
Software Requirements Specification

for

nTravel

Version 1.1 approved

Prepared by

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Revision History

Name	Date	Reason For Changes	Version
<<Person's name>>	10-04-07	Initial Version	1.0
<<Person's name>>	10-18-07	Functional/Nonfunctional Requirements and others errors	1.1

1 Introduction

1.1 Purpose

The product we have is the Universal Translator (nTravel), revision or release number being 1.0.

1.1.1 Vision Statement

The aim of this product is to create a device that will remove barriers to global communication. Many people, ranging from tourists to relief workers, will be able to use this device to facilitate their international activities.

1.1.2 Scope

The scope of this project includes the development of visual and audio translation algorithms, user interface software for the nTravel device and maintenance of a database containing global language information. The algorithms work with the information in the language database to allow the user of the nTravel to translate written or spoken language.

1.2 Document Conventions

This document follows MLA Format. Bold-faced text has been used to emphasize section and sub-section headings. Highlighting is to point out words in the glossary and italicized text is used to label and recognize diagrams.

1.3 Intended Audience and Reading Suggestions

This document is to be read by the development team, the project managers, marketing staff, testers and documentation writers. Our stakeholders, company manufacturing associated

hardware, company providing embedded operating system, shareholders of NAMMPSoft Inc. and distributors who markets the finished product, may review the document to learn about the project and to understand the requirements. The SRS has been organized approximately in order of increasing specificity. The developers and project managers need to become intimately familiar with the SRS.

Others involved need to review the document as such:

Overall Description – Marketing staff have to become accustomed to the various product features in order to effectively advertise the product.

System features – Testers need an understanding of the system features to develop meaningful test cases and give useful feedback to the developers.

External Interface Requirements – The hardware developers need to know the requirements of the device they need to build. The marketing staff also needs to understand the external interface requirements to sell the product by describing the user-friendly features of the nTravel.

Nonfunctional and Functional Requirements – The hardware developers.

1.4 Project Scope

The nTravel has features that enable any one person to communicate with anyone, whether they speak the same language or not. It also lets people be more familiar with their surroundings if they are in a foreign place. Refer to the project scope document for further information.

1.5 References

Please consult the attached project scope document for further information regarding project scope. A *use case diagram* has been attached to accompany sections 2.1: Product Perspective and 2.2: Product Features. A user manual is included to accompany section 2.6: User Documentation. *Product mock-ups* and Requirements Validation Plan have also been included for general reference.

2 Overall Description

2.1 Product Perspective

The software product being developed is for a new portable stand-alone device which functions as a camera and language translation device for text/audio input and common signs. The product works with other software products like an Embedded Operating System, Databases for text and speech, Recognition and Translation Software. The product uses hardware specially designed for this purpose. The hardware is a 4.5 inches x 2.5 inches x 0.5 inches rectangular device equipped with a microphone, a camera, speakers, SD Card Slot, USB 2.0 port, a touch screen and a physical button control panel. Currently, there is no device, which combines all functionalities the way the nTravel does. Therefore, it is a prototype of a new product that merges two separate device families: personal translators and digital cameras. Refer to the attached *use case diagram* for further information.

2.2 Product Features

The nTravel contains the following key features:

1. Captures an image (containing text), recognizes text from it and translates it to required language. An exemplary use of this functionality is translating a restaurant menu or a sign at a market when the language is unfamiliar.
2. Accepts typed in text, translates to foreign language, and displays translated text or audio output of corresponding text. This functionality is useful when the user wishes to translate a word from a known language to a foreign language. For example, somebody attempting to order soup at a restaurant could type in “soup” and then hear how to say the word for “soup” in the foreign language.
3. Accepts voice input from a microphone, performs recognition using a speech recognizer, translation using a machine translator, and generation of the translated audio output using a speech synthesizer. This is useful when attempting to understand foreign radio stations or television stations, or when attempting to converse with a speaker of the foreign language.
4. Provides interpretation of common road signs. The device’s rapid translation algorithm provides a near-immediate translation of road signs to ensure safe transit.
5. Synchronizes to a computer to obtain databases previously downloaded from a web application developed by the company, using a password-protected secure login. The company will frequently update the database with new language research, ensuring that the customer will be have access to the most accurate language data.
6. Stores pictures in either a removable **SD** card or internal memory (2 GB). The device can then, either have the **SD** card removed or be attached to a computer via **USB** 2.0 to transfer the image files.

2.3 User Classes and Characteristics

2.3.1 Customer:

Remote customers most frequently use the device for language translation and sign interpretation purposes. The customers are not expected to have a high educational and proficiency level or technical expertise. Hence, the user interfaces in available in eight popular international languages such as English, French, German, Spanish, Mandarin, Japanese, Arabic and Hindi.

2.3.2 DBA:

The DBA is expected to have a field appropriate college degree and experience of at least 2 years as a DBA and an additional 5 years in the IT field. He/She has the privilege to update information in the database and technical expertise in database management. The DBA does not directly interact with the nTravel device.

2.3.3 Data Entry Level Personnel:

They must have at least a high school diploma or equivalent certification. They do not have privileges to directly access or modify the database without the permission of the DBA. The Data Entry Level Personnel do not directly interact with the nTravel device.

2.4 Operating Environment

The software will operate with the following software components and applications:
The software being developed will be running under MontaVista Mobilinux v5.0 embedded operating system. The hardware that will be running these programs is being developed for this specific project, and will follow the specifications that appear in this document in section 3. The synchronization procedures will be written to interface with Windows XP, Windows Vista, and Mac OS.

2.5 Design and Implementation Constraints

1. Synchronization: uses **USB** 2.0, connects only to Windows XP, Windows Vista, and Mac OS X.
2. Memory: device will have 2GB internal hard drive. Software and database cannot exceed this amount. Device will have a **SD** card slot, and the software must be able to read and write to that slot.
3. Language requirements: software must be multilingual, including the following languages: English, French, German, Spanish, Mandarin, Japanese, Arabic and Hindi.

2.6 User Documentation

For user documentation and information, please consult section 4: External Interface Requirements and attached user manual.

2.7 Assumptions and Dependencies

It is assumed that the hardware designed will work correctly with the third-party operating system (MontaVista Mobilinux v5.0) and the developed software.

Because the device acquires database updates through USB2.0, the customer must have a computer with a USB2.0 port, and have a USB2.0 cable.

3. System Features

3.1 Use case name and identifier – Take a picture (U1)

3.1.1 Objective – The purpose of the U1 use case is to use the device's optical hardware to produce the image detected by the optical hardware. This image is displayed on the device's screen.

3.1.2 Priority - This requirement is medium priority.

3.1.3 Source – The source of this use case is the customer.

3.1.4 Actors – An end user of the device (a customer) would be the relevant actor for this use case.

3.1.5 Flow of events-

3.1.5.1 Basic Flow-

3.1.5.1.2 User enters picture-taking mode.

3.1.5.1.3 Device displays what it is “looking at” on screen.

3.1.5.1.4 User presses button for taking picture.

3.1.5.1.5 Picture is stored in temporary memory and displayed on screen.

3.1.5.2 Alternative Flow- **At step 3.1.5.1.4, the user decides not to take a picture.**

3.1.5.2.1 User presses cancel button.

3.1.5.2.2 Device exits picture-taking mode.

3.1.5.3 Exception Flow – At step 3.1.5.1.4, the device encounters a problem.

3.1.5.3.1 Device provides error message indicating need for repair.

3.1.5.3.2 Device exits picture-taking mode.

3.1.6 Includes – None.

3.1.7 Requirements-

3.1.7.1 The system shall provide the option to take a picture.

3.1.7.2 The system shall display the currently viewed image.

3.1.7.3 The system shall store the image in temporary memory.

3.1.7.4 The system shall indicate a need for repair if broken.

3.1.8 Preconditions – User is logged in, optical hardware is operational.

3.1.9 Post conditions – An image is shown on the device’s screen, available for permanent saving or deletion.

3.1.10 Nonfunctional requirements –

3.1.10.1 Performance Requirements-

3.1.10.1.1 Maximum allowed execution time for U1 use case is 3 seconds, starting at the time when the user presses the take picture button and ending when the image has been saved and displayed.

3.1.10.2 Safety Requirements-None.

3.1.10.3 Security Requirements-None.

3.1.10.4 Software Quality Requirements-None.

3.1.11 Notes/Issues – U1 is often followed by the U2 use case.

3.1.12 Special requirements – Always keep enough memory available so that the current picture can be temporarily saved, in case the user decides to permanently save it.

3.2 Use case name and identifier – **Save a picture (U2)**

3.2.1 Objective – The purpose of the U2 use case is to enable the user to permanently store images captured during the U1 use case on the device’s internal memory.

3.2.2 Priority – This requirement is low priority.

3.2.3 Source – The source of this use case is the customer.

3.2.4 Actors – An end user of the device (a customer) would be the relevant actor for this use case.

3.2.5 Flow of events-

3.2.5.1 Basic flow-

3.2.5.1.1 User is queried as to whether to save current picture.

3.2.5.1.2 User presses “save” button to indicate desire to save picture.

3.2.5.1.3 Picture is saved to device’s internal memory.

3.2.5.2 Alternative flow- At step 3.2.5.1.2, the user decides not to save the picture.

3.2.5.2.1 User presses the “cancel” button to indicate desire to not save picture.

3.2.5.2.2 The current picture is not saved to the device’s internal memory.

3.2.5.2.3 The device goes back to picture taking mode.

3.2.5.3 Exception flow- At step 3.2.5.1.2, the device encounters problem due to insufficient memory.

3.2.5.3.1 Device provides error message indicating insufficient memory remaining

3.2.5.3.2 Device prompts user to go to file management mode to make memory available.

3.2.6 Includes – None.

3.2.7 Requirements –

3.2.7.1 The system shall ask the user whether to save a picture.

3.2.7.2 The system shall store the picture in internal memory.

3.2.7.3 The system shall notify the user if insufficient memory to store the picture remains.

3.2.8 Preconditions – User has taken a picture (in U1 use case), sufficient memory is available to store a picture.

3.2.9 Post conditions – Picture is saved to device’s internal memory.

3.2.10 Nonfunctional Requirements–

3.2.10.1 Performance Requirements-

3.2.10.1.1 Maximum allowed execution time for U2 use case is 3 seconds, starting when user presses the save button and ending when the picture has been saved in memory and the user has been notified of this event.

3.2.10.2 Safety Requirements-None.

3.2.10.3 Security Requirements-None.

3.2.10.4 Software Quality Requirements- None.

3.2.11 Notes/Issues – Check on use case identifier for removing pictures from memory.

3.2.12 Special Requirements – Memory must be available for picture to be saved.

3.3 Use case name and identifier - Translate written text (U3)

3.3.1 Objective - The object of the U3 use case is to translate any chosen text, in the device, to any desired language. It would help anyone understand the foreign text in his or her device. The foreign text would be typed into the device.

3.3.2 Priority – This requirement is high priority.

3.3.3 Source – The source of this use case is the customer.

3.3.4 Actors - The only actor in this part is the customer.

3.3.5 Flow of Events-

3.3.5.1 Basic Flow-

3.3.5.1.2 The chosen text is read.

3.3.5.1.3 The language is identified.

3.3.5.1.4 Then, it is compared to the downloaded database in our device.

3.3.5.1.5 The text is then translated into the desired language.

3.3.5.1.6 Final result will be either displayed on the screen or will be output through the speaker, depending on the user's choice of output.

3.3.5.2 Alternative flow- At step 3.3.5.1.2, the device does not recognize the language due to incorrect input.

3.3.5.2.1 The device beeps and the message "INVALID INPUT" is displayed on the screen.

3.3.5.3 Exception Flow- At step 3.3.5.1.4, the device cannot find translations in the database.

3.3.5.3.1 The device beeps and the message, "NOT TRANSLATED" is displayed on the screen.

3.3.6 Includes –Typing in the text, comparing to database, displaying translated text.

3.3.7 Requirements-

3.3.7.1 The system shall receive text input from the user.

3.3.7.2 The system shall identify the language of the text entered.

3.3.7.3 The system shall compare the input to the database.

3.3.7.4 The system shall translate the text into the desired language.

3.3.7.5 The system shall output the translated text.

3.3.7.6 The system shall indicate when a translation cannot be found.

3.3.7.7 The system shall indicate when the text's language cannot be identified.

3.3.8 Preconditions - The user has already typed in the text.

3.3.9 Post conditions - The text has been translated into the desired language and the final output has reached the user in the desired form. The user understands the foreign text.

3.3.10 Nonfunctional requirements –

3.3.10.1 Performance Requirements-

3.3.10.1.1 Maximum allowed execution time for U3 use case is 5 seconds for every 30 words being processed.

3.3.10.2 Safety Requirements-None.

3.3.10.3 Security Requirements-None.

3.3.10.4 Software Quality Requirements-None.

3.3.11 Notes/Issues – None.

3.3.12 Special Requirements - The database needs to be updated frequently by the user by connecting the device to any computer and looking for updates. There should be fast processing also.

3.4 Use case name and identifier- Translate spoken language (U4)

3.4.1 Objective - The object of the U4 use case is to translate any chosen speech, in the device, to any desired language. It would help anyone understand the foreign speech in his or her device. The foreign speech would be recorded into the device by the in-built

microphone.

3.4.2 Priority – This requirement is high priority.

3.4.3 Source – The source of this use case is the customer.

3.4.4 Actors - The only actor in this part is the customer.

3.4.5 Flow of Events-

3.4.5.1 Basic Flow-

3.4.5.1.1 Speech is recorded by microphone.

3.4.5.1.2 Language being used is identified.

3.4.5.1.3 Speech is compared to database.

3.4.5.1.4 Speech is translated to the desired language.

3.4.5.1.5 Final result will either be displayed on the screen or will be output through the speaker, depending on the user's choice of output.

3.4.5.2 Alternative flow- At step 3.4.5.1.2, the device does not recognize the language due to incorrect input.

3.4.5.2.1 The device beeps and the message "INVALID INPUT" is displayed on the screen.

3.4.5.3 Exception Flow- At step 3.4.5.1.4, the device cannot find translations in the database.

3.4.5.3.1 The device beeps and the message, "NOT TRANSLATED" is displayed on the screen.

3.4.6 Includes - Recording speech, comparing to database, displaying translated speech.

3.4.7 Requirements-

3.4.7.1 The system shall record speech using the microphone.

3.4.7.2 The system shall identify the language of the spoken words.

3.4.7.3 The system shall compare the input to the database.

3.3.7.3 The system shall query the user as to the format of output to use (text or speech).

3.4.7.4 The system shall output the spoken language as text.

3.4.7.5 The system shall output the spoken language as speech.

3.3.7.6 The system shall indicate when a translation cannot be found.

3.4.7.6 The system shall indicate when the speech's language cannot be identified.

3.4.8 Preconditions - The user has recorded the speech into the device.

3.4.9 Post conditions - The speech has been translated into the desired language and final output has reached the user in his/her desired form. The user understands the foreign speech.

3.4.10 Nonfunctional requirements-

3.4.10.1 Performance Requirements-

3.4.10.1.1 Maximum allowed execution time for U4 use case is 5 seconds for every 30 words being processed.

3.4.10.2 Safety Requirements-None.

3.4.10.3 Security Requirements-None.

3.4.10.4 Software Quality Requirements-None.

3.2.11 Notes/Issues – None.

3.4.12 Special Requirements - The database needs to be updated frequently by the user by connecting the device to any computer and looking for updates. Fast processing is an

additional special requirement.

3.5 Use case name and Identifier-Translate signs (U5)

3.5.1 Objective - The object of the U5 use case is to interpret any chosen sign, with or without text, in the device. It would help anyone understand the foreign sign in his or her device. The camera in the nTravel will take a picture of the foreign sign and returns an explanation of the sign.

3.5.2 Priority – This requirement is medium priority.

3.5.3 Source – The source of this use case is the customer.

3.5.4 Actors - The only actor in this part is the customer.

3.5.5 Flow of Events-

3.5.5.1 Basic Flow-

3.5.5.1.2 The chosen sign is selected from a permanently saved or temporarily saved picture.

3.5.5.1.3 The language and symbol is identified.

3.5.5.1.4 Then, it is compared to the downloaded database in our device.

3.5.5.1.5 It is then interpreted in the desired language.

3.5.5.1.6 Final result will either be displayed on the screen or will be output through the speaker, depending on the user's choice of output.

3.5.5.2 Alternative flow- At step 3.5.5.1.2, the device does not recognize the language due to incorrect input.

3.5.5.2.1 The device beeps and the message "INVALID INPUT" is displayed on the screen.

3.5.5.3 Exception Flow- At step 3.5.5.1.4, the device cannot find a translation in the database.

3.5.5.3.1 The device beeps and the message, "NOT TRANSLATED" is displayed on the screen.

3.5.6 Includes –Taking a picture of the sign, comparing to database, displaying interpretation.

3.5.7 Requirements-

3.5.7.1 The system shall identify a sign in an existing picture.

3.5.7.2 The system shall identify the language in a sign.

3.5.7.3 The system shall compare the sign to signs that exist in the database.

3.5.7.4 The system shall translate any text on the sign.

3.3.7.3 The system shall query the user as to the format of output to use (text or speech).

3.5.7.5 The system shall output the sign information as text.

3.5.7.6 The system shall output the sign information as speech.

3.3.7.6 The system shall indicate when a translation of the sign cannot be found.

3.5.7.7 The system shall indicate when the sign's language cannot be recognized.

3.5.8 Preconditions – None.

3.5.9 Post conditions - The sign has been interpreted into the desired language and final output has reached the user in his desired language.

3.5.10 Nonfunctional requirements –

3.5.10.1 Performance Requirements-

3.5.10.1.1 Maximum allowed execution time for U5 use case is 5 seconds, starting when the user requests a sign translation and ending when the audio/visual output has been transmitted.

3.5.10.2 Safety Requirements-None.

3.5.10.3 Security Requirements-None.

3.5.10.4 Software Quality Requirements-None.

3.5.11 Notes/Issues – None.

3.5.12 Special Requirements - The database needs to be updated frequently by the user by connecting the device to any computer and looking for updates.

3.6 Use case name and identifier- Update device software (U6)

3.6.1 Objective - Update is used to update products software applications and database.

3.6.2 Priority – This requirement is low priority.

3.6.3 Source – The source of this requirement is the developers.

3.6.4 Actors – Customer, Customer’s Computer, Master Database.

3.6.5 Flow of events-

3.6.5.1 Basic Flow-

3.6.5.1.1 User connects the device to the computer using a **USB** 2.0 cable.

3.6.5.1.2 The computer identifies the nTravel as being connected.

3.6.5.1.3 The software on the computer asks the user if it can search online for updates.

3.6.5.1.4 User says “yes”.

3.6.5.1.5 Software looks for update.

3.6.5.1.6 If updates are found, they are downloaded to the device & installed.

3.6.5.1.7 User disconnects the device from the computer.

3.6.5.2 Alternative Flow –At step 3.6.5.1.3, the user says “no”.

3.6.5.2.1 The software exits without updating.

3.6.5.2.2 The user can now remove the device from the computer.

3.6.5.3 Exception Flow – At step 3.6.5.1.1, the computer does not detect the nTravel device.

3.6.5.3.1 Error message, “UNKNOWN DEVICE” is displayed suggesting that the user check nTravel software installation on computer.

3.6.6 Includes – None.

3.6.7 Requirements-

3.6.7.1 The system shall communicate via **USB** 2.0 using the drivers installed on the user’s computer.

3.6.7.2 The system shall relay information regarding current software version information such that it can be determined whether a software update is required.

3.6.7.3 The system shall allow software updates to be transferred to it via **USB** 2.0 from the user’s computer.

3.6.7.4 The system shall indicate when no software updates are available.

3.6.7.5 The system shall indicate when the nTravel device is unrecognizable by the user’s computer.

3.6.8 Preconditions - Update software given with the device should be installed on the computer.

3.6.9 Post conditions - Updates are installed on the device.

3.6.10 Nonfunctional requirements –

3.6.10.1 Performance Requirements-

3.6.10.1.1 Maximum time to perform data synchronization is 10 minutes.

3.6.10.2 Safety Requirements- None.

3.6.10.3 Security Requirements- None.

3.6.10.3.1 Security protocols must be implemented to ensure that malicious programming cannot pass from the computer to the device.

3.6.10.4 Software Quality Requirements- None.

3.6.11 Notes/Issues – For optimal performance, device’s database should be updated at least once per month.

3.6.12 Special Requirements - The computer should have an Internet facility available to install updates.

3.7 Use case name and identifier -Set Language (U7)

3.7.1 Objective – The customer can set the text/audio input language and language to which the text/audio input is to be converted.

3.7.2 Priority – This requirement is high priority.

3.7.3 Source – The source of this requirement is the customer.

3.7.4 Actors – An end user of the device (a customer) would be the relevant actor for this use case.

3.7.5 Flow of Events-

3.7.5.1 Basic Flow –

3.7.5.1.1 The user sets the input language and the system gets ready to store the input.

3.7.5.1.2 The user sets the language in which the translation is needed and the system retrieves the corresponding database.

3.7.5.2 Alternative Flow – At step 3.7.5.1.1, the user does not find the required language.

3.7.5.2.1 Device's language settings remain in current state.

3.7.5.3 Exception Flow –At step 3.7.5.1.1, the language database information on nTravel device is corrupted and cannot be read.

3.7.5.3.1 Device displays a message indicating error in language database and a suggestion to download the language database again.

3.7.6 Includes – Update device software (U6).

3.7.7 Requirements-

3.7.7.1 The system shall allow the user to select input language.

3.7.7.2 The system shall allow the user to select output language.

3.7.7.3 The system shall check the updated database to find required language.

3.7.7.4 The system shall get ready to translate via chosen output.

3.7.7.5 The system shall indicate when a database file is corrupt and cannot be read.

3.7.8 Preconditions – User must download the language database to the device before selection.

3.7.9 Post conditions – The device will be ready to translate after the input and output languages are selected.

3.7.10 Nonfunctional requirements –

3.7.10.1 Performance Requirements-

3.7.10.1.1 Maximum allowed execution time for a language database change is 20 seconds.

3.7.10.2 Safety Requirements- None.

3.7.10.3 Security Requirements- None.

3.7.10.4 Software Quality Requirements- None.

3.7.11 Notes/Issues – None.

3.7.12 Special Requirements – None.

3.8 Use case name and identifier -Synchronize Files (U8)

3.8.1 Objective – The customer can connect the nTravel device to a personal computer to transfer saved pictures and notes.

3.8.2 Priority – This requirement is low priority.

3.8.3 Source – The source of this requirement is the customer.

3.8.4 Actors – Customer, Customer's Computer.

3.8.5 Flow of Events-

3.8.5.1 Basic Flow –

3.8.5.1.1 User connects the device to the computer using a **USB** cable.

3.8.5.1.2 User's computer identifies the nTravel as being connected.

3.8.5.1.3 nTravel software on user's computer queries the user for desire to synchronize nTravel-related files (pictures and notes).

3.8.5.1.4 User indicates desire to synchronize nTravel-related files such that the files on the computer will be updated with the files currently on the nTravel.

3.8.5.1.5 Files on nTravel are copied to directory specified by user.

3.8.5.1.6 User disconnects device from computer.

3.8.5.2 Alternative Flow – At step 3.8.5.1.3, the user indicates lack of desire to synchronize nTravel-related files.

3.8.5.2.1 User disconnects device from computer.

3.8.5.3 Exception Flow –At step 3.8.5.1.1, user's computer is unable to identify the nTravel as being connected.

3.8.5.3.1 Error message, "UNKNOWN DEVICE" is displayed suggesting that user check nTravel software installation on computer.

3.8.5.6 Includes – None.

3.8.7 Requirements-

3.6.7.1 The system shall communicate via **USB** 2.0 using the drivers installed on the user's computer.

3.6.7.5 The system shall indicate when the nTravel device is unrecognizable by the user's computer.

3.8.7.1 The system shall query the user regarding desire to synchronize image and note files.

3.8.7.2 The system shall transfer image and note files from the nTravel to the user's computer using **USB** 2.0.

3.8.8 Preconditions – User has installed nTravel software on user's computer.

3.8.9 Post conditions – User's computer has updated files stored.

3.8.10 Nonfunctional requirements –

3.8.10.1 Performance Requirements-

3.8.10.1.1 Maximum allowed execution time for file synchronization is 1 second per 20 MB of files being transferred.

3.8.10.2 Safety Requirements- None.

3.8.10.3 Security Requirements- None.

3.8.10.4 Software Quality Requirements- None.

3.8.11 Notes/Issues – None.

3.8.12 Special Requirements – None.

4. External Interface Requirements

4.1 User Interfaces

The nTravel's user interface has been specifically designed with their customers in mind, giving them convenience while they travel. The nTravel makes sure at every point, that the customer spends most of the time using the device rather than figuring out how to use it.

The home screen offers a menu with a list of functions that the device performs. The user can select one of the options on the menu, and is taken to the respective screen. Every screen displays the menu on the bottom. The user can click on any one of the options and is taken to the screen of their choice. In addition, clicking on the power button displays the home screen with the menu options.

The device offers easy scroll options to navigate the screens efficiently. To scroll down any screen, simply touch the scroll bar on the screen, and roll down. If the user does not know how to use any functionality or has any queries, the help option can be used. The help screen contains a text field to enter search terms. A list of search results pertaining to the query is displayed.

4.2 Hardware Interfaces

The nTravel contains a **USB** 2.0 port to connect to the user computer and download software updates. It can also be used to transfer images from the device to the user's computer and vice versa. The device also contains a **SD** card slot for extra storage.

4.3 Software Interfaces

The nTravel software runs on MontaVista MobiLinux v5.0 embedded operating system. The OS is altered specifically to meet the needs of nTravel. The nTravel features revolutionary touch screen software that makes it convenient to use. The nTravel also offers a touch screen QWERTY keyboard that helps users type text to translate into different languages. The nTravel uses synchronization software that is compatible with Windows, Linux & Mac operating systems. The device contains an in-built language database containing image, text and audio files. The database can be updated with additional languages by downloading them on the user's computer and synchronizing them to the device.

4.4 Communications Interfaces

User's can connect their device to their computer's using a **USB** 2.0 cable. Once connected to the computer, user's can easily transfer images, text files, and the other files between the device and computer. User's can easily update their nTravel device software when connected to the computer. User's can download updates from nTravel's website at anytime using secured login and password provided to them. Whenever the user connects the device to the computer, the device updates itself. The update should not take any longer than 10 minutes.

5 Other Nonfunctional Requirements

For information regarding nonfunctional requirements, refer to section 3: System Features. Each feature has its requirements listed alongside the feature information. There are no additional Non Functional Requirements.

6 Other Requirements

For information regarding functional requirements, refer to section 3: System Features. Each feature has its requirements listed alongside the feature information. Special requirements for each system feature are also mention in section 3. There are no additional Functional requirements.

7 System Requirements Chart **[[Fleck – Description column should be wider and some other columns narrower to make it look better]]**

ID	Priority	Type NF=Nonfunctional F=Functional	Source	Used in Use Case(s)	Description
3.1.7.1	Medium	F	Customer- John Doe	U1	The system shall provide the option to take a picture.
3.1.7.2	Medium	F	Customer- John Doe	U1	The system shall display the currently viewed image.
3.1.7.3	Medium	F	Customer- John Doe	U1	The system shall store the image in temporary memory.
3.1.7.4	Medium	F	Customer- John Doe	U1	The system shall indicate a need for repair if broken.
3.2.7.1	Low	F	Customer- John Doe	U2	The system shall ask the user whether to save a picture.
3.2.7.2	Low	F	Customer- John Doe	U2	The system shall store the picture in internal memory.
3.2.7.3	Low	F	Customer- John Doe	U2	The system shall notify the user if insufficient

					memory to store the picture remains.
3.3.7.1	High	F	Customer-John Doe	U3	The system shall receive text input from the user.
3.3.7.2	High	F	Customer-John Doe	U3	The system shall identify the language of the text entered.
3.3.7.3	High	F	Customer-John Doe	U3, U4, U5	The system shall compare the input to the database.
3.3.7.4	High	F	Customer-John Doe	U3	The system shall translate the text into the desired language.
3.3.7.5	High	F	Customer-John Doe	U3	The system shall output the translated text.
3.3.7.6	High	F	Customer-John Doe	U3, U4, U5	The system shall indicate when it cannot translate the input.
3.3.7.7	High	F	Customer-John Doe	U3, U4	The system shall indicate when the text's language cannot be identified.
3.4.7.1	High	F	Customer-John Doe	U4	The system shall record speech using the microphone.
3.4.7.2	High	F	Customer-John Doe	U4	The system shall identify the language of the spoken words.
3.4.7.3	High	F	Customer-John Doe	U4	The system shall compare the input to the database.
3.4.7.4	High	F	Customer-John Doe	U4	The system shall output the spoken language as text
3.4.7.5	High	F	Customer-John Doe	U4	The system shall output the spoken language as

					speech.
3.5.7.1	Medium	F	Customer- John Doe	U5	The system shall identify a sign in an existing picture.
3.5.7.2	Medium	F	Customer- John Doe	U5	The system shall identify the language in a sign.
3.5.7.3	Medium	F	Customer- John Doe	U5	The system shall compare the sign to signs that exist in the database.
3.5.7.4	Medium	F	Customer- John Doe	U5	The system shall translate any text on the sign.
3.5.7.5	Medium	F	Customer- John Doe	U5	The system shall output the sign information as text.
3.5.7.6	Medium	F	Customer- John Doe	U5	The system shall output the sign information as speech.
3.5.7.7	Medium	F	Customer- John Doe	U5	The system shall indicate when the sign's language cannot be recognized.
3.6.7.1	Low	F	Development Team	U6, U8	The system shall communicate via USB 2.0 using the drivers installed on the user's computer.
3.6.7.2	Low	F	Development Team	U6	The system shall relay information regarding current software version information such that it can be determined whether a software update is required.
3.6.7.3	Low	F	Development Team	U6	The system shall allow software updates to be transferred to it via

					USB 2.0 from the user's computer.
3.6.7.4	Low	F	Development Team	U6	The system shall indicate when no software updates are available.
3.6.7.5	Low	F	Development Team	U6, U8	The system shall indicate when the nTravel device is unrecognizable by the user's computer.
3.7.7.1	High	F	Customer-John Doe	U7	The system shall allow the user to select input language.
3.7.7.2	High	F	Customer-John Doe	U7	The system shall allow the user to select output language.
3.7.7.3	High	F	Customer-John Doe	U7	The system shall check the updated database to find required language.
3.7.7.4	High	F	Customer-John Doe	U7	The system shall get ready to translate via chosen output.
3.7.7.5	High	F	Customer-John Doe	U7	The system shall indicate when a database file is corrupt and cannot be read.
3.8.7.1	Low	F	Customer-John Doe	U8	The system shall query the user regarding desire to synchronize image and note files.
3.8.7.2	Low	F	Customer-John Doe	U8	The system shall transfer image and note files from the nTravel to the user's computer using USB 2.0.
3.1.10.1.1	Medium	NF	Development Team	U1	The system shall

3.2.10.1.1	Medium	NF	Development Team	U2	Maximum allowed execution time for PictureSaver is 3 seconds, starting when user presses the save button and ending when the picture has been saved in memory and the user has been notified of this event.
3.3.10.1.1	High	NF	Development Team	U3	Maximum allowed execution time for Textlator is 5 seconds for every 30 words being processed.
3.4.10.1.1	High	NF	Development Team	U4	Maximum allowed execution time for Speechlator is 5 seconds for every 30 words being processed.
3.5.10.1.1	High	NF	Development Team	U5	Maximum allowed execution time for Signlator is 5 seconds, starting when the user requests a sign translation and ending when the audio/visual output has been transmitted.
3.6.10.1.1	Low	NF	Development Team	U6	Maximum time to perform data synchronization is 10 minutes.
3.6.10.3.1	High	NF	Development Team	U6	Security protocols must be implemented to ensure that malicious programming

					cannot pass from the computer to the device.
3.7.10.1.1	High	NF	Development Team	U7	Maximum allowed execution time for a language database change is 20 seconds.
3.8.10.1.1	Medium	NF	Development Team	U8	Maximum allowed execution time for file synchronization is 1 second per 20 MB of files being transferred.

Appendix A: Glossary

SD – Secure Digital. A widely available format for flash memory cards.

USB – Universal Serial Bus. A serial bus standard that is used in many computer peripherals and other electronic devices