
SOFTWARE REQUIREMENTS SPECIFICATION

for

Student Activity Monitor and Alert Generator

Version: 1.2
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Revision History

Sno.	Date	Reason For Changes	Version
1	7/2/17	Original	1.0
2	9/2/17	Remarks from Prof. Bhattacharya	1.1
3	16/2/17	Remarks from Prof. Bhattacharya & Final Edits	1.2



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1 Introduction

1.1 Purpose

The purpose of this document is to give a detailed description of the requirements for the Student Activity Monitor and Alert Generator software. It will illustrate the purpose and complete declaration for the development of system along with the system constraints. This document is primarily intended to be proposed to a customer for their approval and as a reference for developing the first version of the system for the development team.

1.2 Document Conventions

Term	Definition
Instructor	Person who shall be using the software for monitoring
Student	Person who shall be monitored by the instructor
Device	An electronic device using which the instructor is delivering thier lecture
DESC	Description
RAT	Rational
DEP	Dependency

1.3 Project Scope

This software is meant to be deployed in an IT-enabled large classroom environment where in the lecture delivered by the insturctor is via a device through which both audio and video are transmitted. This software shall allow the instructor to conveniently

2 Overall Description

2.1 Product Perspective

This software will be a top up on the already existing system for communication between the instructor and the students inside a classroom in which the slides of the lecture are delivered to the students' devices along with audio which they can listen to via ear phones. The slide transitions are handled automatically by the existing system. The responsibility of the proposed system shall be to monitor the attention of the students and ensure that they are not chatting/slacking or are indulged in entertainment.

2.2 Product Functions

The product leverages the sensors such as gyroscope, proximity sensor, accelerometer in the devices used by the students which determine factors such as orientation, distance from user, shaking frequency which enable the system to determine the attention of students and alert the instructor accordingly.

The application should also allow the instructor to see the summary of the data collected during lecture which shall be helpful during feedback sessions and grading.

2.3 User Classes and Characteristics

The users are divided into two classes viz. the instructors and students. The students interact with their mobile devices having the sensors which are used to determine their

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The users are divided into two classes viz. the instructors and students. The students interact with their mobile devices having the sensors which are used to determine their attention by the software. This can then be viewed by the instructor in real time or at his/her leisure.

2.4 Operating Environment

The environment is an IT enabled large classroom where both the above user classes carry their devices. The slides are shared from the instructor through his/her device to the students along with slide transitions and audio which can be heard by plugging earphones into their devices. Due to the presence of a large classroom, it is not possible

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2.4 Operating Environment

The environment is an IT enabled large classroom where both the above user classes carry their devices. The slides are shared from the instructor through his/her device to the students along with slide transitions and audio which can be heard by plugging earphones into their devices. Due to the presence of a large classroom, it is not possible for the instructor to observe all students and therefore we have the need for an app which measures the attention of the student.

The smartphones then, with their sensors take various parameters like device orientation and others into account in determining the attention of the student.

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2 Overall Description

2.5 Design and Implementation Constraints

For the above purpose of implementing the app, we are forbidden to use the camera for measuring the attention. The students might exploit the sensors used to portray themselves as paying attention even when they are not.

This gives a false positive in cases when the student uses a stand to maintain the orientation rendering the accelerometer and gyroscopic functions redundant.

2.6 Assumptions and Dependencies

We assume the presence of an IT-enabled large classroom with the availability of a system that can display slides from the instructor to the students along with slide transitions is available.

One assumption about the product is that it will always be used on mobile phones that have enough performance. If the phone does not have enough hardware resources available for the application, for example the users might have allocated them with other applications, there may be scenarios where the application does not work as intended or even at all. Also, we assume the devices have sophisticated sensors to meet our requirements of measuring even minute shaking to make the software precise.

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3.1 User Interfaces

The software in the devices should allow the instructor to have an option to connect with the devices of all the students present in the lecture classroom. The students must also have a complementary option to connect to the instructor's device.

Thereafter the instructor should have options getting real time statistics of the attention span of the attendees. The UI should be more focused on being organized and work oriented rather than having fancy style and animation. The interface should have rigorous error management.

3.2 Hardware Interfaces

The students mobile devices should have all the necessary sensors like the gyroscope, accelerometer, proximity sensor with enough specification to handle the task at hand. Also, the devices should have high performance and space to be able to run the software as a background 'Daemon' service.

The instructors device should also have high enough performance to connect to all the users. The network should have enough capability to handle the traffic of the large classroom.

3.3 Software Interfaces

The data collected by the devices carried by the students has to be transported to the device being carried by the instructor. The medium of transport shall be deduced by the design team it could be using wifi, bluetooth or some other wired connection. The instructor's device shall receive the data from all the student devices.

The system calls required for the communication would have to be invoked. For gathering sensor data the driver modules of the student devices would have to be cooperated with.

3.4 Communications Interfaces



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3.4 Communications Interfaces

The transfer rate between the devices should be sufficient enough for the instructor to reflect upon the findings of the application. Since the application will be exposed to a limited environment thus the encryption concerns are not humongous.



4 Functional Requirements

4.1 User Class 1: Instructor

1 Start Class Session

ID: FR_INS_1

INPUT: Course name and class group

OUTPUT: Related course page is opened

DESC: Start the application with the details of the current course and lecture.

RAT: The Instructor might be taking multiple courses and lectures involving different students so the application needs to adjust to the circumstances accordingly

1.1 Establish Connection — Instructor

ID: FR_INS_1.1

INPUT: Course administration details

OUTPUT: Connection request to all students present and acknowledgement for the instructor

DESC: Establish connection with the students present currently in class

RAT: Without connection between the devices information cannot be communicated

1.1.1 Real Time Individual Student Attention Statistics

ID: FR_INS_1.1.1

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1.1.1 Real Time Individual Student Attention Statistics



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DESC: Establish connection with the students present currently in class

RAT: Without connection between the devices information cannot be communicated

1.1.1 Real Time Individual Student Attention Statistics

ID: FR_INS_1.1.1

INPUT: Sensor data from student devices

OUTPUT: Details of the students' attention at that instant

DESC: An option for getting insight on real time attention activity of the students on an individual basis

RAT: For monitoring an individual student

1.1.2 Real Time Overall Class Attention Statistics

ID: FR_INS_1.1.2

INPUT: Sensor data from student devices

OUTPUT: Summarized Pictorial or textual portrayal of the class' attention details at that instant

DESC: An option for getting insight on real time attention activity of the students on an aggregate basis

RAT: For monitoring the class as a whole

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4 Functional Requirements

1.1.3 End Class Session

ID: FR_INS_1.1.3

INPUT: Current Session tokens

OUTPUT: Exits the current course page and closes all impending connections

DESC: Close the currently opened connections and the application

1.2 Connection Error Notification — Instructor

ID: FR_INS_1.2

INPUT: Data flow across instructor and student devices

OUTPUT: Error message in case of interrupted or stopped data flow

DESC: Notify Instructor in case of connection drop of a particular student

RAT: In case of faulty connection or inefficient instruments appropriate error message should be generated

2 Overall Class Attention — Non-Real Time

ID: FR_INS_2

INPUT: Course administration details

OUTPUT: Displays overall attention span of the entire class of a given class and lecture per lecture

DESC: Get the attention span of the entire class of a given class and lecture per lecture

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DESC: Close the currently opened connections and the application

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2 Overall Class Attention — Non-Real Time

ID: FR_INS_2

INPUT: Course administration details

OUTPUT: Displays overall attention span of the entire class of a given class and lecture per lecture

DESC: Get aggregate summary of the attention spans of the individual students on a per lecture basis

RAT: Helps the instructor during feedback sessions and grading process

2.1 Individual Student Monitor — Non-Real Time

ID: FR_INS_2.1

INPUT: Course and lecture names along with the name or roll no. of the student

OUTPUT: Displays the aggregate attention of the given user as stored from multiple instances of different lectures

DESC: Search for a particular student for his/her specific summary

2.2 Upper Division Threshold Filter

ID: FR_INS_2.2

INPUT: Data taken from the sensor devices over the span of the course

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ID: FR_INS_2

INPUT: Course administration details

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DESC: Search for a particular student for his/her specific summary

2.2 Upper Division Threshold Filter

ID: FR_INS_2.2

INPUT: Data taken from the sensor devices over the span of the course

OUTPUT: Displays the list of students with more than 65% attention span overall

2.3 Lower Division Threshold Filter

ID: FR_INS_2.3

INPUT: Data taken from the sensor devices over the span of the course

OUTPUT: Display the list of students with less than 10% attention span overall

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2.4 Sort Students by Attention Span

ID: FR_INS_2.4

INPUT: Data taken from the sensor devices over the span of the course

OUTPUT: Display the list of the students in order of their attention spans (overall or given)

DESC: Sort the students on the basis of their attention spans

4.2 User Class 2: Student

1 Open Course Page

ID: FR_STUD_1

INPUT: Entering course name and lecture details

OUTPUT: Related course page is opened

DESC: Start the application with the details of the current course and lecture.

RAT: The Student might be taking multiple courses and lectures involving different instructor so the application needs to adjust to the circumstances accordingly

1.1 Establish Connection — Student

ID: FR_STUD_1.1

INPUT: Course Details and unique token from instructor

OUTPUT: Establish Connection and provide an acknowledgement of the same

DESC: Establish connection with the instructor present currently in class

RAT: Without connection between the devices information cannot be communicated.

1.1.1 Pause Monitoring

ID: FR_STUD_1.1.1

INPUT: Connection Details of the lecture

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2.4 Sort Students by Attention Span

ID: FR_INS_2.4

INPUT: Data taken from the sensor devices over the span of the course

OUTPUT: Display the list of the students in order of their attention spans (overall or given)

DESC: Sort the students on the basis of their attention spans

4.2 User Class 2: Student

1 Open Course Page

ID: FR_STUD_1

INPUT: Entering course name and lecture details

OUTPUT: Related course page is opened

DESC: Start the application with the details of the current course and lecture.

RAT: The Student might be taking multiple courses and lectures involving different instructor so the application needs to adjust to the circumstances accordingly

1.1 Establish Connection — Student

ID: FR_STUD_1.1

INPUT: Course Details and unique token from instructor

OUTPUT: Establish Connection and provide an acknowledgement of the same

DESC: Establish connection with the instructor present currently in class

RAT: Without connection between the devices information cannot be communicated.

1.1.1 Pause Monitoring

ID: FR_STUD_1.1.1

INPUT: Connection Details of the lecture

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ID: FR_STUD_1.1

INPUT: Course Details and unique token from instructor

OUTPUT: Establish Connection and provide an acknowledgement of the same

DESC: Establish connection with the instructor present currently in class

RAT: Without connection between the devices information cannot be communicated.

1.1.1 Pause Monitoring

ID: FR_STUD_1.1.1

INPUT: Connection Details of the lecture

OUTPUT: Put the connection on hold and provide appropriate feedback message

DESC: Facility for student to pause connection in between to leave the class

RAT: Attending nature's call

1.2 Error Notification Student

ID: FR_STUD_1.2

INPUT: Data flow across instructor and student devices. OUTPUT: Error message in

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4 Functional Requirements

case of interrupted or stopped data flow. DESC: Notify the student in case of connection drop.

RAT: In case of faulty connection or inefficient instruments appropriate error message should be generated

2 Student Attention Span Feedback

ID: FR_STUD.2

INPUT: Data taken from the sensor devices over the span of the course

OUTPUT: Results interpreted from the recorded data

DESC: Get aggregate summary of their own attention span

RAT: Helps the student self introspect

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5 Other Nonfunctional Requirements

5.1 Performance Requirements

- The search enabling the instructor to view the summary of a student and give his analysis should be clear and well understandable.
- The program must update the real time statistics at a fast enough pace so that the instructor can have a clear view on the current attention of the class.
- The program must be able to handle the information of the entire class i.e in full attendance almost 90 students and also individually not be glitch in a given mobile device.
- Time to give the error message on losing a particular connection should be minimal (almost immediate).

5.2 Security Requirements

- The students enter their authentication (webmail) to enable access to connection to the slides.
- Since the environment is local i.e limited to the classroom no security precaution or encryption of data is necessary.

5.3 Software Quality Attributes

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- The students enter their authentication (webmail) to enable access to connection to the slides.
- Since the environment is local i.e limited to the classroom no security precaution or encryption of data is necessary

5.3 Software Quality Attributes

- Code should be modular and well written, so as to facilitate further addition and implementation of new features and improvement.
- The system should be robust enough not to fail during the class.

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