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Sixth Sense Technology

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***Abstract*—This paper deals with the latest technology called the sixth sense. It's a wearable interface that augments the physical world around us with the digital information. It's just born concept which allows user to connect with the internet seamlessly. Without use of keyboard, mouse we can see videos access, change, move data simply .But this concept bottle necks lead to modification of the same by using commands instead of gestures. Speech IC is used as a database for commands which will be initially trained for storage. It performs the corresponding commands accessing the operation from the mobile device connected to it and action is projected using a projector over any surface. It's more possibly to be implemented in future because of its cost constraints,**

Keywords— speech IC, projector, mobile device

I. INTRODUCTION

This technology is a revolutionary way to interface the physical world with digital information. Modern technologies include the touch screen techniques which is used widely and it makes ease of operation and saves utilisation time. Sixth sense is a wearable gestural interface that augments the physical world around us with digital information and lets us use natural hand gestures to interact with that information. But the bottle necks of this method such as position of camera, for capturing gestures interprets the accuracy in the projected output, lead to use of commands instead of hand gestures. The position of camera is a major constraint in the image capturing and projected output efficiency and accuracy. Therefore the actions which we regularly perform in our daily life, are converted to commands and are trained to a speech IC .They are stored as a database in the integrated circuit and corresponding actions are performed when the speech is recognised from the user.

It's a hi-tech device seamlessly integrate Analog information with our every day physical world. The voice is directly performed into operation within fractions of seconds, and the action is projected on the surface. It's a portable device and eases the operation which we regularly perform. Basically the sixth sense technology concept involves the use of hand gestures .the finger tip will contain coloured markers and hence gestures performed will be captured by the camera. Then it's given to the mobile device for the corresponding action to be performed. The action is projected on the surface through the projector. Software algorithms and computer vision technologies will be used to enable the action from the mobile device for the corresponding gesture captured in the camera. This gesture based technology is used for variety of applications like performing basic actions, locating points in the map, watching video in news paper, dialling number in hand etc.The slight modification of this method lead to the use of commands that is analog information into real world. The analog data is converted into digital and performed as action, as all times the hand gestures cannot be used.

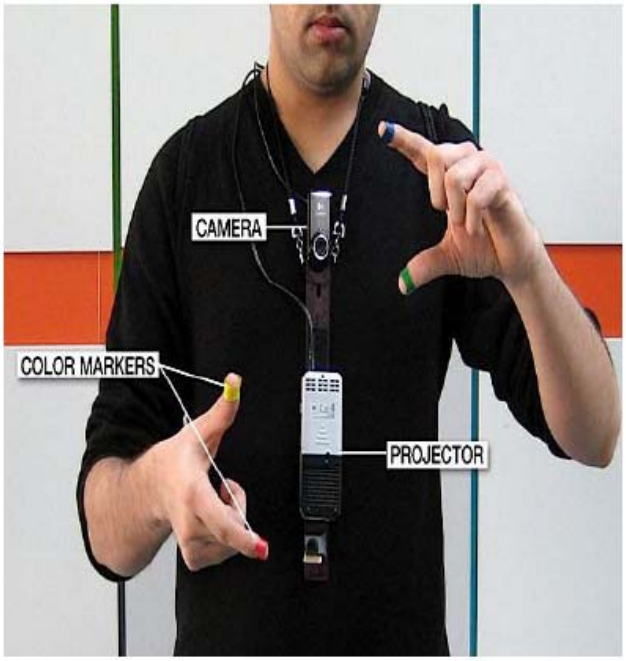

Fig1: Representation Of Gesture Based Design

This was how the wearable device is fit to the human body .Here colour markers are used in the finger tips .In our technology we use commands for performing the same operations. Many high technology speech integrated circuits evolved which makes our operation enhanced with more advanced features.

To ensure accurate gesture recognition and an intuitive interface a number of constraints are applied. A region in the front of the projection screen is defined as the active zone and the gestures are ignored, if the gestures are performed out of this area. Gestures are also defined by a set start posture, end posture and dynamic motion between the start and end postures. Perhaps the use of gestures is most powerful when

combined with other input modalities, especially voice. Allowing combined voice and gestural input has several tangible advantages. The first is purely practical-ease of expression .Ease corresponds to the efficiency with which commands can be remembered and expressiveness, size of command vocabulary.

II. Motivation And Background

Previously many technologies evolved such as augmented reality which is to add information and meaning to real object or place. Unlike virtual reality, augmented reality does not create a simulation of reality instead it takes a real object or space as the foundation and incorporates technologies that add contextual data to deepen a person understanding of the subject. It's a term for live direct or indirect view of a physical real world environment whose elements are augmented by virtual computer generated imagery.

Gesture recognition is a term with a goal of interpreting human gestures through mathematical gestures and mathematical algorithms.

Computer vision is the science and technology of machines that is concerned with the theory behind artificial systems that extract information from the images. As a technological discipline, computer vision seeks to apply its theories and models to the construction of computer vision systems. The examples include the controlling processes, detecting events, organising information, modelling objects or environments and interaction.

Recently speech integrated circuits evolved which is used widely in car automation and home appliances. It eases the operation and saves the utilisation time of the manual operations performed by the human's every day. The speech recognition process is performed by a software component known as speech recognition engine. The primary function of this is to process the spoken input and translate it into text which the application understands. The application then can do one of the two things, 1.The application can interpret the result of the recognition as a command, in this case application is a command and control application.2.If the application handles the recognised text as simply text, then it's considered as dictation application. When the user says something, it is known as utterance. An utterance is a stream of speech between two periods of silence. The speech IC can be used for all sorts of data, statistical models, and algorithms to convert spoken input into text.

III. Design And Working

The sixth sense device comprises of

1. Wearable projector
2. Mobile device
3. Speech IC
4. Mirror

The sixth sense device is a mini projector coupled with a speech IC and a cellphone, which acts as a computer and our connection to the cloud, all the information stored on the web. The components are controlled by or communicated with a mobile computing device carried in the user's pocket. The hardware components are coupled in a pendant like mobile wearable device .both the speech IC and the projector are connected to the mobile computing device in the user's pocket. The projector, projects the visual information enabling surfaces, walls and physical objects around the user to be used as interfaces. While the speech IC stores commands which were trained by the user and executes the corresponding action through the projector, enabling the actions from the mobile device.

A remote computer can also be connected which gathers data from user ,processes it, searches the web for relevant execution of the command and returns the result in real time to the user. The speech IC is trained with regularly used operating data and thus it acts as a database for storing all such commands.

There evolved many speech integrated circuits with fabulous technical aspects to be embedded for vast kind of applications. There are three ways for speech recognition and language understanding. 1. Multipurpose processors intended for embedded applications. 2. Customised integrated circuits for speech recognition and language undererstanding.3.implementing speech recognition and language understanding as part of larger integrated circuit in the device.

Some integrated circuits can be used for less than 15 words, which have a menu based type of interaction whereas other ASIC integrated circuits can be used for hundreds of words which posses natural language understanding. The IC will be trained with a sophisticated neural network to recognise the commands and activate it correspondingly.

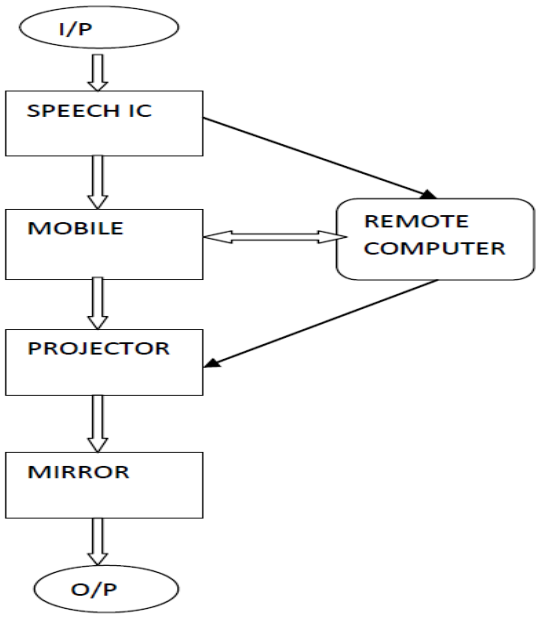

Fig 2: Basic Design of Our Concept

The speech IC is initially trained with the words or commands .The user gives the input as commands and when such analog speech is received to the IC ,the data is converted into digital and is sent to the mobile device .the mobile device activates the command and is given in turn to the projector. The projector output is seen on the screen through the mirror for accurate projection from the projector which is wearable in the body. For more advanced operations and for accessing net which is our future work, can be accessed from the remote computer simultaneously and projected as before.

IV. APPLICATIONS

The basic operations such as enabling clock, inbox, browsing, searching gallery, calendar, seeing contact list etc are performed regularly in the mobile every time. These operations can be stored as commands in the IC and then can be accessed on the screen or over any surface using our technology within fractions of seconds.

Fig 3. Example Of Commonly Used Applications

This figure depicts that when clock command is given it's activated in our wrist.

Fig 4. Wrist Watch Illusion

TABLE I
ANALYSIS of TWO METHODS

	DIRECT MANIPULATION	NATURAL LANGUAGE
STRENGTHS	1. Intuitive 2. Consistent look feel 3. Options apparent 4. Fail safe 5. Direct engagement with the object	1. Intuitive 2. Description 3. Context 4. Asynchronous
WEAKNESSES	1. Description 2. Anaphora 3. Operation on sets 4. Delayed actions difficult	1. Coverage's opaque 2. Overkill for short and frequent queries 3. Difficulty of establishing and navigating context 4. Error prone 5. Anaphora problematic

This tabulation clearly defines the boon and bane of both the gestural use and voice mode of technology in our sixth sense concept. Both techniques have their own strengths depending upon the kind of applications we use.

V. CONCLUSION

The sixth sense technology using gesture movement and speech integrated circuits are emerging innovative ideas. We have a seamless access to data or information that may exist to help us make decisions. This provides access to relevant information about the things in the environment and enables the new interactions between the real world and the world of data. Although the miniaturisation of computing devices allows us to carry computers in our pockets, there had been no link between the digital devices we carry and our interactions with the physical world, and our speech in a efficient level.

Sixth sense is developed to seamlessly integrate information into reality. The future may depend upon this sixth sense. May be within this 2020, the proliferation and the use of this technology is immense. Sufficient awareness of the sixth sense will lead to further development of any technology

which aids for getting information and performing any type of action practically at any time, using simply the gestures and commands given.

The advantage of this technology is portable, its connectedness between the world and the information as speech. Its cost effectiveness and data can accessed from the machine directly in real time. It can also be said as an open source technology. Within twenty years this technology will bring a drastic change in field of science and will create a revolutionary change among the mass.

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REFERENCES

[1] Alon,J.Athitsos,V.Quan,YuanSclaroff,S. Computer Science Dept., Boston Univ., Boston, MA, USA, *A Unified Framework for Gesture Recognition and Spatiotemporal Gesture Segmentation,* IEEE transactions on Pattern Analysis and Machine Intelligence, Volume: 31, Issue:9 pp 1685 - 1699 ., Sept. 2009

[2] Mu-Chun SuInst. of Computer Science & Inf. Eng., Nat. Central Univ., Chung-Li *A fuzzy rule-based approach to spatio-temporal hand gesture recognition,Systems, Man, and Cybernetics,* Part C: Applications and Reviews, IEEE Transactions on Volume: 30, Issue:2 pp276 – 281., May 2000

[3] Kirishima, T. Sato, K. Chihara, K.Dept. of Electr. Eng., Nara Nat. Coll. of Technol., Japan Robotics, *Gesture Spotting and Recognition for Human–Robot Interaction*, IEEE Transactions on Volume: 23, Issue:2 pp256 – 270., April 2007

[4] Real-time gesture recognition by learning and selective control of visual interest points*: Pattern Analysis and Machine Intelligence,* IEEE Transactions on, Volume: 27 , Issue:3, pp351 – 364., March 2005

[5] Ozer, I.B. Tiehan Lu Wolf, W. Princeton Univ., NJ, USA Design of a real-time gesture recognition system: high performance through algorithms and software *Signal Processing,* IEEE Volume: 22, Issue:3, pp 57 – 64., May 2005

[6] Evans, J.R. Tjoland, W.A. Allred, L.G.Ogden Air Logistics Center, Hill AFB, *UT Achieving a hands-free computer interface using voice recognition and speech synthesis [for Windows-based ATE] Aerospace and Electronic Systems,* IEEE Volume: 15, Issue:1, pp 14-16., Jan 2000

[7] Kaynak, M.N. Qi Zhi Cheok, A.D. Sengupta, K. Zhang Jian Ko Chi Chung Dept. of Electr. Eng., Arizona State Univ., Tempe, AZ, USA *Analysis of lip geometric features for audio-visual speech recognition Systems, Man and Cybernetics, Part A: Systems and Humans,* IEEE Transactions on Volume: 34, Issue: 4, pp-564 – 570., July 2004

[8] Gomez, A.M. Peinado, A.M. Sanchez, V. Rubio, A.J.dept. eoria de la Senal, Granada Univ *Recognition of coded speech transmitted over wireless channels Wireless Communications, IEEE Transactions on* Volume: 5, Issue: 9, pp-2555 – 2562., September 2006

[9] Pelaez-Moreno, C. Gallardo-Antolin, A. Diaz-de-Maria, F. Dept. de Tecnologias de las Comunicaciones, Univ. Carlos III de Madrid, *Recognizing voice over IP: a robust front-end for speech recognition on the world wide webMultimedia, IEEE Transactions on* Volume: 3, Issue:2, pp-209 – 218., Jun 2001

[10] http://boingboing.net/2009/11/12/sixthsense-technology.html

[11] http://theviewspaper.net/sixth-sense-technology-will-revolutionise-the world/

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