Gesture Recognition Using a Proximity (Touch less) Sensor and Haptic Technology

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Abstract: - **Touchless sensor technology is the newly evolved generation of touch screen technology, in fact these are the once which can be called as sensibly smart devices. Gesture recognition sensors come from the same family of touch screen but these are the successors of Human Machine Interface (HMI). In the growing IT field it is much more important that the devices or gadgets we work with are not only smart but also sensible. Gesture recognition is identifying the motion of an object through its touchless sensors and this movement of the body is processed using a micro controller and the corresponding response is given depending on the motion of the body. As far as the applications of Gesture recognition touch less sensors are concerned, they can be implemented in almost every field.**

Keywords- **Touchless Sensors, touch screen, gesture recognition, Human Machine Interface(HMI), microcontroller, Proximity sensors.**

I. INTRODUCTION

A. Haptic Technology

Haptic Technology is a branch in computer science and language technology which deals with interpreting human gestures through algorithms. Gestures can happen from any body movement or state of motion that commonly takes place through face and hand. Users can make use of the devices which implement haptic technology without knowing any complicated sign language. This technology is best suited to the ones who are physically disabled. Current focus is in the field of recognition of emotions through gesture recognition.

B. Proximity Sensors

Proximity sensing technology is becoming wide range of use in electronic gadgets. Proximity sensor is a sensor which senesce the presence of a device or some movement and collects the data accordingly. To detect an object you need not have physical contact with the sensors it is all touchless. A proximity sensor usually emits electromagnetic radiations, infrared or ultrasonic radiations continuously whenever there is a change in the surroundings there is noise generated since the radiations strike the object and gets reflected this reflection is detected and captured by the sensor hence the further process continues. The object that is detected of to which the particular radiations strikes are called the target object. The target object might be human or any lifeless thing. Some sensors are customizable you can configure

the amount of distance up to which a sensor can detect an object and also the intensity of radiations emitted can be set to a nominal range. Proximity sensors are extensively used in mobile phones in order the sense the ear once the call is received the display light of the mobile goes off and hence saves the mobile battery. Proximity sensors are also used in mobile phones when it is put to reading mode, it checks whether the person reading from the mobile has his/her eyes open if so the screen display light is kept on if not the screen display light is turned off but itself.

C. Gesture recognition

Gesture is the physical movement might be small or huge right from the clap of hand to a roundhouse kick, or a nod of head, sometimes voice is also considered as a gesture. Gesture recognition is the ability of a devise to capture the human body movements and compute the data or command given by the user and execute the output accordingly. Gesture is usually used are a form of input to a devise, this makes the interaction of human more natural with the computers. Gesture input is the most comfortable way to convey to computer what command we are willing to execute. Gesture recognition is widely implemented in 3D-gaming technology, virtual reality and simulation modeling environment. The major advantage of gesture recognition is that a user is not limited to a touch screen input which happens in case of GUI(graphical user interface) due to which the input may sometimes be limited to mouse, keyboard and touch

screen which are sometimes redundant. Gesture recognition implements HMI (human machine interface) which allows user to interact with computers without any mechanical devise. Provided the gesture must be simple and understood by the machine. Most of the electronic gadgets like Wii Fit, X-box and play Stations implement this technology.

II. WORKING

Gesture recognition system is a source for user to provide real time data to computers. Rather than typing through keyboard on tapping on screens, a proximity sensor senses the movement which is the primary source for data input.

What happens within the time after the gesture is recognized and the system responds?

•   A camera captures the image data into its memory and sends it through the serial communication link connected to the micro-controller.

•   Devise 1 and devise 2 can be a proximity sensor which continuously emits the infrared radiations, or may be infrared sensors and projectors for calculating distance of the object from the devise.

•   The specialized software recognizes the gesture made and it compares the gesture with its database or the gestures that are pre-determined in its built-in library.

•   Once the gesture is recognized it is seen that it is sensible and meaningful.

•   Once the interpretation of the gesture is completed the micro-controller executes the respective command that is associated for the particular gesture.
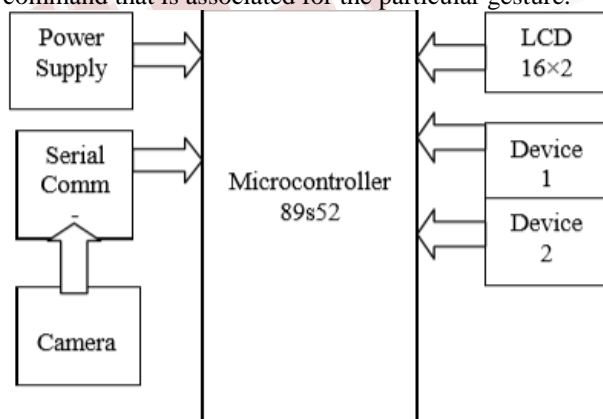

Fig.1.Block Diagram [2]

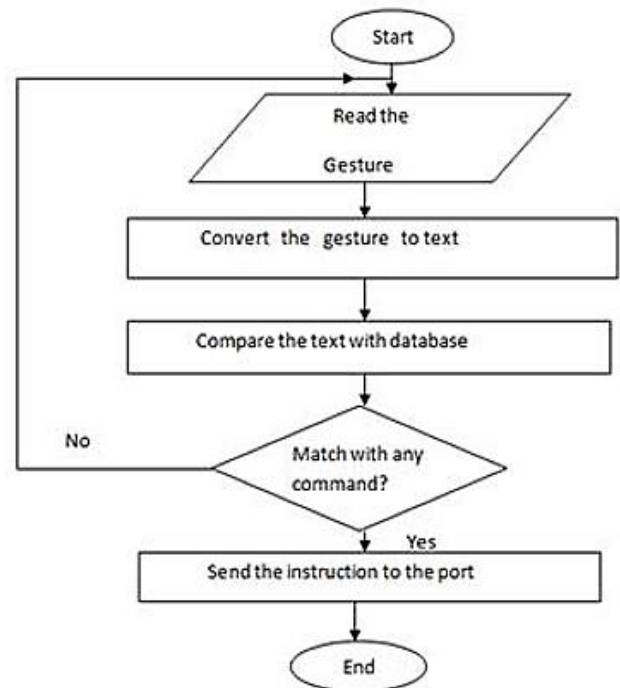The blocks of the system are as follows:
1. Micro-controller. 2. LCD 3. Camera.

Fig.2. General flow diagram of a System [2]

III. APPLICATIONS

•   Automative and healthcare applications will exhibit high growth potential through the forecast time frame. Factors such as increasing awareness for safety and hygiene will also accelerate a growth.

•   Key technology segments of the touchless sending market are camera based sensors and hand recognition.

•   To unlock smart phones and it is also used in gaming sector application.

IV. BEST PRACTICES

•   It provides a simple, usable and interesting user interface and satisfies the need for more freedom in a human computer interaction environment.

•   It is the most user friendly interface to interact with smart phones, laptops, vehicles and so on.

•   Free hand motion and touchless board.

•   No wired transmission,

•   No accelerometer sensors and no cameras.

•   It replaces large input devices.

•   It is also useful for physically handicapped persons,

•   It is also widely used in various kinds of application areas since it gives the user a new experience of feeling.

V. COMMON ISSUES

• Initial cost is very high.
• Proper ambience is required.
• Used in sophisticated environment.
• Vision-based recognition systems have been overcome in the touchless gesture recognition.
• Consumes high power.
• Gesture must not be too complex and should be universally acceptable.

VI. CONCLUSION AND FUTURE WORK

According to this proposed system it is possible to control a computer or a device without touching, typing, pointing, holding or even wearing any device. Failure to identify the gesture is very low. While sensing the electromagnetic radiations reflected from the target object there may be data loss or some noise interrupt may occur. We can also include a database system in this so that we can keep track of the number of users accessed the device and the gesture that is most commonly repeated can be updates in the system library.
Gesture recognition system may be widely implemented in the infotainment field due to its user friendly nature and the smarter way to process the data.

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