Section III - Human Machine Interface System

3.1 Optical Character Recognition System for Devanagari

➤ **Technology Developer**
Indian Institute of Technology
Dept. of Industrial and Management Engineering
Kanpur -208016
Tel: 0512-597743 Fax: 0512-597553
Dr. Veena Bansal
veena@iitk.ac.in

➤ **Level : Product/ Subsystem**
Software Product

➤ **Description**
The system works with the help of a Scanner. User puts a piece of paper document printed in Devanagari (Hindi) script under the scanner, runs the OCR software and gets all the text from that document available inside the computer just as if it was typed in.

➤ **Encoding Standards**
The data is stored in ISCII code.

➤ **Portability/ Expandability**
The system is developed using C programming language. The technology can be used with LINUX platform.It can be easily ported to Windows platform. The OCR software can be integrated with a Hindi Speech Synthesis System to make a Text to Speech system in Hindi. It can be used as front end for a Machine Aided Translation System.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide to Use and configure the system are being prepared.
IPRs
Not yet applied.
Testing
Alpha testing is in progress.

➤ **Potential beneficiaries**
Newspaper (printed in davanagari script) Houses, Libraries, Offices looking for office automation, Linguistic Community (for creating Corpus), Blind People, etc.

➤ **User Tie-ups**
None

3.2 Optical Character Recognition System for Devanagari

➤ **Technology Developer**
Indian Statistical Institute
Computer Vision and Pattern Recognition Unit
203,Barrackpore Trunk Road, Kolkata –700035
Tel: 033-5778085, 5777694
Fax: 5776680, 5773035
Prof. B.B. Chaudhary, Head
bbc@isical.ac.in

➤ **Level : Product/Subsystem**
Software Product

➤ **Description**
The system works with the help of a Scanner. User puts a piece of paper document printed in Devanagari (Hindi) script under the scanner, runs the OCR software and gets all the text from that document available inside the computer just as if it was typed in. System produces the output in the ISCII format and hence, output can be viewed or edited with any editor that supports ISCII. The software can be used for automatic script (data) entry, office automation, digital library, reading aid for the blind etc.

➤ **Encoding Standards**
The OCR output is coded in ISCII.

➤ **Portability/ Expandability**
The system is developed using C programming language. The technology can be used with any Platform including UNIX, LINUX, Windows, since the programme is totally platform independent. The OCR software can be integrated with a Hindi Speech Synthesis System to make a Text to Speech System in Hindi.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide, to Use and configure the system, are being prepared.
IPRs
Not yet applied.
Testing
The results of the Alpha testing says that the performance of the OCR is up to an acceptable level.
The system is able to take care of document skew in between (+5) deg to (-5) deg.Documents printed with mostly used fonts are well recognized.Variation in font size and style (except Italic) do not affect recognition accuracy. System shows acceptable performance even for documents for which print and paper quality is not so good.

➤ **Potential beneficiaries**
Newspaper (printed in davanagari script) Houses, Libraries, Offices looking for office automation, Linguistic Community (for creating corpus), Blind People, etc.

➤ **User Tie-ups**
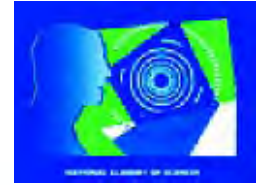A MoU has been signed between ISI, Kolkata and C-DAC, Pune.

Human Machine Interface System

3.3 Optical Character Recognition System for Devanagari & Bangla

➤ **Technology Developer**
Centre for Development of Advanced Computing, GIST Group
Pune University Campus, Ganesh Khind Road
Pune-411007
Tel. : 91-20-5694000
Fax : 91-20-5651111
Shri M.D. Kulkarni
mdk@cdac.ernet.in

➤ **Level-Product/Subsystem**
Software Product

➤ **Description**
Optical character recognition facilitates conversion of text in an image into a editable text. Currently for Devanagari and Bangla (More languages to come soon).

➤ **Encoding Standards**
Currently supports ISCII and ISFOC data encoding.

➤ **Portability/Expandability**
Currently works on Windows and Linux. There is a scope to port this on Windows CE and other hand held platforms.

➤ **Type of Technology**
Human Machine Interface.

➤ **Readiness for TOT**
Documentation
Installation guidelines and User's guide to Use and configure the system are ready.
IPR's
Owned By C-DAC Pune and ISI Kolkatta in respective areas.
Testing
Done

➤ **Potential beneficiaries**
Desktop Publishing sector.
Office sector
Home Users
Digital Library

➤ **User Tie Ups**
As Above

3.4 Optical Character Recognition System for Bangla

➤ **Technology Developer**
Indian Statistical Institute
Computer Vision and Pattern Recognition Unit
203,Barrackpore Trunk Road, Kolkata –700035
Tel. 033-5778085, 5777694 Fax: 5776680, 5773035
Prof. B.B. Chaudhary, Head
bbc@isical.ac.in

➤ **Level: Product/ Subsystem**
Software Product

➤ **Description**
The system works with the help of a Scanner. User puts a piece of paper document printed in Bangla script under the scanner runs the OCR software and gets all the text from that document available inside the computer just as if it was typed in. System produces the output in the ISCII format and hence, output can be viewed or edited with any editor that supports ISCII. The software can be used for automatic script (data) entry, office automation, digital library, reading aid for the blind etc.

➤ **Encoding Standards:**
The OCR output is coded in ISCII.

➤ **Portability/ Expandability**
The system is developed using C programming language. The technology can be used with any Platform including UNIX, LINUX, Windows since the programme is totally platform independent. The OCR software can be integrated with a Hindi Speech Synthesis System to make a Text to Speech System in Hindi.

➤ **Type of Technology**
Human Machine Interface.

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide to Use and configure the system are being prepared.
IPRs
Not yet applied.
Testing
The results of the Alpha testing says that the performance of the OCR is up to an acceptable level.
The system is able to take care of document skew in between (+5) deg to (-5) deg.
Documents printed with mostly used fonts are well recognized. Variation in font size and style (except Italic) do not affect recognition accuracy.
System shows acceptable performance even for documents for which print and paper quality is not so good.

➤ **Potential beneficiaries**
Newspaper Houses, Libraries, Offices looking for Office Automation, Linguistic Community, Blind People, etc.

➤ **User Tie-ups**
A MoU has been signed between ISI, Kolkata and C-DAC, Pune.

Section III - Human Machine Interface System

3.5 Optical Character Recognition System for Oriya

➤ **Technology Developer**
Indian Statistical Institute
Computer Vision and Pattern Recognition Unit
203,Barrackpore Trunk Road, Kolkata –700035
Tel. 033-5778085, 5777694 Fax: 5776680, 5773035
Prof. B.B. Chaudhary, Head
bbc@isical.ac.in

➤ **Level: Product/ Subsystem**
Software Product

➤ **Description**
The system works with the help of a Scanner. User puts a piece of paper document printed in Oriya script under the scanner runs the OCR software and gets all the text from that document available inside the computer just as if it was typed in. System produces the output in the ISCII format and hence, output can be viewed or edited with any editor that supports ISCII. The software can be used for automatic script (data) entry, office automation, digital library, reading aid for the blind etc.

➤ **Encoding Standards**
The OCR output is coded in ISCII.

➤ **Portability/ Expandability**
The system is developed using C programming language. The technology can be used with any Platform including UNIX, LINUX, Windows, since the programme is totally platform independent. The OCR software can be integrated with a Hindi Speech Synthesis System to make a Text to Speech System in Hindi.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide to Use and configure the system are being prepared.
IPRs
Not yet applied.
Testing
The results of the Alpha testing says that the performance of the OCR is up to an acceptable level. System is able to take care of document skew in between (+5) deg to (-5) deg. Documents printed with mostly used fonts are well recognized. Variation in font size and style (except Italic) do not affect recognition accuracy. System shows acceptable performance even for documents for which print and paper quality is not so good.

➤ **Potential beneficiaries**
Oriya Newspaper Houses, Libraries, Offices looking for Office Automation, Linguistic Community, Blind People, etc.

➤ **User Tie-ups**
A MoU has been signed between ISI, Kolkata and C-DAC, Pune.

3.6 Optical Character Recognition System for Oriya

➤ **Technology Developer**
Utkal University, Bhubaneshwar
Department of Computer Science & Applications
Vani Vihar,Utkal University
Bhubaneshwar – 751 004
Tel. 0674-580216(O),540865(R)
Fax: 0674-581850
Prof. (Mrs) Sanghmitra Mohanty
sangham1@sancharnet.in

➤ **Level: Product/ Subsystem**
Software Product

➤ **Description**
It is a OCR System developed using techniques like region growing (labeling & counting), Skeletonization and Neural Network Technique. It can handle colour documents by cleaning noise and converting to monochrome using threshold techniques. Zooming is used for enabling the system to tackle omni font Oriya characters. Neural Network, technique is used for quick and exact recognition avoiding space and time complexity. Colored Document Handling is done taking into consideration the RGB factor of the document (dirty, old and noisy). In the first phase the colored document is coverted to gray tone and then to two tone where the threshold is domain specific (decided as per the color of the paper).

➤ **Encoding Standards**
The OCR output is coded in ISCII.

➤ **Portability/ Expandability**
Integration of OCR and Text to Speech Regional Language e-mail Service can be done.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide, to use and configure the system, are under preparation.
IPRs
Not yet applied
Testing
Self testing under progress.

➤ **Potential beneficiaries**
Offices using Oriya, Blind People,etc.

➤ **User Tie-ups**
Hexacell Pvt. Ltd. & Webdunia.com

Human Machine Interface System

3.7 Optical Character Recognition System for Gurmukhi

➤ **Technology Developer**
Thapar Institute of Engineering & Technology
Department of Computer Science & Engineering
(Deemed University), Patiala 147 001
Tel: 0175-214868, 393137
Fax: 0175-214498, 216391, 212012, 212002
Shri G.S. Lehal (Asst. Prof.)
Tel:393374(D),283502(R)
gslehal@mailcity.com

➤ **Level : Product/ Subsystem**
Software Product

➤ **Description**
The system works with the help of a Scanner. User puts a piece of paper printed in Gurmukhi script under the scanner, runs the OCR software and gets the printed matter into TEXT form, in the ISCII format, which can be viewed/ edited with any editor which supports ISCII. It recognizes Multi Font and Multi Size Gurmukhi Characters. Post processor is applied which uses contextual and Punjabi grammar rules to validate characters during recognition process. The system automatically detects and corrects page orientation. Automatically corrects skewed images by rotating documents to their up-right position.

➤ **Encoding Standards**
The system encodes the output in ISCII encoding format.

➤ **Portability/ Expandability**
The technology can be used with any platform including UNIX, LINUX, Windows 95/98/2000, ME, NT 4.x.

➤ **Type of Technology**
Human Machine Interface.

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide, to use and configure the system, are under preparation.
IPRs
Not yet applied
Testing
The results of the Alpha testing says that the performance of the OCR is up to acceptable level. In the tests the system has showed 97% accuracy.

➤ **Potential beneficiaries**
Newspaper Houses, Libraries, Offices looking for Office Automation, Linguistic Community, Blind People, Corpus Developers,etc.

➤ **User Tie-ups**
None

3.8 Optical Character Recognition System for Telugu

➤ **Technology Developer**
University of Hyderabad
Dept. of Computer & Information Sciences
P.O. Central University, Hyderabad-500 046 (AP)
Tel. 040-3010500 Extn. 4056 (D), 3010064(O), 3010374(R)
Fax: 040-3010120, 3010145
Prof. K. Narayan Murthy (CI)
knmcs@uohyd.ernet.in

➤ **Level: Product/ Subsystem**
Software Product

➤ **Description**
This is a software for Optical Character Recognition of Printed Telugu Texts. An OCR system converts scanned images into editable text. This OCR system is a multi-font system that works across a range of font sizes. The current recognition rate is 96% to 97%.

➤ **Encoding Standards**
It supports both ISCII and Unicode.

➤ **Portability/ Expandability**
The code is developed in C under Linux and is highly portable. The technology used is sophisticated template matching on connected components and so can be easily extended to other languages/ scripts. It can be integrated with Text Editor, Content Creation Tools, Web Site development, Publishing Industry,etc.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide, to use and configure the system, are under preparation
IPRs
Not yet applied
Testing
Alpha Testing: Tested on about 25 printed Telugu pages. Recognition rate is between 92% to 97%. Best results for inputs scanned at 300 to 400 DPI and 16 point fonts. Test results have been analyzed and plans chalked out for overcoming the current limitations.

➤ **Potential beneficiaries**
Content Creators, Publishers, Telugu-Hindi Anusaaraka.

➤ **User Tie-ups**
Shri Veda Bharti, Hyderabad
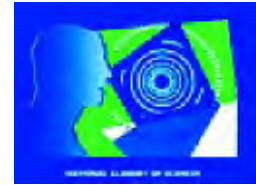
Human Machine Interface System

3.9 Optical Character Recognition System for Tamil

➤ **Technology Developer**
Indian Institute of Science
Department of Electrical Engineering
Bangalore-560012
Tel. : 080-3092222, 3466022
Fax : 080-3600683
Prof. A.G. Ramakrishna, Prof. N.J. Rao
njrao@mgmt.iisc.ernet.in

➤ **Level: Product/ Subsystem**
Software Product

➤ **Description**
Runs on Windows 95/98. Developed on VC++ platform. Gives 98% recognition on printed text, multifont, multisize, relatively good documents. Integrates all the modules from scanning to outputting in an editable format.

➤ **Encoding Standards**
TAB encoding. ISCII also can be given.

➤ **Portability/Expandability**
Can be ported to other Windows OS easily. Expandable to include bilingual text.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Preliminary documentation is ready
IPRs
Not yet applied.
Testing
Has been tested on many documents. But, exhaustive testing to be done.

➤ **Potential beneficiaries**
Government offices, printing presses, publication houses, digital libraries. If it is adapted, then post offices and other users of mass form-processing can benefit.

➤ **User Tie-ups**
None

3.10 High Quality PC based Parametric Synthesizer

➤ **Technology Developer**
Central Electronics Engineering Research Institute
CSIR Complex
NPL Campus, Hillside Road,
New Delhi-110 001
Tel. 011-5781467/5783172 Fax : 5788347
Dr. S. S. Aggarwal,Scientist G and Head
sagrawal@ceerid.ernet.in

➤ **Level: Product/ Subsystem**
Software Subsystem

➤ **Description**
The synthesizer simulate the Vocal Tract Mechanism by combining the source model and the Vocal Tract Model of the speaking mechanism and produce the waveform synthesis.

➤ **Encoding Standards**
The data is stored in ISCII code.

➤ **Portability/ Expandability**
The system can be used with any Pentium machine with Windows Operating System with multimedia facility.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide to use and configure the system are ready.
IPRs
Not yet applied.
Testing
It is very useful software for Speech Synthesis and generates synthesized sounds of any language. The performance of the system is up to the satisfaction level.

➤ **Potential beneficiaries**
It is an important software for speech researchers and speech labs engaged in developing Text to Speech conversion system and Speech Recognition System. It is a useful tool for blinds to access IT tools.

➤ **User Tie-ups**
None
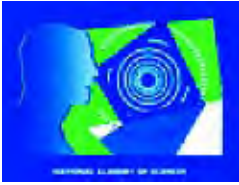
Human Machine Interface System

3.11 HindiVani - Text to Speech Synthesis System for Hindi

➤ **Technology Developer**
Central Electronics Engineering Research Institute
CSIR Complex,
NPL Campus, Hillside Road,
New Delhi-110 001
Tel. 011-5781467/5783172 Fax : 5788347
Dr. S. S. Aggarwal, Scientist G and Head
sagrawal@ceerid.ernet.in

➤ **Level: Product/ Subsystem**
Software Product

➤ **Description**
The HindiVani is the Windows based software for converting Hindi Text files into Speech. The text document is generated using Hindi editor, which supports ISCII standard. The input words are split into syllables, using a parser. An acoustic-phonetic database of all these syllables is available in the database, which is subsequently used to create words. The concatenation of syllables into words and the superimposition of quality features is done by developing rules. A cascade-parallel formant synthesizer developed at CEERI is used to synthesize the speech.

➤ **Encoding Standards**
The storage code is ISCII.

➤ **Portability/ Expandability**
The system can be used with any Pentium machine with Windows Operating System and multimedia facility. This system can be expanded to other spoken languages of India. It can be integrated with OCR system.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide to use and configure the system are ready.
IPRs
Not yet applied.
Testing
Beta testing is going on.

➤ **Potential beneficiaries**
It is very useful product for Hindi speaking visually handicapped people, Information retrieval in spoken form, Text Reading Machines.

➤ **User Tie-ups**
None

3.12 Text to Speech Synthesis System for Hindi

➤ **Technology Developer**
Centre for Development of Advanced Computing, GIST Group
Pune University Campus, Ganesh Khind Road
Pune-411007
Tel. : 91-20-5694000
Fax : 91-20-5651111
Shri M.D. Kulkarni
mdk@cdac.ernet.in

➤ **Level: Product/ Subsystem**
Software Subsystem

➤ **Description**
· Capability of generating speech in Hindi, Marathi and English languages.
· ISCII standard input.
· Phoneme based speech engine.
· Syllable splitting for proper pronunciation.
· Capability of speaking Hindi, Marathi and English numbers.
· Provides Application Programming Interface for user applications.
· Allows selection of Hindi or Marathi language.
· Option to speak numbers as individual digits.
· Change of tempo, pitch, amplitude of the speech.
· Isolated Matras, Vowel modifiers are spoken individually.
· Moderate size of speech database.

➤ **Encoding standards**
Not Applicable

➤ **Portability/ Expandability**
Text2Speech being a DLL can be very easily ported.

➤ **Type of Technology**
Software Component

➤ **Readiness for ToT**
Documentation
A comprehensive document is available.
IPRs
CDAC Pune
Testing
In progress

➤ **Potential beneficiaries**
Railways, Telecommunication service providers, visually impaired etc.

➤ **User Tie-ups**
CEERE Delhi
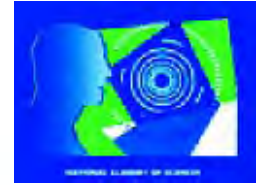
Human Machine Interface System

3.13 Text-to-Speech System in Hindi

➤ **Technology Developer**
Tata Institute of Fundamental Research
School of Technology and Computer Science
Homi Bhabha Road,
Mumbai 400 005
Tel. : 022-2152971 Fax : 022-2152181
Shri A. Sen
asen@mailhost.tifr.res.in

➤ **Level: Product/ Subsystem**
Software Subsystem

➤ **Description**
The system accepts Hindi text in terms of coded Devnagari. It generates corresponding Hindi speech. All phonemes of standard Hindi are supported. A few selected voice types are available. Speaking rate can be adjusted. By changing basically the front-end text processor, it can be adapted to different Indian languages.The system supports unlimited vocabulary text and generates continuous synthetic speech with reasonable intelligibility. It employs (DECtalk type) formant synthesis technique. A limitation is that the synthetic speech is not too natural sounding. The TTS system is suitable for delivering small messages.

➤ **Portability/ Expandability**
It is currently in C language and can be ported to virtually any platform. It can be expanded to Java or any other suitable language.

➤ **Type of Technology**
HUMIS

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide to use and configure the system are under preparation.
IPRs
Not yet applied.
Testing
Alpha beta testing not done yet. But it underwent evaluation by MIT.

➤ **Potential beneficiaries**
Railways, Telephone companies, speech technology companies, village community centres.

➤ **User Tie-ups**
Interaction with Tata Infotech Ltd. was done.

3.14 Labelled and Continuous Speech Data Base for Hindi

➤ **Technology Developer**
Tata Institute of Fundamental Research
School of Technology and Computer Science
Homi Bhabha Road,
Mumbai 400 005
Tel. : 022-2152971 Fax : 022-2152181
Shri A. Sen
asen@mailhost.tifr.res.in

➤ **Level: Product/ Subsystem**
Software Subsystem

➤ **Description**
This data base will be useful for speech recognition training in particular and for any kind of speech research in Hindi, in general. 500 Hindi sentences were recorded at the voice of 50 speakers. It consists of 100 phonetically balanced sentences and two "dialect" sentences: to be spoken by all speakers. The data base is available in CD in both Window and Linux format.

➤ **Portability/ Expandability**
It is available in Window and Linux format and can be expanded to other formats, on demand.

➤ **Type of Technology**
HUMIS

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide to use and configure the system are under preparation.
IPRs
Not yet applied.
Testing
Alpha beta testing not done yet. But it underwent evaluation by MIT.

➤ **Potential beneficiaries**
Speech laboratories, academic and research institutes, speech technology industries.

➤ **User Tie-ups**
Interaction with Tata Infotech Ltd. was done.
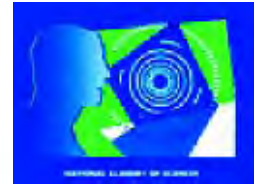
Human Machine Interface System

3.15 Word Recognition System for Hindi

➤ **Technology Developer**
Tata Institute of Fundamental Research
School of Technology and Computer Science
Homi Bhabha Road,
Mumbai 400 005
Tel. : 022-2152971 Fax : 022-2152181
Shri A. Sen
asen@mailhost.tifr.res.in

➤ **Level: Product/ Subsystem**
Software Subsystem

➤ **Description**
This system supports a vocabulary of 200 Hindi words, selected in the context of a travel guide application. The vocabulary also contain several common words, so that it can be adapted to some other similar task domain. The system is speaker independent. It is pre-trained with about 100 Indian speakers and can accept Indian accent easily. The accuracy at 4-5 word choice (organized as a query tree with multiple levels) is near 100%. Speech can be input through an ordinary microphone. It employs Hidden Markov Modelling (HMM) technique.

➤ **Portability/ Expandability**
It is currently in C language and can be ported to virtually any platform. It can be expanded to Java or any other suitable language.

➤ **Type of Technology**
HUMIS

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide to use and configure the system are under preparation.
IPRs
Not yet applied.
Testing
Alpha beta testing not done yet. But it underwent evaluation by MIT.

➤ **Potential beneficiaries**
Railways, Telephone companies, speech technology companies, village community centres.

➤ **User Tie-ups**
Interaction with Tata Infotech Ltd. was done.

3.16 Text to Speech Synthesis System for Bangla

➤ **Technology Developer**
Indian Statistical Institute
Computer Vision and Pattern Recognition Unit
203,Barrackpore Trunk Road, Kolkata –700035
Tel. 033-5778085, 5777694 Fax: 776680,5773035
Prof. B.B. Chaudhary, Head
bbc@isical.ac.in

➤ **Level: Product/ Sub System**
Software Product

➤ **Description**
This system converts Bengali Text into Speech. One can type Bangla text and convert it into speech online. For typing text, system provides a Bangla text editor. On the other hand a pre typed text can also be converted into speech form.

➤ **Encoding Standards**
The storage code is ISCII.

➤ **Portability/ Expandability**
The system is developed using Microsoft Visual C++ and hence it is portable among any of the Windows 95/98/2000 or Windows NT environment. A brail coding system could be integrated to the current TTS.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide, to use and configure the system, are under preparation.
IPRs
Not yet applied
Testing
Results of alpha testing are satisfactory.

➤ **Potential Beneficiaries**
Any public (Railway, Airport etc.) or Private Announcement Department, Broadcasting Department, Blind Schools,etc.

➤ **User Tie-Ups No**
None

विश्वभारत @tdil

Human Machine Interface System

3.17 Speech Recognition System for Oriya

➤ **Technology Developer**
Utkal University, Bhubaneshwar
Department of Computer Science & Applications
Vani Vihar,Utkal University
Bhubaneshwar – 751 004
Tel. 0674-580216(O),540865(R)
Fax: 0674-581850
Prof. (Mrs) Sanghmitra Mohanty
sangham1@sancharnet.in

➤ **Level: Product/ Subsystem Product**
Software Product

➤ **Description**
It is Oriya Speech Recognition System, it converts Oriya Text into Speech. In it Pulse Code Modulation technique is applied to speech signals then least mean square technique is applied to the signals to find the desired parameter and thus the speech data base is prepared. For normalization average of a set of samples is taken to standardize the data base. For data base creation pure phonetic nature of Oriya language is taken into account and thus words and sentences are uttered.

➤ **Encoding Standards**
The storage code is ISCII.

➤ **Portability/ Expandability**
Integration of OCR with Text to Speech System.

➤ **Type of Technology**
Human Machine Interface.

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide, to use and configure the system, are under preparation.
IPRs
Not yet applied
Testing
Self testing is under progress.

➤ **Potential beneficiaries**
Blind people, Illiterate people.

➤ **User Tie-ups**
Hexacell Pvt. Ltd.

3.18 Text to Speech Engine for Tamil

➤ **Technology Developer**
Anna University
School of Computer Science & Engineering
Chennai - 600 025
Tel. 044-2351723 Fax: 044-2350397
Dr. T.V.Geetha/Ms. Ranjani Parthasarthi
rp@annauniv.edu

➤ **Level: Product/ Subsystem**
Software Subsystem

➤ **Description**
Tamil is a morphologically rich language. This technology provides tools for Tamil Voice processing. It converts Tamil Text into Speech. Also it has been utilized in Tamil Browser, Mail Client, Chat and Note Pad with talking capabilities. The modules has been built such that an application developer can use the engine just by sending in text from the application into engine thus getting the speech output through sound card.

➤ **Encoding Standards**
TAM fonts are used as input for the engine. Sound of the corresponding phonemes are stored in the form of WAV files.

➤ **Portability/ Expandability**
The engine is being developed in PERL language and the same module was also built with VISUAL Basic. Engine built with VB can be plugged into any application developed for Windows. The engine developed in PERL can be ported to more then 10 Operating Systems. Modular approach was strictly followed to make the technology expandable.

➤ **Type of Technology**
Human Machine Interface.

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide, to use and configure the system, are under preparation.
IPRs
Not yet applied.
Testing
Testing is in Progress.

➤ **Potential beneficiaries**
Any user developer intending to provide Voice Interface.

➤ **User Tie-ups**
M/S Chennai Kavagil, Chennai

Human Machine Interface System

3.19 Telephony Speech Recognition Software

➤ **Technology Developer**
IBM India Research Lab
Block – I, IIT Campus,
Hauz Khas, New Delhi-16
Tel. 6861100,6861185 Fax : 6861555
Dr. P.V. Kamesan, Senior Manager
pkamesam@in.ibm.com

➤ **Level: Product/ Subsystem**
Software Subsystem

➤ **Description**
This is a prototype of telephone based transactions system using the telephony Hindi Speech recognition system. Telephony speech recognition can be used in automating/improving some of the telephone banking, directory assistance, enquiry systems. Speech can serve as a means of input instead of punching digits on a telephone keypad. The main research challenges in developing telephony Hindi speech recognition are to handle the spontaneity of the speaker, to handle the telephone noise conditions and to handle the various accents.

➤ **Encoding Standards**
Compliant with IBM ViaVoice telephony standards.

➤ **Portability/ Expandability**
Applications can be built over the system for different tasks such as Banking, Directory Automation, etc. The system can be expanded to handle a large number of calls simultaneously.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide, to use and configure the system, are under preparation.
IPRs
IEEE Conference Papers and 1 patent filed.
Testing
Testing is in progress.

➤ **Potential Beneficiaries**
Hindi speaking population.

➤ **User Tie-ups**
None

3.20 Hindi Speech Recognition System

➤ **Technology Developer**
IBM India Research Lab
Block – I, IIT Campus,
Hauz Khas, New Delhi-16
Tel. 6861100 Fax : 6861555
Dr. P.V. Kamesan, Senior Manager
pkamesam@in.ibm.com

➤ **Level: Product/ Subsystem**
Software Subsystem

➤ **Description**
This is a Hindi Speech recognition system for a large vocabulary speaker-independent dictation task. For any given language, the computer first needs to learn the sound of spellings in various context which is a training phase. After this system is ready for speech recognition. Complex signal processing and statistical techniques are used to make the recognition robust to speaker speech variations and to make it work on continous speech of a large vocabulary.

➤ **Encoding Standards**
Compliant with IBM ViaVoice Standards, will soon be using Unicode standard.

➤ **Portability/ Expandability**
The system can be customized to different tasks for further improving the accuracy. Expandability (in terms of increasing new words to the system) is available.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide, to use and configure the system, are under preparation.
IPRs
Two IEEE Conference Papers and 1 patent filed.
Testing
Done

➤ **Potential Beneficiaries**
Hindi speaking population.

➤ **User Tie-ups**
None

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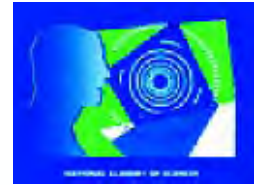
Human Machine Interface System

3.21 Hindi Dictation and PC Control

➤ **Technology Developer**
Megasoft India
921, Sector-14, Sonipat
Haryana-131001
Tel : 01264-47807 Fax : 01264-42583
Shri Anil Aggarwal
megasoftindia@rediffmail.com

➤ **Product/ Subsystem**
Software Subsystem

➤ **Description**
Hindi dictation and PC control is dynamic speech recognition application for two languages, Hindi (first time) and Indianized English by Megasoft India. It is capable of taking continues dictation and controlling PC functions in both languages by simple phrases and commands which can be extended to any limit like telephony-PC communication, voice query systems and lots more using VB, VC++ applications. Hindi dictation and PC control uses L&H Dragon NaturallySpeaking professional platform and is derived using SDK 4.0 under their clause of customization of vocabularies and developing speech aware applications. This is presently developed for Hindi language with last seven years of efforts and can be developed in parallel for any Indian language in less than two years of effort now. Also this needs pre-installation of Dragon NaturallySpeaking 4.0 professional platform or can be integrated with L&H Dragon Enhanced Runtime 4.0 (needs licensing).

As this technology is compatible with two languages and performance is of world class, so it has very wide business prospects and very bright future.

➤ **Features**
1. Proficient in Indian English and Hindi.

2. Purely Indian accent and adaptable to any accent.

3. Huge Indian vocabulary,e.g., places, names, objects, festivals,etc. More than three lakh terms in English and 30,000 in Hindi.

4. Only 5-10 minutes of training.

5. Phonetically independent for different speaking styles.

6. Self adaptive, accuracy increases exponentially with use.

7. Excellent accuracy than any other speech recognition software.

8. Speed of 160 wpm can be achieved theoretically. Very simple user interface, no technical knowledge required for use.

9. Now controlling windows tasks by Hindi/English mixed natural phrases under PC Control System.

➤ **Encoding Standards**
It supports Unicode.

➤ **Portability/ Expandability**
Many speech applications can be made with business potential using Hindi/English speech recognizer. Present research work regarding vocabulary and Hindi language (context and vocabulary) can be implemented on other recognizer platform very quickly with very effective results.

➤ **Type of Technology**
Human Machine Interface.

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide, to use and configure the system, are under preparation.
IPRs
No patents, original platform patents lies with Dragon Systems USA.
Testing
It was being advertised in national newspaper "Dainik Bhaskar" front page on 24 June, 2001 with photographs. It is demonstrated at MIT Delhi, AIR Delhi, Palam Airport Staff, Aaj Tak News Media Correspondent (testing), and many mores. This all gave very positive opinion, response and cooperation. Tested with different voices, training from various people and very positive results.Being Lab tested for last one year for various bugs or limitations.

➤ **Potential beneficiaries**
For present development: All the people interacting with computers using Hindi and English. Potentially, those who do the documentation, numeric and text data entry work. Command & Control helps in voice automated editing of MS- Office and software operations including internet browsing,etc. by voice.

➤ **User Tie-ups**
None

Human Machine Interface System

3.22 Speech Recognition

➤ **Technology Developer**
Tata Infotech Ltd.,
Technology Cognitive Systems Research Lab,
Sanpada,
Navi Mumbai - 400705.
Tel. 022-7903251/56, 022-7682379 Ext-127
Fax: 022-7619926
Akhilesh C Srivastava, Senior Manager
akhilesh.srivastava@tatainfotech.com

➤ **Level: Product/ Subsystem**
Software Subsystem

➤ **Description**
Isolated word recognition system specially tuned for Indian speakers

➤ **Encoding Standards**
As per the company's quality standards.

➤ **Portability/ Expandability**
Linux RH6.2, 7.0, Windows 95, 98,2000 and NT.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide, to use and configure the system, are to be reviewed.
IPRs
Complete IPR with Tata Infotech Ltd
Testing
Tested with 47 words. Easily scalable for larger number of words.

➤ **Potential Beneficiaries**
Useful for fixed vocabulary speech recognition applications such as speech enabled Interactive Voice Response (IVR) systems, Telebanking, tourism information kiosk, airline reservation, voice portals, voice commands' recognition for automobile control etc.

➤ **User Tie-ups**
Presently none but tie-ups possible with any of the potential beneficiaries listed above.

3.23 Speaker Verification

➤ **Technology Developer**
Tata Infotech Ltd.,
Technology Cognitive Systems Research Lab,
Sanpada,
Navi Mumbai - 400705.
Tel. 022-7903251/56, 022-7682379 Ext-127
Fax: 022-7619926
Akhilesh C Srivastava, Senior Manager
akhilesh.srivastava@tatainfotech.com

➤ **Level: Product/ Subsystem**
Software Subsystem

➤ **Description**
System to verify the claimed identiy of the speaker belonging to a valid group people.

➤ **Encoding Standards**
As per the company's quality standards.

➤ **Portability/ Expandability**
Linux RH6.2, 7.0, Windows 95, 98,2000 and NT.

➤ **Type of Technology**
Human Machine Interface

➤ **Readiness for ToT**
Documentation
Installation guidelines and User's guide, to use and configure the system, are under progress.
IPRs
Complete IPR with Tata Infotech Ltd
Testing
Prototype tested

➤ **Potential Beneficiaries**
Useful for voice authenticated access control (in telebanking, mobile phones, automobiles etc.), forensic applications (crime detection).

➤ **User Tie-ups**
Presently none but tie-ups possible with banks, Government agencies etc.