

Roomie

software requirements specification



University
of Windsor

Object :

The SRS document contains the system requirements specification for the new project - Roomie by Toto Inc.

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Mrs Sonya S. (Director, Toto Inc.)
Teams involved in the development of Roomie
Stakeholders of Roomie

State : **Proposed**

INTRODUCTION

Toto Inc., a company directed by Mrs Sonya S., wants to develop and commercialize a new kind of automated bedroom because they identified problems with the existing ones. First, most of the citizens in western countries, especially in Canada, complain about a rude awakening in the morning. Most of them live in a basement apartment, meaning they don't have any windows in their room. Consequently, they don't see the sun, which impacts their mood, and they don't really have a good feeling of time when they wake-up. Moreover, some customers would like to have advice to choose their clothes according to the news of the day, the weather, and the planned events. 58% declared that they would be happy that a system plays music for them to improve their mood. 70% of people would also like that the bedroom proposes to them a personalized program of fitness in the morning, and a personalized program to rest well in the night. Mrs Sonya requires a proof of concept (i.e. a simulator) and the final program.

1. Purpose

The purpose of this SRS document is to specify the requirements for a new automated bedroom system for Toto Inc. The new system provides customers a smart bedroom with personalized customizations for better sleep, mood and feeling of the real time and nature outside just by using their smartphones. This document describes the scope, objectives and goal of the new system.

2. Document Conventions

The mention of "Roomie" or "system" refers to the same project being discussed. Each requirement has been given its own priority and the high level designs inherit the same priority of the actual requirement statement discussed further in detail. Mainly, light tones for colors - white, black and grey - have been used for ease of reading.

3. Intended Audience and Reading suggestions

The document is intended for (but not limited to) software developers, product managers, citizens living in European countries especially in basement bedrooms, marketing team, quality assurance team, documentation maintainers. It is advised for all to go through the complete document and not miss anything to get a clear picture of the requirements. This document can be read by all the stakeholders of Roomie provided they have gone through and have a basic understanding of the below topics:

1. Automation <https://en.wikipedia.org/wiki/Automation>
2. IoT https://en.wikipedia.org/wiki/Internet_of_things
3. Extended reality https://en.wikipedia.org/wiki/Extended_reality

4. Product Scope

The scope is to develop and commercialize both - a simulator and a software - that can be used with the help of a smartphone. The business strategy will not be covered in this document and only the main features of the software will be in current scope.

5. Refer

Document style guide:

1. "IEEE Guide for Software Requirements Specifications," in IEEE Std 830-1984, vol., no., pp.1-26, 10 Feb. 1984, doi: 10.1109/IEEESTD.1984.119205.
2. "SRS template" 2021 by Dr. Aznam Yacoub

OVERALL DESCRIPTION

1. Product perspective

Roomie - the new automated bedroom system is an enhancement to the existing bedroom scenario in the market which were unable to fulfill some of the advanced needs of the users. Primarily, the citizens living in the European countries where most people live in basement bedrooms with no windows. There is a need to connect these users to the nature outside, give them a feeling of time, improve their mood and health using virtual reality and smartphones and overcome the physical limitations of the bedroom.

2. Product functions

Our system should be able to provide the following features, listed in the relative order of their priority as per the user needs (backed by the survey data):

1. Feeling of the time outside
2. Personalized fitness program
3. Personalized sleep program
4. Music to improve mood
5. Clothing suggestions

3. User classes and characteristics

The main target user is the bedroom owner, whose characteristics can be defined below:

1. Name
2. Birthdate
3. Gender
4. BMI (Weight, Height to used for fitness program)
5. Current mood
6. Location (can be used for geographic suggestions)
7. other publicly available data (if required)

4. Operating Environment

- The operating system will initially be UNIX based, to support nearly all kinds of devices, primarily smartphones (iOS and Android)
- The controller will be the mobile application which is the software which pilots the system (the automated bedroom)
- The user interface which is the interface between a user and the bedroom
 - light (can see)
 - sound (can listen and talk to)
- The simulator will be embedded on a wall (void of any major obstacles or textures) which simulates this bedroom with smaller components:
 - display projector with energy source (can be battery or electric)
 - microphone (takes user voice input)
 - speaker (gives sound output)

5. Design and Implementation Constraints

Some of the design and implementation constraints are:

- There will be a need to comply to user confidential data, e.g. General Data Protection Regulation (GDPR).
- Software limitations can be access to internet, bluetooth or RF (radio frequency) devices which will help to communicate signals and data from and to between the smartphone and the simulator.
- Hardware limitations to store temporary data until Wifi or smartphone is available to be connected and data can be uploaded, and eventually uploaded to cloud to reduce local/smartphone storage.
- Communication protocols (such as HTTPS) need to be adhered to at all costs, as it contains personal data of the user, and stored securely at rest using encryption.

6. User Documentation

A user manual will be provided to set up the projector on the wall top (or ceiling) both with the hardware and can be accessed anytime from the smartphone. A basic GIF or video will be shown before onboarding the user on each feature for better output.

7. Assumptions and Dependencies

Some of the assumed facts that could affect the requirements stated in the SRS:

1. Third-party ads (like Google ads) can be used for commercialization.
2. Connection or communication dependencies from smartphone to the projector using RF (radio frequency) or low energy bluetooth to save energy.
3. Accuracy of the data given (input) by the user is considered close to real.
4. Hardware interfaces (like projector, speaker, microphone) lifetime and optimal energy usage have been assumed to work seamlessly

EXTERNAL INTERFACE REQUIREMENTS

1. User Interfaces

The user will be able to access the mobile application with the smartphone (both iOS and Android) and will show connection error messages as a pop up on the application screen and log the messages (to enhance and debug issues later) both on the local device and upload to the user database if any.

2. Hardware interfaces

<Describe the logical and physical characteristics of each interface between the software product and the hardware components of the system. This may include the supported device types, the nature of the data and control interactions between the software and the hardware, and communication protocols to be used.>

3. Software interfaces

The following software interfaces will be used:

1. MongoDB database (to to be used as a cloud database and can be later used to visualize and analyze the user generic feedback to improve features)
2. UNIX operating system to be used for underlying structure
3. React Native to be used to create cross OS software for both mobile platforms having rich libraries and good community support
4. Google adwords (commercial component)

Some of the above have already been mentioned with the possible risks.

4. Communication interfaces

1. HTTPS and HTTP protocols for API communications.
2. FTP for email notifications
3. Data transfer rates will be limited to the device capability and the communication bandwidth available at the time of data exchange
4. Global CDNs to be provided to speed up common data access

SYSTEM FEATURES

We will be discussing in detail the High priority features here and the scope of the commercial and low priority features is for the future version.

1. Feeling of the time outside

- Description and Priority

The system should be able to give visual displays to the user based on the real time outside even if the room is in the basement. e.g. A wall should have a scene with the sun and clouds (better to give real time data and option with custom view settings). Since most of the users will be affected by this feature and this is the primary goal of the customer, this will have the highest priority.

- Stimulus/Response Sequences

This should trigger a visual response for the user.

- Functional Requirements

- get real time information
- check status of weather conditions outside based on location
- give visual feedback that mimics this condition to give feel to user

2. Personalized fitness program

- Description and Priority

The system should be able to give a personalized fitness program so that the user is able to perform those sets of exercises without the need of going to the gym and just by using home equipment or body weight. The audio system will speak timer seconds and the visual display will show exercise for the user.

- Stimulus/Response Sequences

This should trigger a visual and audio response for the user.

- Functional Requirements

- take input from user of height and weight and calculate the BMI
- take initial health input after letting user perform basic 7 minute workout
- based on the above inputs and feedbacks, output a personalized program with needful set of exercises and take survey after every use to get idea of user mood to enhance feature incrementally

NON-FUNCTIONAL REQUIREMENTS

1. Performance Requirements

- The system must be capable of supporting “x” parallel users, when uploading common data to the database.
- The system should be able to work even on “y” kbps internet speed.
- The system should be energy efficient and use low energy communications whenever possible

2. Safety Requirements

A cloud backup will be given so that users can start using the same system in another smartphone in case of failure.

3. Security Requirements

- The system will take care of the sensitive data and will transfer (HTTPS) and keep that data at rest in encrypted forms at all costs.
- Conform to the GDPR compliance.

4. Software Quality Attributes

- Usability: Should be able to use the software on z% of the devices currently in the iOS and android market
- Availability: Should provide good availability
- Testability: an initial environment with beta users can be given to test out the features and get early feedback