

# The iTEMA E-mail Reader

Jerneja Žganec Gros<sup>1</sup>, Vlado Delić<sup>2</sup>, Darko Pekar<sup>3</sup>, Milan Sečujski<sup>2</sup>, Aleš Mihelič<sup>1</sup>

<sup>1</sup>Alpineon R&D, Iga Grudna 15, Ljubljana, Slovenia

<sup>2</sup> Faculty of Engineering, Trg D. Obradovića 6, 21000 Novi Sad, Srbija

<sup>2</sup> AlfaNum, Trg D. Obradovića 6, 21000 Novi Sad, Srbija

## Abstract

The iTEMA project is outlined within the paper. The project aims to develop the iTEMA e-mail reader: a user-friendly solution to e-mail access over the telephone. By using iTEMA, users will be able to listen to the received e-mails in a variety of European languages, with an emphasis on ex-Yugoslav languages: Slovenian, Serbian, Croatian, Bosnian and Macedonian. They will also be able to choose between basic responses to the heard email and to save or delete individual messages. By the end of the project, a toll-free number will be provided in all the participating countries where free voice-enabled email access over telephone lines will be enabled for the chosen end-user target groups with disabilities, in particular for blind and visually-impaired persons.

## Samodejni bralnik elektronske pošte iTEMA

V okviru projekta iTEMA nameravamo razviti aplikacijo računalniško podprte telefonije za telefonski dostop do elektronske pošte. Namen projekta je omogočiti skupini slepih in slabovidnih oseb ter ostarelim, da preko govornega vmesnika dostopajo do elektronske pošte. Telefonski bralnik elektronske pošte je zanimiv tudi za individualno in poslovno uporabo, saj omogoča oddaljen dostop do elektronske pošte preko telefona, denimo na poti v službo, na službenem potovanju, ipd. Govorna aplikacija bo dostopna slepim in slabovidnim uporabnikom na brezplačni številki in bo podpirala jezike, ki se uporabljajo na področju nekdanje Jugoslavije.

## 1. Introduction

Recent initiatives involving e-inclusion aim to prevent risks of 'digital exclusion', which is to ensure that disadvantaged people are not left behind and to avoid new forms of exclusion due to a handicap, lack of digital literacy or of Internet access. At the same time e-inclusion means also tapping new 'digital opportunities' for the inclusion of socially disadvantaged people and less-favoured areas.

The Information Society has the potential to distribute knowledge resources more equally and to offer new job opportunities, also by overcoming traditional barriers to mobility and geographic distance.

The strategic challenge for e-inclusion applications and services is thus twofold:

- to fully exploit the ICT potential to overcome traditional forms of social exclusion,
- to ensure that all citizens benefit from the Information Society.

The third objective of the recent initiative i2010 Communication: "an Information Society that is inclusive, provides high quality public services and promotes quality of life" [i2010], brings new challenges for e-inclusion. Furthermore, the year 2007 has been proclaimed by the EC as the "European year of equal opportunities for all", as a joint effort to promote equal opportunities and to prevent discrimination [Delić05].

The iTEMA project directly tackles a large target group of end-users within the e-inclusion initiative, namely the blind and visually impaired community, along with the elderly – the ageing population, which is often much more experienced in using telephones than computers. Both target groups are not able to use one of the most widely spread basic communication means of our time – the electronic mail or e-mail.

First an overview of the iTEMA project goals is provided. We continue by describing the tentative system architecture and system modules. An implementation plan and evaluation plans are provided by the end of the paper.

## 2. iTEMA E-mail Reader

The iTEMA project will research and develop a multilingual CTI application for voice-enabled telephone access to user e-mails. Free access will be provided for user groups with disabilities, esp. to blind and visually impaired persons.

The project will focus on the following main technological issues:

- analyse the state-of-the-art of how people with visual disabilities and the elderly access voice-enabled services;
- analyse end-user requirements during the project and tune the resulting application according to the resulting findings of the research;
- specify standards for technologies and application programming interfaces that are being addressed within the project; with a view to enable easy access by disadvantaged groups of citizens;
- research, develop and utilize speech technologies, voice-enabled browser applications and e-mail access and processing techniques, which provide the building blocks of the proposed iTEMA system;
- implement an intelligent multilingual telephone e-mail reader using sophisticated text-to-speech engines to provide voice output of the user e-mail messages.

The main project goals and the planned implementation of the system are further outlined in the subsequent chapters.

### 3. User Requirements

State-of-the-art of the services and applications for users with disabilities and the elderly will be analysed from the point of view of usability in real practice in the countries of participants. Special attention will be paid to voice-enabled services.

User requirements for a voice-enabled e-mail reader application will be collected and digested. Based on their analysis a final set of recommendations for the development of an e-mail reader application will be compiled.

### 4. System Architecture

The system architecture of the e-mail reader application of the iTEMA system will be defined with respect to the results of the recommendations based on the user requirements. The system architecture will be upgraded from existing speech application architectures from the project partners.

Common standards for technologies and application programming interfaces with a view to enable easy access of disadvantaged groups of citizens will be identified and applied.

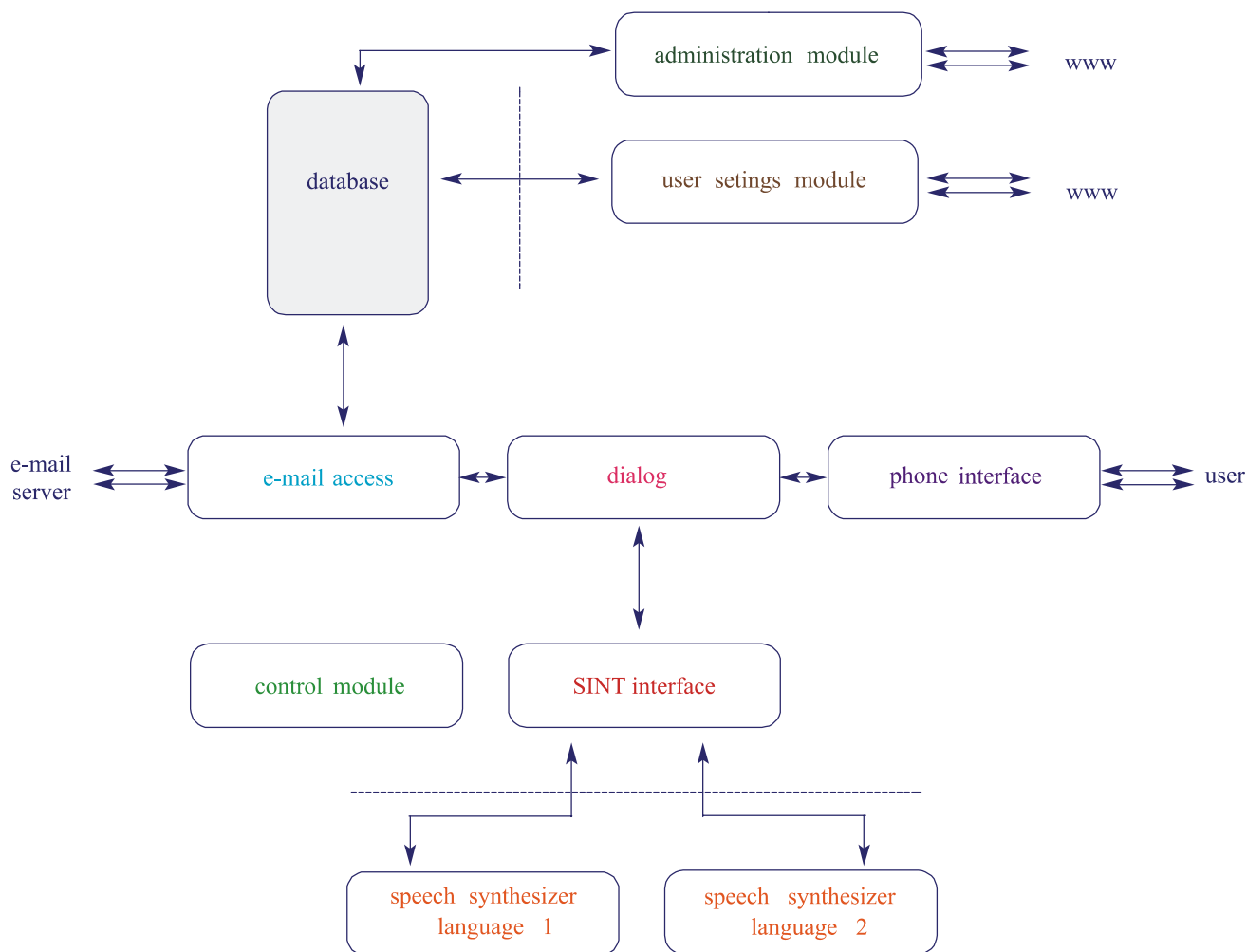


Figure 1. System architecture of the iTEMA e-mail reader.

A communication workflow and a failure behaviour protocol between the system modules will be defined.

A preliminary version of the iTEMA system architecture is depicted in Figure 1.

### 5. System Modules

According to Figure 1, the iTEMA system consists of the following modules:

a) speech synthesiser:

- converts input text to speech signal,
- saves speech signal into speech WAV files,

- for each language supported a TTS engine is needed.

b) SINT interface:

- coordinates requests for speech synthesis,
- performs language identification,
- performs time optimization for speech synthesis requests.

c) phone interface:

- accepts user calls and oversees the phone connection with the user,

- detects user commands,
- transmits messages to the user.

d) mailbox access:

- initializes a connection with the e-mail server (POP3 protocol),
- delivers e-mail data from the e-mail server,
- analyzes the content and format of the e-mail messages,
- accesses user settings from the database.

e) dialog module:

- controls the dialog between the application and the user,
- coordinates the actions of other parts of the system.

f) control module:

- oversees the correct start-up of the system,
- oversees the other system components and provides system self-repair.

g) administration module:

- enables viewing of user settings,
- enables the administrator to change the parameters within the system,
- enables inspection of system load and history of access to the system.

h) user settings web interface:

- enables setup of user settings.

In order to enable maximum quality speech output, two speech synthesis methods will be used in parallel. Application-specific voice message chunks will be prerecorded and concatenated in run-time to provide user menu guidance, give information on the number of new e-mails, the number of attachments, receipt dates, etc. All other input text will be rendered using language-specific text-to-speech synthesis methods.

Special attention will be devoted to the development of high-quality text-to-speech systems for all target languages (Slovenian, Serbian, Croatian, Bosnian, Macedonian). State-of-the art methods for text preprocessing, phoneme-to-allophone conversion, prosody modelling and speech production will be applied [Mihelič06], [Žganec Gros06], [Sečujski05].

Intelligent e-mail processing will be developed. E-mail messages will be parsed into various fields: sender, subject, receipt date, number of attachments, and most importantly, the message body. When processing the message body, it will be taken into account that some characters in the target languages (mainly those with diacritics, like č, ć, ž, š, đ), are not included in a standard ASCII codepage, and therefore many users tend to replace them with their closest ASCII relatives. This problem needs to be properly addressed in the speech synthesis module.

A n-gram language identification module will be developed which will classify and assign the input text to one of the target languages; it will support various code pages for different alphabets, e.g. Serbian Cyrillic.

The dialog module needs to be developed in a user friendly way so that the user can comfortably navigate through the application. It has to enable user log-in and application menu navigation.

The user should be able to choose to listen to her/his old/new e-mail messages, delete them or respond to the sender of the message using one of your pre-set e-mail replies. While listening to the content of an e-mail, the user can choose to: move to the start/end of the message, move to the next/previous sentence, listen to the next/previous message, delete/reply to a message, return to the menu. The dialog flow will be specified in XML.

## 6. User Settings

The multilingual User Settings web interface will enable remote setup of user profiles through HTTP clients. Before using the iTEMA system users will have to update their user profile through a web interface.

The following parameters will be mandatory – they will have to be set for a normal usage of the iTEMA system:

- User telephone number: telephone number that the user will most frequently use to access the iTEMA system, 10 digits;
- New password: PIN code;
- E-mail server address: name or IP address of the e-mail server storing user e-mails;
- E-mail server access protocol: e.g. POP3 or Secure POP3 (protocol for contacting the e-mail server);
- E-mail server access port: usually 110 (port for e-mail access on the e-mail server using a chosen protocol);
- User name on the e-mail server: e.g. test (user identification name on the e-mail server);
- User password on the e-mail server: \*\*\*\*\* (user identification password on the e-mail server);
- SMTP server address for sending e-mail replies: server name or IP address of the server for sending e-mails;
- SMTP server access port: usually 25 (port for accessing the SMTP server);
- User reply ID: e.g. Test (reply-to user name – friendly name used for replies to e-mail messages).

On the iTEMA User Settings Pages users will be able to set additional parameters that will be optional: three preset answers for replies to the received e-mail messages and two filter lists for filtering the e-mail messages that the user wants to access via the iTEMA system:

- List of desired senders: this list contains e-mail addresses or a domain name of those senders whose e-mail messages the user explicitly wishes to access using the iTEMA system.

Examples:

\*: all senders are permitted;

info@alpineon.com: only this sender is permitted.

- List of undesired senders: this list contains e-mail addresses or domain names of those senders whose e-mail messages the user does not wish to access using the iTEMA system - blocking sender list.

## 7. Implementation and Testing

Towards the end of the project, system integration of all modules will be performed, resulting in a 1st prototype of the iTEMA system.

A toll-free number will be procured for a test implementation. Testing will be performed by target user groups and their user-feedback will be collected. In parallel, system performance and robustness testing will be carried out.

A typical scenario of using the iTEMA system would be the following. The system log-in will include the following steps:

**Step 1** The user dials a telephone number that will connect her/him to the iTEMA e-mail reader application. The system responds with a greeting and gives the user further instructions.

**Step 2** In case the user makes the call not from his own telephone - that is used as his user ID in the system - but from another telephone, he first needs to enter his telephone number and press the pound # key. If the call is originated from the user's own telephone Step 2 can be skipped.

**Step 3** After identifying the user the system invites the user to enter his password (PIN code). The user enters a 4-digit PIN code and presses the pound # key.

**Step 4** After verification of the username and password the Main Menu will be prompted.

After initial verification of the username and password the Main Menu will be prompted. The Main Menu consists of the following submenus: New messages, Old messages, Settings, Help. For navigating the system menu structure the user has to use the Function Keys.

If the user chooses to listen to the messages, the system will advise the user on the number of new messages in the mailbox. The new messages are those that are new from the last usage of the system.

The system will start by reading the first message in the detected language (usually two language options are available) and will include the following information:

- Name of the sender;
- Timestamp;
- Subject;
- Content of the message;
- Information on attached files.

After completion of - and already while - listening to an e-mail, the user has the option to respond to the heard e-mail. The user has to pre-set default replies via the User Settings web interface. Upon selection of a pre-set reply the system accesses the original sender's e-mail address and creates a new e-mail reply. Each e-mail can also be deleted from the user's mailbox. The user can interrupt an e-mail at any given time and move back or ahead to another e-mail or another sentence in the current e-mail.

When the system is left waiting too long for the user's selection, it will automatically explain the various viable menu options. After two consecutive occurrences of non-response from a misunderstood command, the iTEMA system will automatically say 'goodbye' and disconnect.

Upon completion of a step within the system, the user will be given various options to choose from. The user will have the option of pressing the Help key, should she/he need any additional assistance. Basic instructions indicating how to use the system will be available to the user at all times.

Final system revisions will be performed before the iTEMA system service launch in all participating countries.

## 8. Conclusion

The iTEMA project outline has been provided within the paper. The project aims to develop the iTEMA e-mail reader: a user-friendly solution to e-mail access over the telephone. By using iTEMA, users will not only be able to listen to the received e-mails in a variety of European languages, with an emphasis on ex-Yugoslav languages, i.e. Slovenian, Serbian, Croatian, Bosnian and Macedonian, but will also be able to choose between basic responses to the heard email. In addition, they will be able to manage their email database by saving or deleting individual messages.

By the end of the project, a toll-free number will be provided in all the participating countries where free voice-enabled email access over telephone lines will be enabled for the chosen end-user target groups with disabilities, in particular for blind and visually-impaired persons.

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