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| ITCS-6112-092: Software<br>System Design and<br>Implementation | <b>Project Proposal</b>  |  | Term Project |           |
|  | <b>FALL 2017</b>         |  | Version:     | Date:     |
|  | SSDI under Dr. Ali Sever |  | 1.9          | 9/19/2017 |

# Project Proposal

## Automatic Playlist Recommender System

**Group Size:** 5

**Group Members:** Dhiksha Ramkumar, Elizabeth Thomas, Indrajeet Mishra, Priyanka Sharma,  
Sairam Rajagopalan

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## 2 TEAM PROFILE

### 2.1 SKILL SET

#### 2.1.1 Technical

| Team Member        | Category            | Technology Stack   |
|--------------------|---------------------|--|
| Dhiksha Ramkumar   | Languages           | C,C++,python and basics of R                                       |
|                    | OS                  | macOS and windows  |
|                    | Tools               | R studio, Eclipse and NetBeans                                     |
|                    | Protocol            | HTTP   |
|                    | Server              | Tomcat 7.0   |
|                    | Database            | MySQL  |
| Indrajeet Mishra   | Languages           | C, C++, Java, Python, R Programming, MATLAB Programming            |
|                    | Protocols           | REST, SOAP   |
|                    | OS                  | Unix(CentOS), Windows  |
|                    | Tools               | R studio, MATLAB, Eclipse, Netbeans                                |
|                    | Framework           | Hadoop, Struts2, Executor, Jersey RESTful Web Services             |
|                    | Server              | JBoss 7.1, Tomcat 7.0  |
|                    | Database            | MySQL, Oracle, Informix  |
|                    | Version Control     | Git, SVN   |
| Elizabeth Thomas   | Languages           | Java, Python (3), basic knowledge of HTML.                         |
|                    | OS                  | MacOs, Unix(Ubuntu), Windows                                       |
|                    | Tools               | Latex, Microsoft Suite, ArgoUML, draw.io, Eclipse, Pycharm, Spyder |
|                    | Business/Commercial | SalesForce, Helio.Zurb, SurveyMonkey                               |
|                    | Server              | Tomcat 7.0   |
|                    | Database            | SQL, Oracle  |
|                    | Applications        | Google Drive, Slack, Piazza, easynote.io                           |
|                    | Version Control     | Git  |
|                    |                     |  |
| Sairam Rajagopalan | Languages           | JAVA, C, C++, Python, XML,PHP                                      |
|                    | OS                  | Windows and Linux  |
|                    | Tools               | Eclipse, Netbeans, Latex   |

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|                 |                 |   |
|-----------------|-----------------|---|
| Priyanka Sharma | Protocol        | HTTP  |
|                 | Server          | WAMP  |
|                 | Database        | MySQL, Oracle   |
|                 | Languages       | Java, Angular JS, J2EE , Shell scripting, XML, XSL, JQuery, JSON,   |
|                 | OS              | Windows, UNIX, Linux  |
|                 | Tool            | Eclipse, HPQC, Jenkins, Rational Rose, Hudson, JIRA   |
|                 | Protocols       | Soap, Http,   |
|                 | Framework       | Hadoop, Springs, Struts 1.2, Kabira provisioning and service activation (provider: TIBCO), Hibernate, SAP JCO |
|                 | Server          | Tomcat, J-Boss, Glass Fish ESB  |
|                 | Database        | Oracle, MySQL, SQL Server, Redis Queue  |
|                 | Applications    | DOM/SAX/STAX Parsing, Stunnel, Soap web service using AXIS, Restful web service using Jersey                  |
|                 | Version Control | Pvcs-Pc, Pvcs-Gcl, Svn, Cvs   |

### 2.1.2 Other S/W engineering process skill (rated on 1-10)

| Description   | Dhiksha | Indrjeet | Elizabeth | Sairam | Priyanka |
|---------------|---------|----------|-----------|--------|----------|
| Architecture  | 8       | 9        | 8         | 8      | 8        |
| Design        | 10      | 8        | 9         | 10     | 8        |
| Documentation | 10      | 8        | 10        | 10     | 10       |
| Integration   | 8       | 10       | 8         | 9      | 9        |
| Qualification | 8       | 9        | 8         | 8      | 9        |

### 2.1.3 Behavioral Skills (rated on 1-10)

| Description                   | Dhiksha | Inderjeet | Elizabeth | Sairam | Priyanka |
|-------------------------------|---------|-----------|-----------|--------|----------|
| Resource Management           | 9       | 9         | 10        | 9      | 10       |
| Time Management               | 10      | 9         | 9         | 9      | 8        |
| Productivity                  | 9       | 10        | 10        | 9      | 9        |
| Team Work                     | 10      | 10        | 10        | 10     | 10       |
| Inter and Cross Communication | 10      | 9         | 10        | 10     | 10       |
| Core Strength                 | 9       | 9         | 9         | 9      | 9        |

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## 3 TEAM STRUCTURE

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**Priyanka Sharma** acts as team leader and works to organize group meetings and keep track of project activities.

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## 4 PROJECT DESCRIPTION

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### 4.1 STATEMENT OF THE GOAL

The goal of our project is to recommend a playlist of M songs based on the user's preference, where M can be as small as 1.

The song is suggested based on: -

1. Users' listening history
2. The system takes into consideration genre, artist, demographic details and popularity of the song.

This Automatic Playlist Recommender also provides a web application that users can interact with, to receive song recommendations based on songs the user already knows and likes. Thus, providing a clean and easy interface to interact with.

### 4.2 LIST OF THE SERVICES TO BE PROVIDED BY THE PROPOSED SYSTEM

**I. Take as input a set of user songs and create a "playlist" of song recommendations based on those selections.**

For this service, we will be using a similarity based collaborative filtering technique to compare user song preferences and find similar song selections, based on genre, artist and popularity. We will be using data structure and Machine Learning libraries packages in python, such as Pandas and Scikit-learn.

**II. Provide a web based GUI/app with which the user can interact with the software in a clean, simple manner.**

The software hosts a website which perform the recommendation service in the backend.

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## 4.3 DESCRIPTION OF THE PROGRAMMING PART OF YOUR PROJECT

### 4.3.1 Data processing and Analysis

The software uses music dataset from the UCI Learning Repository as training set. Using the dataset, an item similarity based collaborative filtering process is performed to generate playlist recommendation.

For data pre-processing and training the recommendation model, we will be using the specialized libraries in python, such as Pandas, Numpy, matplotlib and scikit-learn.

Moving forward with the recommendation engine, we hope to evaluate the accuracy of the songs we are recommending, and improve our recommendation techniques to build a truly useful system for our end users.

### 4.3.2 Technical Functionalities

#### 4.3.2.1 *BACKEND*

We create a song database “song pool”.

#### 4.3.2.2 *FRONTEND*

A clean and interactive user interface is provided on the hosted website.

#### 4.3.2.3 *SERVICE OPERATIONS*

A song is seeded into the system.

The software finds other user data with listening history for the same song (at high frequency of listens), fetches artists and genres that those users also listen to.

Recommend a group of songs within that genre and artist.

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#### **4.3.2.4 SCOPE AND SKILLS**

Although we will be using existing python libraries designed for handling and interacting with data, we will be relying on our programming skills to apply the broad tools offered in these packages to our dataset and project goals. That is, it will be important to have the programming skills to integrate various tools and select the best uses for our purposes.

Additionally, setting up the portion of the software that allows end user interaction will take programming knowledge.

## **4.4 RISK ANALYSIS**

Potential problems that we believe the project may encounter are:-

- 1) **PRIVACY CONCERNS**- Acquisition of user history data
- 2) **ALGORITHM REFINEMENT** -Accuracy of prediction results
- 3) **BUSINESS ASPECT** -Developing/Maintaining a competitive edge or unique offering for the software

## **4.5 POTENTIAL CUSTOMERS**

1. Gym and other fitness centers
2. Yoga Centre
3. Online music engines
4. Therapist
5. People interested in music



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## 5 REVISION

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| Sno | Author    | Section     | Description   | Version | Date      |
|-----|-----------|-------------|---|---------|-----------|
| 1.  | Priyanka  | All         | Document Initialization   | 1.0     | 9/11/2017 |
| 2.  | Elizabeth | all         | My (early) version of the document, to be merged for the final draft<br>Grammar/language checks, some comments about the material | 1.1     | 9/17/2017 |
| 3.  | Dhiksha   | 2,3,4.1,4.2 | list of services  | 1.2     | 9/17/2017 |
| 4.  | Indrajeet | 1,2,3.1,3.2 | Updated Goals and and list of services  | 1.3     | 9/17/2017 |
| 5.  | Sairam    | 1,2         | Updated my skills sets and voted for a leader   | 1.4     | 9/18/2017 |
| 6.  | Sairam    | 2.1.3       | Updated the skill sets  | 1.5     | 9/18/2017 |
| 7.  | Priyanka  | 4           | Merge   | 1.6     | 9/18/2017 |
| 8.  | Priyanka  | all         | Merged  | 1.7     | 9/18/2017 |
| 9.  | Dhiksha   | 2.1.3       | Updated the skill sets  | 1.8     | 9/18/2017 |
| 10. | Priyanka  | 2           | Organized skill sets  | 1.9     | 9/18/2017 |