#### 3 REQUIREMENTS SPECIFICATION

##### 3.1 USER REQUIREMENTS DOCUMENT

###### 3.1.1 Proposed System Overview

The purpose of the proposed system is to create a neural network that we can train to recognize/analyse sheet music – Looking at the types of notes used in what way and the pauses between notes. The neuralnet can then generate its own unique music. It could be capable of producing music indistinguishable from a human composer.

##### Description of Proposed Neural Network

Diagram**:**

Input sheet music

Reads notes

Identifies notes

Inputs specifications

Writes melody

Reads specification



User

##### System User Profile

System User Profile:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **User Role** | **Responsibilities** | **Branch/**  **Division/**  **Section/ Unit** | **Staff**  **Post/Rank** | **Stakeholder Group** |
| **1** | **User(Musician)** | **Output Specifications** | **Production** | **Musician** | **Creation/Patent Group** |

###### 3.1.2 Future Business Process

##### List of Future Business Processes

List of Future Business Processes:

|  |  |
| --- | --- |
| **Process ID** | **Business Process Title** |
| **BP-001** | **Input sheet music (teach the system)** |
| **BP-002** | **Specify type of melody** |
| **BP-003** | **Record output** |

##### Business process

**Business process**

User

System

Start

Open system

Reads notes

Creates melody

(

processing

End

Plays melody

Input sheet

DOne

-

(

Is not

done

)

(

Is done

-

)

Reads specifi- cations

Narratives:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Task No.** | **Actor** | **Task Name and Description** | **Input** | **Output** |
| **1** | **User** | **Input the sheet music into the system to teach it and let it identify notes and spaces** | **Sheet music** | **data** |
| **2** | **system** | **Reads notes, identifies them and records the data** | **specifications** | **Learned information** |
| **3** | **user** | **Input specifications on what the output melody should sound like** | **specifications** | **Learned information** |
| **4** | **system** | **Creation of melody based on previously learned notes and rhythms** | **Learned information** | **Melody** |

Other information:

|  |
| --- |
| **Glossary N/A** |
| **References N/A** |
| **Assumptions:** |
| 1. **It is assumed all input sheet music has been patented by someone else.** 2. **It is assumed that the User does not want to recreate the exact same sound as any of the inputs** 3. **The sheet music inputs are without any errors or musical mistakes or ‘no-go’s’** |
| **Business Rules** |
| 1. **The user will be the owner of the output melody** 2. **The system should not output the same melody as an input due to ownership.** |

###### 3.1.3 Functional Requirements

##### List of Functional Requirements

Priority Key:

* MUST (M),
* SHOULD (S),
* COULD (C),
* WON’T (W)

List of Functional Requirements:

|  |  |  |  |
| --- | --- | --- | --- |
| **Req. ID** | **Requirement Title** | **Target Users** | **Priority** |
| **REQ-SYS-001** | **Music note identification** | **System** | **M** |
| **REQ-SYS-002** | **Note spaces measurement** | **System** | **M** |
| **REQ-BOR-001** | **Visual Sheet** | **User** | **C** |
| **REQ-BOR-002** | **Music output** | **User** | **M** |
| **REQ-BOR-003** | **Melody description** | **User** | **C** |
| **…** | **…** | **…** | **…** |

##### REQ-SYS-001 Music note identification

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **REQ-SYS-001** |
| Requirement Title | **Music note identification** |
| Priority | **Must** |
| Functional Requirement Description | * **The system must be able to identify a note on sheet in order to know what it sounds like so that it can be recorded** |
| Frequency of Use | **During every music sheet input** |
| Acceptance Criteria | **Only predefined notes are to be recognised** |
| Related Business Process | **Refer to BP-001.** |

##### REQ-BOR-001 Note spaces measurement

Requirements Description:

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **REQ-SYS-002** |
| Requirement Title | **Note spaces measurement** |
| Priority | **Must** |
| Functional Requirement Description | * **The system must be able to identify the spaces between and the position of a note on a sheet in order to know what pitch it sounds like so that it can be recorded** |
| Frequency of Use | **Every sheet music input** |
| Acceptance Criteria | **Follows the same number of lines as a standard sheet** |
| Related Business Process | **Refer to BP-001.** |

##### REQ-BOR-002 Visual Sheet

Requirements Description:

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **REQ-SYS-003** |
| Requirement Title | **Visual Sheet** |
| Priority | **Could** |
| Functional Requirement Description | * **The system can show the sheet visually after it is inputted in order to confirm its accuracy** |
| Frequency of Use | **After every music sheet input** |
| Acceptance Criteria | **It should be identical to the input** |
| Related Business Process | **Refer to BP-001.** |

##### REQ-SYS-004 Music output

Requirements Description:

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **REQ-SYS-004** |
| Requirement Title | **Music output** |
| Priority | **Must** |
| Functional Requirement Description | * **The system must be able to output a melody based on all input notes tht it has learned from** |
| Frequency of Use | **User defined** |
| Acceptance Criteria | **It must sound elegant, based on predefined criteria of a ‘catchy song’** |
| Related Business Process | **Refer to BP-002.** |

##### REQ-SYS-005 Melody description

Requirements Description:

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **REQ-SYS-005** |
| Requirement Title | **Melody Description** |
| Priority | **Could** |
| Functional Requirement Description | * **The system can provide a description of the output, highlighting how it was created, what tempo or genre it is, etc.** |
| Frequency of Use | **After every output** |
| Acceptance Criteria | **All details of the melody should be shown** |
| Related Business Process | **Refer to BP-002.** |

###### 3.1.4 Non-functional Requirements

Categories:

* audit, control and security,
* global business rules,
* data requirements,
* usability requirements,
* service level targets

##### List of Non-functional Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Req. ID** | **Category** | **Requirement Title** | **Target Users** | **Priority** |
| **REQ-ACS1** | **Audit , Control & Security** | **System Security** | **User** | **M** |
| **REQ-ACS2** | **Audit , Control & Security** | **Backup and Recovery Requirements** | **User** | **M** |
| **REQ-ACS3** | **Audit , Control & Security** | **Disaster Recovery Requirements** | **User** | **M** |
| **REQ-USR1** | **Usability** | **General Usability Requirements** | **User** | **S** |
| **REQ-SLT1** | **Service Level Targets** | **System Availability** | **User** | **S** |
| **REQ-SLT2** | **Service Level Targets** | **System Performance** | **User** | **S** |

##### REQ-ACS1 System Security

Requirements Description:

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **REQ-ACS1** |
| Category | **Audit , Control & Security** |
| Requirement title | **System Security** |
| Priority | **Must (except for the owner of the project)** |
| Non-functional requirement description | The project should not be accessed by anyone who is not working on it. |

##### REQ-ACS2 Backup and Recovery Requirements

Requirements Description: ….

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **REQ-ACS2** |
| Category | **Audit , Control & Security** |
| Requirement title | **Backup and Recovery Requirements** |
| Priority | **Must** |
| Non-functional requirement description | The project must be able to back up, auto-save and recover projects that can be lost due to unforeseen shutdowns. |

##### REQ-ACS3 Disaster Recovery Requirements

Requirements Description: ….

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **REQ-ACS3** |
| Category | **Audit , Control & Security** |
| Requirement title | **Disaster Recovery Requirements** |
| Priority | **Must** |
| Non-functional requirement description | The project must be able to recover projects that can be lost due to unforeseen shutdowns, losses or system damages. |

##### REQ-USR1 General Usability Requirements

Requirements Description: ….

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **REQ-USR1** |
| Category | **Usability** |
| Requirement title | **General Usability Requirements** |
| Priority | **Should** |
| Non-functional requirement description | The project should be user friendly and be able to accommodate for first time users |

##### REQ-SLT1 System Availability

Requirements Description: ….

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **REQ-SLT1** |
| Category | **Service Level Targets** |
| Requirement title | **System Availability** |
| Priority | **Should** |
| Non-functional requirement description | The project should be available to everyone in the target market. Access should be as easy as possible without compromising business processes. |

##### REQ-SLT1 System Performance

Requirements Description: ….

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **REQ-SLT1** |
| Category | **Service Level Targets** |
| Requirement title | **System Performance** |
| Priority | **Should** |
| Non-functional requirement description | The project should be as efficient and effective as possible. It should work as fast as possible and simplify all components for ease of use. |

##### 3.2 TECHNICAL REQUIREMENTS

###### 3.2.1 List of Technical Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Req. ID** | **Requirement Title** | **Priority** | **Category** | **Responsible**  **Team**  **Member(s)** |
| **TR-SBR-001** | **Computer Hard drive save** | **S** | **System Backup and Recovery Requirements** | **Programmers/Systems**  **Analyst(s)/Project Manager(s)** |
| **TR-SBR-002** | **Backup and recovery** | **S** | **System Backup and Recovery Requirements** | **Programmers/Systems**  **Analyst(s)/Project Manager(s)** |
| **TR-QRC-001** | **QR Code Standards** | **M** | **QR Code requirements to follow ISO/IEC 18004:2006 standards** | **Programmers/Systems**  **Analyst(s)/Project Manager(s)** |
| **TR-DC-001** | **Images into text** | **M** | **Data Conversion** | **Programmers/Systems**  **Analyst(s)/Project Manager(s)** |
| **TR-UE-001** | **User Interface** | **S** | **User Experience/Interface Requirements** | **Design architect** |

###### 3.2.2 TR-SBR-001 Computer Hard drive save

Technical requirements description:

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **TR-SBR-001** |
| Requirement title | **Computer Hard drive save** |
| Priority | **M** |
| Category | **System Backup and Recovery Requirements** |
| Technical requirement description | **System logs and all changes should be systematically saved and backed up onto the computer hardrive.** |

**3.2.3 TR-SBR-002 Backup and Recovery**

Technical requirements description:

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **TR-SBR-002** |
| Requirement title | **Backup and recovery** |
| Priority | **S** |
| Category | **System Backup and Recovery Requirements** |
| Technical requirement description | **System should be able to recover changes and items after an unplanned shutdown.** |

**3.2.3 TR-QRC-003 QR Code Standards**

Technical requirements description:

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **TR-QRC-001** |
| Requirement title | **QR Code Standards** |
| Priority | **M** |
| Category | **QR Code requirements to follow ISO/IEC 18004:2006 standards** |
| Technical requirement description | **System must be coded following the predefined coding standards set out in 2006 by the ISO/IEC** |

**3.2.3 TR-DC-001 QR Images into Text**

Technical requirements description:

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **TR-DC-001** |
| Requirement title | **Images into Text** |
| Priority | **M** |
| Category | **Data Conversion** |
| Technical requirement description | **System must be able to input images of sheet music and then output it as text or graphical symbols to be able to show the melody in sheet form.** |

**3.2.3 TR-DC-001 QR User Interface**

Technical requirements description:

|  |  |
| --- | --- |
| **Item** | **Description** |
| Requirement ID | **TR-UE-001** |
| Requirement title | **User Interface** |
| Priority | **M** |
| Category | **User Experience/Interface Requirements** |
| Technical requirement description | **System user interface design must be both visually functional but also have an appealing look to it. It cannot have colour schemes that hurt the eyes and the layout must be understandable for the user.** |

Furthermore, these are the standards and specifications that the system will strive to adopt:

○ System Backup and Recovery Requirements

* + - Backup arrangements
    - Recovery procedures requirement under various system failures

○ Disaster Recovery Requirements

* + - Minimum service level under disaster
    - Off-site backup arrangement
    - Recovery procedure
    - Time required to recover upon disaster

○ Privacy Requirements

* + - Protection of personal data from unauthorised disclosure e.g. protection on personal identification document number.

○ Technical Support Requirements

* + - Software and hardware support levels
    - Equipment maintenance and repair cycles
    - Test/diagnostic equipment

○ Interface Requirements

* + - User groups
    - Content presentation
    - Application navigation

○ Maintainability, Control and System Management Requirements

* + - System failure(s)
    - Operational readiness and success
    - System effectiveness evaluation and improvement

○ Testing

* + - Design stage testing procedure

○ Data Conversion

* + - Data conversion process
    - Data cleansing
    - Verification program

○ User Experience

* + - Overall experience and satisfaction when a user is using a product or system

Details within the user interface functionality, behaviour, and design