
☐ Dimension: 45mm x 20mm x 15mm

4.2 Software Interfaces

The used software tools, their versions and sources are given in the table below:

Software Product & Version -> Source

Ubuntu 14.04 Operating System -> http://www.ubuntu.com/
OpenCV 3.0 -> http://opencv.org/
Text-to-Speech(E-Speak) -> http://espeak.sourceforge.net/
Tesseract Engine -> https://code.google.com/p/tesseractocr/downloads/list

4.3 Communications Interfaces

UDP/TCP client-server module will provide the communication between our hardware device and web application. Data will be sent to server using UDP module and response data is received by TCP module.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

The system should be programmable to degree of motion, range of motion, weight, weight of thiefs to cause motion, and area of motion detected. To conserve bandwidth and storage requirements, the sensor equipment should be capable of providing a weight compression ratio.

5.2 Safety Requirements

Surveillance is used in identifying potential targets based on security precautions, and it may go on for days or even weeks. Surveillance of a person who has consistent routines and takes very few precautions will generally take less time that surveillance on someone that is constantly changing his schedule. Criminal fines, which are usually proportionate to the amount stolen; higher theft amounts may result in greater fines.

As far as indoor surveillance systems are concerned, homeowners tend to go with a Wi-Fi solution. It makes sense; compared to wired cameras that require some degree of expertise to set up, Wi-Fi cameras are out-of-the-box ready, meaning that we only need to power them up, find a proper place to set them, pair with the mobile or desktop app and that's it

So, we have wired and non wired sensors, that run in a closed circuit, that are part of a larger surveillance system, and Wi-Fi sensors that are hooked up to your home's router via an IP. If you just want to make sure that everything's hunky-dory while you'll away, a wireless sensor hanged just above the doorway is more than enough.

On the other hand, if we want to keep tabs on what's happening in your backyard or on the other side of the front door, it would be best to go with a closed-circuit and wired surveillance system. It's the best safety measure today for that those package pirates

5.3 Security Requirements

Security systems come with everything you need to set up a system. This includes the security weight sensors, management software, and a NVR to record and save files.

1. Secure Wireless Transmission.
2. Secure Internet Transmission.
3. Multiple Users.
4. Keeping the software up-to-date.
5. Check camera's password settings.
6. Use a strong password.
7. Enable camera's security features.
8. Confirm that app is up-to-date.

5.4 Software Quality Attributes

Over the last few decades, remarkable infrastructure growths have been noticed in security-related issues throughout the world. So, with increased demand for Security, Surveillance has become an important area for the research. An Intelligent system basically censored the performance, happenings, or changing information usually in terms of human beings, vehicles or any other objects from a distance by means of some electronic equipment (usually digital camera). The scopes like prevention, detection, and intervention which have led to the development of real and consistent systems are capable of intelligent processing competencies. designing a system requires better remote access, further remarkable mix with different systems, enhanced quality and additionally that requires flexibility with others system. In any case, for end clients to take the full preferred standpoint of the advantages, the outline and execution of the arrangement should be precisely arranged and executed. This will guarantee the system is adaptable and future-sealed and is proper for a client's need. These six stages cover guidance about choosing the correct hardware, an assessment of the accessible innovation and help with the decisions that should be made.

6. Other Requirements

malicious hackers tend to sort of try to remote-connect to routers, using the credentials buried in those databases. What we know so far is that home security cameras can be hacked and it's not that hard to do it. So, the question that ensues is: how can I tell if my home security camera got hacked?

1. Strange noises in the dead of night
2. Check for abnormal rotations
3. Check for any subtle changes in the camera's security settings

4. Poor performance, intermittent video feed, ramped up processor

This is not the end of the road. Simply because someone hacked your camera, doesn't mean we should throw it away. Well, not always – here are a couple of stuff that can be tried before getting rid of home security cam.

1. Change password
2. Wipe and revert to factory settings
3. Choose better encryption
4. Regular firmware updates
5. Use Two-Factor Authentication

Appendix A: Glossary

Admin	Person who is responsible for the upkeep, configuration and reliable operation of the system.
CPU	Central Processing Unit
GPIO	General purpose input/output ports
GPU	Graphics Processing Unit
OS	Operating system
Raspberry Pi	A low-cost, basic computer
SRS	Software Requirements Specification
UDP	User Datagram Protocol
TCP	Transmission Control Protocol
OpenCV	A real time computer vision library that is free for academic and commercial purposes
USB	Universal Serial Bus
Tesseract engine	An OCR tool to read text

Appendix B: Analysis Models

<Optionally, include any pertinent analysis models, such as data flow diagrams, class diagrams, state-transition diagrams, or entity-relationship diagrams.>

Appendix C: Issues List

< This is a dynamic list of the open requirements issues that remain to be resolved, including TBDs, pending decisions, information that is needed, conflicts awaiting resolution, and the like.>