International Journal of Technical Research and Applications e-ISSN: 2320-8163,
www.ijtra.com Special, Issue 43 (March 2017), PP. 52-55

Blue Eyes Technology

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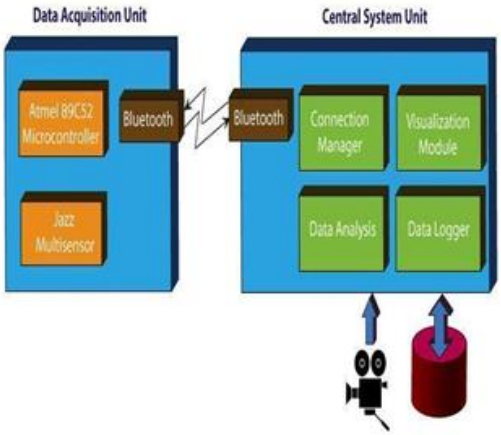
***Abstract*—What is Blue Eye? Blue means Bluetooth, which enables reliable wireless communication. And eye plays an important role in obtaining a lot of interesting and important information. Blue Eye uses sensing technology to identify human actions and to extract information. The eyes, fingers, speech are the elements which help to sense the emotion level of human body. The aim is to develop a computer which can act as a human without resembling one.**

***Index Terms*— CSU (Central System Unit), DAU (Data Acquisition Unit), Emotion Mouse, MAGIC (Manual and Gaze Input C), Simple User Interest Tracker (SUITOR).**

I. INTRODUCTION

Imagine yourself in a world where humans interact with hosts. Host means a computer or a system that would be able to understand humans. It is obliged to gather information about you and interact with you by the help of some sensoring devices like facial recognition gadget, speech recognition gadget, etc. It can even understand your emotions at the touch of the mouse. This system would be able to interpret and understand the things it notices. It verifies your identity, feels your presence, and starts interacting with you. Adding extraordinary perceptual abilities to computers would enable computers to work together with human beings.

Human insight depends primarily on the ability to perceive, interpret, and unite audio-visuals and sensing information. Research is been made to deploy this next-generation technology in our near future.

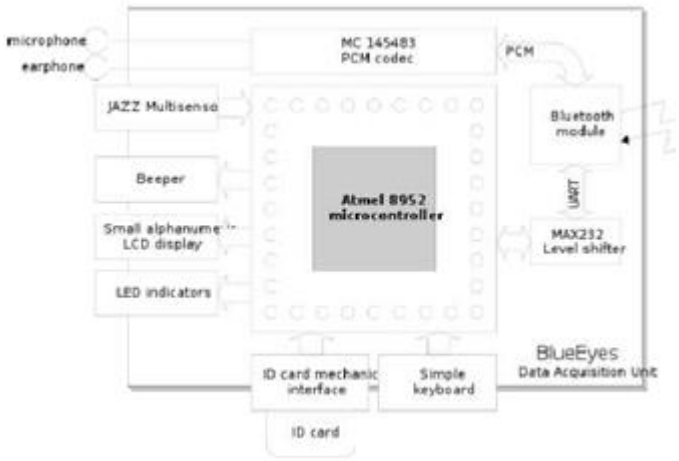


A. Data Acquisition Unit

In a nutshell, Data Acquisition is the process of measuring analog and digital signals that represent real world physical conditions then digitizing the measurements for manipulation by a control system.

The Data Acquisition unit comprises of several hardware modules.

A. Atmel 89C52 microcontroller - system core



The AT89C52 is a low-power, top-end and efficient 8-bit Complementary Metal-Oxide Semiconductor data processor with 8K bytes of Flash programmable and erasable read only memory (PEROM). Atmel's high-density not elusive memory technology is used to developed this technology. Industry-standard instruction set along with pin out 80C51 and 80C52 are also compatible. Program memory could be reprogrammed by using on-chip flash. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C52 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications. Amalgamation of an 8-bit CPU and a monolithic chip with Flash creates a high performance data processor which provides a feasible and less pricey solution to many root control application.

B. Bluetooth module (based on ROK101008)

ROK 101 008 is a module for applying Bluetooth techniques into various electronic devices. ROK 101 008 has three components; a flash memory, a baseband controller, and a radio that runs in the widely available 2.5 GHz free ISM band. Both data and voice transmission is carried by the module. Communication between ROK 101 008 and the host

controller is supported via UART and PCM interface. ROK 101 008 is a Class 2 Bluetooth Module (0 dBm) and is type-approved.

C. HD44780 - small LCD display

The HD44780U dot-matrix liquid crystal display controller and driver LSI shows alphanumeric, Japanese kana symbols, and sign characters. It can be manipulated to drive a dot-matrix liquid crystal display under the control of a 4- or 8-bit data processor. Since all the functions such as display character generator, RAM and LCD required for driving a dot-matrix liquid crystal display are inclusively provided on one chip, in this controller a minimal system can be interfaced. A single HD44780U can screen-up up to one 8-character line or two 8-character lines.

The DAU used in the Blue Eyes technology is the mobile component of the system. It plays an important role in understanding the normal function in living systems. The main function of DAU is to gather the physiological information from sensors and forward to the CSU for processing and verification purposes.

To accomplish the task the device must manage wireless Bluetooth connections (connection establishment, authentication and termination). Personal ID cards and PIN codes provide operator's authorization.

D. Central System Unit

CSU maintains other side of the Bluetooth connection, buffers incoming sensor data, performs online data analysis records conclusion for further exploration and provides visualization interface. Following are the components of Central System Unit.

1) Connection Manager

It is responsible for managing the wireless communication between the mobile Data Acquisition Units and the central system. The Connection Manager handles:

•communication with the CSU hardware
•searching for new devices in the covered range
•establishing Bluetooth connections
•connection authentication
•incoming data buffering
•sending alerts

2. Data Analysis Module

The analysis of the raw sensor data in order to obtain information about the physiological condition of operator through the Data Analysis module. There are separately running modules which supervises each of the working operators. The module consists of a number of smaller analyzers containing different types of information. Each of the analyzers registers provides the results of the analysis. An analyzer can be of two types. A simple signal filter (e.g. Finite Input Response (FIR) filter) or a generic data extractor (e.g. saccade detector, signal variance) or a custom detector module. As new data of the supervisor need is added all the time, new custom modules are created by the application of a supervised machine learning algorithm to a set of previously recorded examples containing the characteristic features to be recognized. In the prototype we used an improved C4.5 decision tree induction algorithm. The computed feature scan be e.g. the user ‘s position’s (walking, standing and lying) or whether his eyes (pupils) are opened or closed. As built-in analyzer modules we implemented a saccade detector, visual attention level, pulse rate analyzers and blood oxygenation.

3. Data Logger Module

The module provides support for storing the monitored data in order to enable the supervisor to reconstruct and analyze the course of the operator’s duty. The module registers as a consumer of the data to be stored in the database. Each working operator’s data is recorded by a separate instance of the Data Logger.

*4.*Visualization Module

The module provides user interface for the supervisors. It enables them to watch each of the working operator’s physiological condition along with a preview of selected video source and his related sound stream. All the incoming alarm messages are instantly signalled to the supervisor. Moreover, the visualization module can be set in the off-line mode, where all the data is fetched from the database. The physiological data is presented using a set of custom-built GUI controls:

•A pie-chart used to present a percentage of time the operator was actively acquiring the visual information

•A VU-meter showing the present value of a parameter time series displaying a history of selected parameters' value.

2. Basic Structure

The objective of Blue Eyes technology is to design a smart computational host having sensory and perceptual abilities like human beings. The host will use most modern cameras, microphones and advanced non-intrusive sensing techniques to interact with humans and understand the emotions of human beings. The host will have the ability to grasp the eye movement of the user, the needs of the user and also can monitor the status and the parameters of the body like heart beat and blood pressure.

3. Steps Involved

1. Process of giving sensing capacity
2. Human Emotion detection or Affect Detection

1. Process of giving sensing capacity:

Blue Eyes utilizes many sensor mechanisms, which is equivalent for the ears, eyes and other sensory organs that human beings used to express emotions and recognize each

other. Blue Eyes uses voice recognition software, cameras and biometric sensors to understand and respond to the emotional levels of humans.

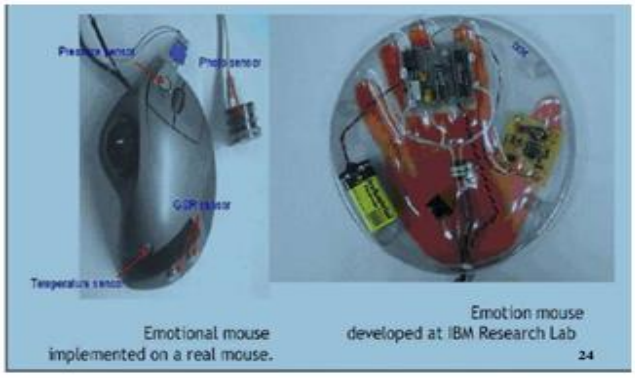
2. Human Emotion detection or Affect Detection

The machines have the ability to identify the minor changes in the moods of human beings. The Blue Eyes enables the machines to identify these minor emotional changes of human beings even by a single touch on the mouse or keyboard and the machines starts to react with the users according to these emotional levels.

Types of Emotion Sensors used in Blue Eyes Technology:

2.1] Emotion Mouse:

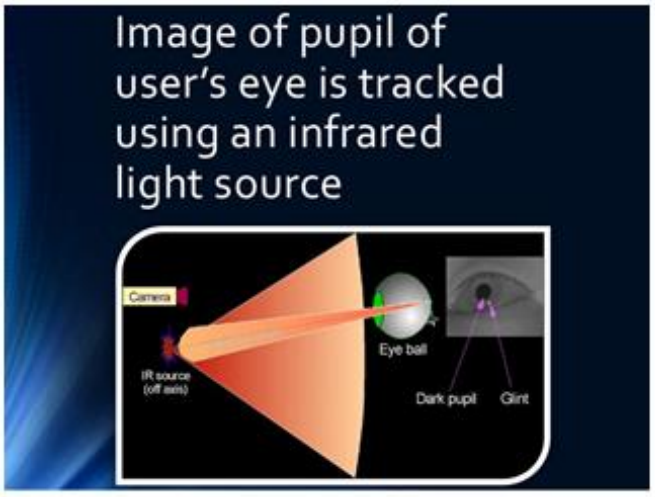
One of the methods for gaining user interaction and information through touch is via mouse. This allow user to relate the cardiac(heart) rhythm, body temperature, electrical conductivity of the skin and other physiological Attributes according to our mood. This is how the creation mouse works. The device can measure heart rate, temperature, skin response produced by chemical reaction and minute bodily movements and matches them with six emotional states: happiness, surprise, anger, fear, sadness and disgust. The mouse includes a set of sensors, including infrared detectors and temperature-sensitive chips. Emotion mouse can track Behaviour of human mind through the mouse movements, button click frequency and Finger pressure when a user presses his/her button. The Physiological information such as Heart rate, Skin temperature, Skin electricity can also be tracked by Emotion Mouse through Thermistor, Galvanic skin response and Electromyogram. Physiological information are obtained by various channel such as Pressure, Temperature, GSR and Hear pulse collected from Emotion Mouse.



2.2] Expression glasses:

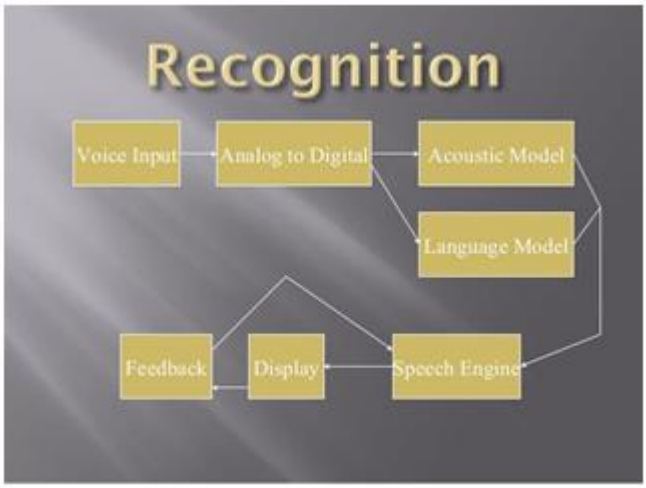
Expression Glass is an alternative for the vision face or eye recognition methods. By analyzing pattern recognition methods and facial muscle variations, the glass senses and identifies the expressions such as enthusiasm or bewilderment of the user. The prototype used for this glass uses piezoelectric sensors

2.3] The Simple User Interest Tracker (SUITOR):



SUITOR continuously analyses the user that where his/her eyes focuses on his/her personal computer screen. And with such ability it determines the topic of interest of user and according to that it can deliver the appropriate data. Attentive systems pay attention to what users do so that they can attend to what users need. SUITOR based systems pay attention to what users do so that they can give information regarding users need. Suitor systems track user behavior, model user interests, and collect user desires and actions. Because the general class of attentive systems is broad — ranging from human butlers to web sites that profile users — we have focused specifically on attentive information systems, which observe user actions with information resources, model user information states, and suggest information that might be helpful to users. In particular, we describe an implemented system, Simple User Interest Tracker (Suitor), that tracks computer users through multiple channels — gaze, web browsing, application focus — to determine their interests and to satisfy their information needs. By observing behaviour and modelling users, Suitor finds and displays potentially relevant information that is both timely and non-disruptive to the users' ongoing activities.

2.4] Artificial Intelligent voice recognition:



To implement Artificial Intelligent voice recognition, it is very necessary to consider the working environment. 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 may affect the quality of speech recognition. This system is for automatic call-handling without any telephone operator. It is important to consider the environment in which the speech recognition system has to work. 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 may affect the quality of speech recognition. The user Speaks to the computer through a microphone, which, in used; a simple system may contain a minimum of three filters. The more the number of filters used, the higher the probability of accurate recognition. 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. 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 by the ADCS. A large RAM (random access memory) stores all the digital values in a buffer area. This digital information, representing the spoken word, is now accessed by the CPU to process it further. The normal speech has a frequency range of 200 Hz to 7 kHz. Recognizing a telephone call is more difficult as it has bandwidth limitation of 300 Hz to3.3 kHz.

CONCLUSION

BLUE EYES technological approach aims to achieve a technique, that simplifies our life by supporting more easy to use and user friendly provision in computing devices. The day is very near, that this Blue Eyes technology will advance its way towards your household devices and makes you.

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