# A Review on "Blue Eye Technology"

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***Abstract—*** *The world of science cannot measure in terms of process and development. Now a days, technology reached enough that we are sitting in front of our personal computer that can sense and control human emotion known as "BLUE EYE TECHNOLOGY". In this technology the gadgets are used which can sense the emotion level of human body like facial and speech recognition etc. The technology which are used in Blue Eye Technology can understand our emotion at the of mouse, it verifies our identity, feel our presents and start interacting with us.*

*In this paper a discussion of new techniques known as Emotion Sensory world of Blue Eye Technology which identify human emotion (sad, happy, surprised) using image processing technique.*

***Keywords— blue eyes, emotions, images ,image processing, sense***

## I. INTRODUCTION

Blue Eye Technology aims at creating computational machine that have perceptual and sensory ability .

It use camera and microphone to identify user action and emotions. Blue in terms of Bluetooth which enable wireless reliable wireless communication eyes because the eye movement enable us to obtain a lot of interesting and important information.

People spend approximately 1/3 of their total computer time touching input device. Physiological data is obtained and emotional state is determined. A user model will be built that reflect the personality of user. Measurement of heart beat, temperature, galvanic skin response(GSR), general somatic activity . Heart rate was measured with chest strap sensor , temperature with thermocouple attached to a digital multimeter (DMM). GSR also with DMM , somatic movement basic emotion are anger, tear, sadness, disgust, joy and surprise.

Firstly a multidimensional procedure was used to determine dimensionality of data with computer mouse movement. Then fit the Physiological similarities and dissimilarities into four dimensional table. Secondly, discriminant function that would distinguish the six states.

Blue Eyes system basically have two system i.e. mobile measuring device and a central analytical system. Bluetooth module integrated with mobile device is used to provide wireless interface between sensors worn by the operator and the central unit. Each of the operators is being assigned unique ID card and required user profiles on the central unit side provide necessary data customization. Blue Eye System basically consist of three device which are as follows:

1. Mobile measuring device (DAU)
2. Central System Unit (CSU)
3. The Hardware

### *A. Data Acquisition Unit .*

Data Acquisition Unit is a Mobile part of the Blue eyes system is known as Data Acquisition System. This system is used to fetch the physiological data from the sensor and send it to the central system which is to be processed.

Wireless Bluetooth connections (connection establishment, authentication and termination) must be maintained to fulfill this task. Personal ID cards and PIN codes used to provide operator's authorization. A simple 5-key keyboard, a small LCD display and a beeper is used to carry out communication with the operator.

The device uses exceptional situation to notify the operator. A small headset, interfaced to the DAU with standard mini-jack plugs is used to tansfer voice data . The Data Acquisition Unit have several hardware modules Atmel 89C52 microcontroller - system core Bluetooth module (based on ROK101008) HD44780 - small LCD display 24C16 - I2C EEPROM (on a removable ID card) Beeper and LED indicators, 6 AA batteries and voltage level monitor.

### *B. Central System Unit*

The second associate of the wireless connection is Central System hardware. A Bluetooth module (based on ROK101008) and a PCM codec is contained in this Box which is used for voice data transmission. A parallel, serial and USB cable are used to provide interfacing between this module and PC. The standard mini-jack sockets provide the accessibility of audio data . A simple programming device is being developed to program operator's unique ID. Serial and PS/2 (power source) ports are being used to interface program to a PC. Inside, there is Atmel 89C2051 microcontroller, which handles UART transmission and I2C EEPROM (ID card) programming is being handled Atmel 89C2051 microcontroller which is present inside the Central System Unit.

## II. THE SOFTWARE

Looking after working operators' physiological condition is the main task of Blue Eye System Software. Real time buffering of the incoming data , real-time physiological data analysis and alarm triggering are being performed by the software to show instance reaction on Operator's condition . Several functional modules System core is consisted in The Blue Eyes software which facilitates the flow of transfer between other system modules (e.g. transfers raw data from the Connection Manager to data analysers, processed data from the data analysers to GUI controls, other data analysers, data Visualization module provides a user interface for the supervisors. A preview of selected video source and related sound stream the working operator's physiological condition's watching is enabled by this software. Every time the supervisor is instantly signalled on the incoming of alarm messages . The Visualization module can be set in an off-line mode, where all the data is fetched from the database. The supervisor reconstruct the course of the selected

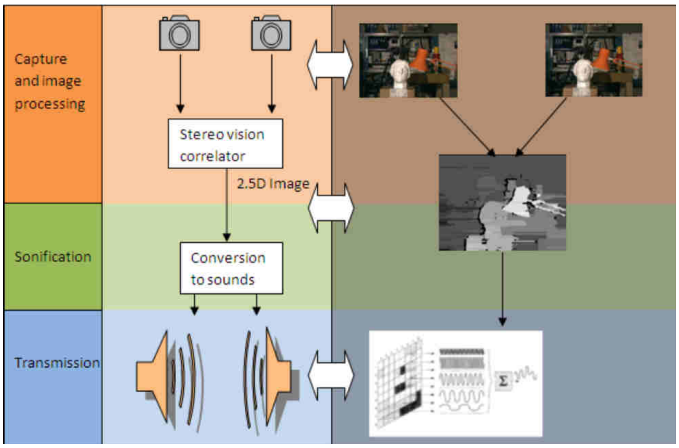


*Fig. 2.1 Software Analysis Diagram*

operator's duty by watching all the recorded physiological parameters, alarms, video and audio data. A set of custom-built GUI controls is used to present physiological data.

## III. EMOTION COMPUTING

The importance of emotions to the computing community is being described by the Rosalind Picard (1997) . The ability to detect emotions and the ability to express emotions are two aspects of affective computing. Emotions and emotion detection is an important step to an adaptive computer system.

An adaptive, smart computer system is used to detect a person's emotional state . A study (Dryer & Horowitz, 1997) has shown that people with personalities that are similar or complement each other collaborate well.

It has been shown that people view their computer as having a personality by Dryer (1999). it is important to develop computers which can work well with its user.

*A.Theory*

A correlation between a person's emotional state and a person's physiological measurements is being shown on the basis of facial expression work of Paul Ekman. Selected works from Ekman and others on measuring facial behaviour describe Ekman's Facial Action Coding System (Ekman and Rosenberg, 1997). Participants attached to devices to record certain measurements including pulse, galvanic skin response (GSR),temperature, somatic movement and blood pressure is one of the Ekman's experiments . The participants were instructed to mimic facial expressions which corresponded to the six basic emotions. Six basic emotions as anger, fear, sadness, disgust, joy and surprise are described him. From this work, Dryer(1993) determined how to distinguish various emotional states using physiological measures . GSR, heart rate, skin temperature and general somatic activity (GSA) are some measures which are being used. There are basically two different kind of data analysis. A multidimensional scaling (MDS) procedure is the first analysis which is used to determine the dimensionality of the data.

*B.Result*

Scores for four physiological assessments [GSA, GSR, pulse, and skin temperature, for each of the six emotions (anger, disgust, fear, happiness, sadness, and surprise)] across the five minute baseline and test sessions are consisted by the data of each subject. At every second GSA data was sampled 80 times and approximately 3-4 times GSR and temperature were reported and 1time pulse was recorded as a beat was detected. The difference between the baseline and test scores were being calculated to account for individual variance in physiology. Scores were treated as missing if they differed by more than one and a half standard deviations from the mean. According to this criterion, twelve score were removed from the analysis. The results show the theory behind the Emotion mouse work is fundamentally sound. A correlation model is used to correlate the physiological measurements . A calibration process is used to derive correlation model. The calibration processis having a baseline attribute-to emotion correlation is interpreted based on statistical analysis of calibration signals generated by users having emotions that are measured or known at calibration time.

## IV. EMOTION SENSORS

*Types of Emotion Sensors for Hand:*

1.Emotion Mouse

2.Sentic Mouse

*Types of Emotion Sensors for Eyes:*

1. Expression Glasses

2. Magic Pointing

3. Eye Tracking

*Types of Emotion Sensors for Voice:*

1. Artificial Intelligence Speech Recognition

*A. Emotion Sensors for hand*

*1. Emotion Mouse*


*Fig. 4.1. Emotional Mouse*

Active, smart computer system is one goal of human computer interaction (HCI). Gesture recognition, facial recognition, eye tracking, speech recognition, etc could possibly include in this type of project. Touching is another non-invasive way to obtain information about a person. Computers are used to obtain, store and manipulate data by the people. The computer must start gaining information about the user in order to start creating smart computers. Gaining user information through touch via a computer input device, the mouse is one of the proposed method .

An emotional state may be determined from the physiological data obtained from the user . The emotional state is related to the task the user is currently doing on the computer. In order to gain a sense of the user's personality over a period of time, a user model will be built. The scope of the project is to create a better working environment where the user is more productive by having the computer adapt to the user.

*2. Sentic Mouse*

The Sentic Mouse is an experimental inspiration which come from the work of Peter J. Lang, Ward Winton, Lois Putnam, Robert Kraus and Dr. Manfred Clynes .This proviide the base for designing a tool for the measurement of the human being's emotional valence response. Any emotional assessment of stimuli, from positive (associated with pleasure, liking and attraction) to negative (associated with displeasure, dislike and avoidance or revolution) can be generalized as Emotional valence. Through this experiment quantitative values can be applied to emotions so that a predictive model for emotional theory can be obtained.

Peter J. Lang and others showed subjects a series of pictures and asked them to self-rate their emotional response. While the subject is being testing through this experiment heart rate and skin conductance are being measured by the Ward Winton, Lois Putnam, and Robert. conducted a series of sentic experiments was conducted by Dr. Manfred Clynes in which data are being gathered from every vertical and horizontal component of finger pressure.

*Fig. 4.3 Sentic Mouse*

finger pressure. The main aim of these experiments are to quantify human emotions and map them into predictive model of emotion theory.

. The Affective Computing research group gave approval to these three models to apply interaction between human being and computers. Using a computer, an experiment was conducted to provide the affective stimulus to the human subject which combined all three emotion studies using a computer.

In Dr. Clynes experiments to collect sentic data an ordinary computer mouse was connected with a pressure sensor. Simultaneously as the subjects viewed Lang's affective picture database, IAPS, we monitored the various other bio sensors were also monitored and connected including GSR and EKG as forgotten by the work done by Winton, Putnam, and Krauss.

The three: sentic data, heart rate, and self-assessment are the three measured results which were compared, against each other as well as against the theoretically predicted results to assess the subject's emotional valence for each slide. The results of the preliminary stages of analysis recommend the capturing of valence information by the sentic mouse.

*B.Eye*

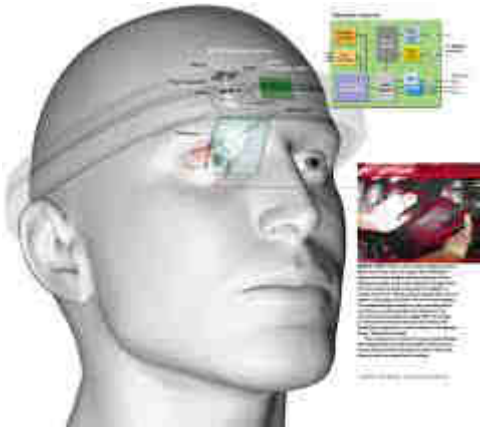

*Fig. 4.4 Expression Glass*

xpression Glass provide the alternative to the general-purpose machine vision face recognition systems and is application based wearable devices. These expression glasses feel all facial muscle movements, and identify meaningful expressions such as confusion or interest using use pattern recognition pattern recognition. A prototype for these types of glasses has been built and evaluated. The features of compactness, user control, and anonymity are being provided by the use of hidden piezoelectric sensors in a visor extension to a pair of glasses. These glasses give the accuracy of 94% in detecting an expression for untrained users. Give 75% accuracy in recognizing the expression of confusion or interest. With extent in use and with some feedback Significant improvement is being achieved. beyond these numbers appears to be possible with extended use, and.

## V. ARTIFICIAL INTELLIGENT SPEECH RECOGNITION

It is in demand to have a kind of environment in which the speech recognition system work. Some factors that may affect the quality of speech include the grammar used by the speaker and accepted by the system, noise level, noise type, position of the microphone, and speed and manner of the user's speech are some factors that recognition .When you call at any telephone number of a big company, you are likely to hear the grandiloquent voice of a cultured lady who responds to your call with generosity saying "Welcome to company X. Please give me the extension number you want". You declare the extension number, your name, and the name of person you want to contact. If the call is being accepted by the called person, the connection is given quickly. An automatic call-handling system is used without employing any telephone operator which is made possible by artificial intelligence.

*A.The Technology.*

Artificial intelligence (AI) basically have two ideas. First one is that, it include the studying of thought processes of human beings. And the second one is that it include the representation of those processes via machines (like computers, robots, etc). AI can be defined as the behavior of a machine which do the same work as done by human intelligence. AI brought smartness to the computers and make computer more useful and less expensive than natural intelligence. Natural language processing (NLP) is one of the artificial intelligence methods to provide communication with a computer in a human language like English. NLP program take the input, read it and initiate the action. Scanning and matching of input words are done against internally stored known words. Recognition of a key word initiate some action. In this way, a person can communicate with the computer in his own language, no special commands or computer languages are required and thus there is no need to write the programs in a special language for creating software.

## VI. SPEECH RECOGNITION

Some SR systems use "speaker-independent speech recognition" and some others use "training" where an individual speaker reads volumes of text into the SR system. The person's voice is analyzed by the SR system and then the SR system use this for fining the tune of person's speech recognition which results a more accurate transcription. "Speaker-independent" systems do not use training and the systems which use training are called "speaker-dependent" systems. Voice user interfaces such as voice dialing (e.g. "Call home"), call routing (e.g. "I would like to make a collect call"), demotic appliance control, search (e.g. find a podcast where particular words were spoken), simple data entry (e.g., entering a credit card number), preparation of structured documents (e.g. a radiology report), speech-to-text processing (e.g., word processors or emails), and aircraft (usually termed Direct Voice Input) are some of the application of voice speech recognition. The word *voice recognition* or *speaker identification* means to identify the speaker. Recognizing the speaker is helpful for the system that are trained and also prove helpful for the authentication and verification identity of speaker as a part of security process. Since over some 50 years ago several major technical innovations have been done in speech recognition . The most recent und of innovations since 2009, debatably the most important one which defines the current state of the art in speech recognition accuracy and has been in imposing use since 2013 throughout the speech industry worldwide, is based on deep learning concepts, architectures, methodologies, algorithms, and practical system implementations enabled by big training data and by GPU based big compute.

A microphone is used by the user to speak to the computer. A simple system may contain a minimum of three filters. The probability of accurate recognition increases with the

increment of number of filters. Presently, switched capacitor digital filters are used because these can be custom-built in integrated circuit form. These are smaller and cheaper than active filters using operational amplifiers. The filter output is then fed to the ADC to translate the analogue signal into digital word. The ADC samples the filter outputs many times a second. Each sample represents different amplitude of the signal .Evenly spaced vertical lines represent the amplitude of the audio filter output at the instant of sampling. Each value is then converted to a binary number proportional to the amplitude of the sample. A central processor unit (CPU) controls the input circuits that are fed by the ADCS. A large RAM (random access memory) stores all the digital values in a buffer area. This digital information, which is used to represent the spoken word, is accessed by the CPU to process word further. The frequency range of normal speech lies between 200 Hz to 7 kHz. A telephone call has bandwidth limitation of 300 Hz to3.3 kHz so the identification of any call is very difficult. Filters and ADCs process the spoken words. Each of these words represented by binary values which becomes a template or standard, against which the words could be compared. These templates are stored in the memory. After the completion of storing process, the system can go into its active mode and then identify the spoken words. Each word is converted into binary equivalent and is stored in RAM. The computer perform the searching operation and compares the binary input pattern with the templates. It generally happens that even if the same speaker talks the same , there always a slight variations comes in the amplitude or loudness of the signal, pitch, frequency difference, time gap, etc. So there could not be a perfect match between the template and binary input word. Statistical techniques are used in the pattern matching process which designed for the best fit. The result of the subtraction of binary input word's values from the corresponding values in the templates is stored and If both the values are same, the result is zero and there is perfect match. If not, the subtraction produces some difference or generate error. The match's quality increase with decrement in the error. When the best match occurs, the word is identified and displayed on the screen or used in some other manner. The search process takes a considerable amount of time, as the CPU has to make many comparisons before recognition occurs. This necessitates use of very high-speed processors. A spoken word may last only a few hundred milliseconds, but it translated into many thousands of digital words so a large RAM is required . The matching of alignment of words and templates should be correctly done on time before computing the similarity score. This process, known as dynamic time warping, recognizes that different speakers speak the same words at different speeds as well as elongate different parts of the same word.

## VII. APPLICATIONS

1. One of the main advantages of speech recognition system is that it allows the users to do multiple works simultaneously. So that user can concentrate on observation and manual operations, and still having control on machinery by voice input commands. Military operations have another major application of speech processing . controlling of weapons by voice is an example. Reliable speech recognition equipment provide pilots to give commands and information to the computers by simply speaking into their microphones—they don't need to use their hands for this purpose.
2. Another good example is a radiologist scanning hundreds of X-rays, ultra sonograms, CT scans and simultaneously dictating conclusions to a speech recognition system connected to word processors. The radiologist can focus his attention on the images rather than writing the text.
3. In airline and hotel reservations voice recognition could be used on computers. A user only required to state his needs, to make reservation, cancel a reservation, or doing enquiries about schedule.
4. Provide prevention from dangerous incidents
5. Brought decrement in ecological consequences financial loss a threat to a human life
6. Blue Eyes system provides technical means for monitoring and recording human-operator's physiological condition. The key features of the system are:
7. Visual attention monitoring (eye motility analysis)
8. Physiological condition monitoring (pulse rate, blood oxygenation)
9. Operator's position detection (standing, lying)
10. Wireless data acquisition using Bluetooth technology
11. Real-time user-defined alarm triggering
12. Physiological data, operator's voice and overall view of the control room recording

## VIII. THE SIMPLE USER INTEREST TRACKER (SUITOR)

If the perceptual and sensory abilities are gained by the computer then computer would become more powerful than living beings on the earth. An intimate relationship between the computer and the humans is need to be done. And the Simple User Interest Tracker (SUITOR) is a revolutionary approach in this direction. By observing the Webpage at net is browsing, the SUITOR provide the facility of fetching more information at his desktop. By observing where the user's eyes focus on the computer screen, the SUITOR can be more precise in determining his topic of interest.

Intimation of suitor with the user decides the success of suitor.”Can we exploit nonverbal cues to create more effective user interfaces? “ is the question which provide base for IBM's Blue Eyes research project according to Myron Flickner, a manager in Almaden's USER group. have created some A new techniques was created by Flickner and his colleagues for tracking a person's eyes and this gaze-tracking technology incorporated into two prototypes. One, called SUITOR (Simple User Interest Tracker), fills a scrolling ticker on a computer screen with information related to the user's current task. SUITOR have every information about your eye’s movement , the application you are running and the web pages you are browsing. "If I'm reading a Web page about IBM, for instance," says Paul Maglio, the Almaden cognitive scientist who invented SUITOR, "the system presents the latest stock price or business news stories that could affect IBM. If I read the headline off the ticker, it pops up the story in a browser window. If I start to read the story, it adds related stories to the ticker.

That's the whole idea of an attentive system—one that attends to what you are doing, typing, reading, so that it can attend to your information needs."

## IX. CONCLUSION

The BLUE EYES technology make the computer so much smart and intelligent that it behave like a human being. It make the life of human being more simpler by providing more luxurious and user friendly services in computing devices.. Till now we have demonstrated the method, the next step is hardware improvement. In lieu of using burdensome modules for gathering of information about the user, it will be better to use smaller and less encroached units. The day when this technology will create its space into your house hold, making you more lazy is very near and it may even reach your hand held mobile device. In short Blue eye technology can be called as a technological prediction.

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