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Cloud Computation Using Gesture Control

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ABSTRACT: A conventional touch sensor is a Binary system i.e. it can only detect the presence or absence of touch. Touché, on the other hand, is a form of capacitive touch sensing, achieves the above mentioned function and also obtains more complex information such as the hand gesture or body posture of the user by employing the Swept Frequency Capacitive Sensing technique. In this paper we achieve the same by using an Arduino Uno board. This is a cost effective alternative when compared to high frequency wave generators controlled by higher frequency Processor and other sensors used as touch sensing. Here in this novel system we introduced system which can the recognize gesture and perform necessary computation i.e. sending emergency message to the user's contacts saved on user's cloud. Cloud technology offers new services addressing the high growing demands of IoT. We focus on developing Future Internet (FI) applications for gesture recognition systems utilizing cloud technology. We propose architecture for FI applications and we present an application that enables access of cloud services.

KEYWORDS:IoT, Arduino Uno, Cloud, Swept frequency, Touché.

I. INTRODUCTION

The existence of Gesture based communication has been from a long time. Presently there exists an advanced and natural form of interaction, named gesture-based interaction. Gesture Computer Interaction has been applied in some fields successfully. Gesture-based interaction has advantages over traditional interaction which traditional interactions form cannot offer, this can be said from user's point of view. The research of HCI has elevated much interest and attention. Many new applications have appeared and its importance can be felt in our life . A gesture is a motion of the body and it contains lots of information .Bowing down, thumbs up are some examples. The main importance of gesture is that it is a natural way of communication and the ease it brings. People usually use a broad range of gestures naturally while they speak. Conventional interaction, like keyboard ,button, mouse etc are almost totally free of gestures, we need to learn how to use them ,they depend on direct manipulation. Gesture-based interaction provides a new, easy and natural form to interact with devices and shows great breakthrough in field of human computer interaction. Here in this technology, devices can get input visually or by touch and recognize people's gesture without touching keys or screens. Gesture-based interaction is an advancement in the field of HCI and more natural form of human computer interaction.

IoT is an evolution of mobile, home and embedded applications which are connected to internet which integrates greater capabilities using data analytic, which tract meaningful information. In this, connected devices become an intelligent system of systems. These system of systems share data on cloud and analyze it, they can change our businesses, our lives, and our world in countless ways. Whether its medical outcome or we can deliver better quality products in low development cost, van make shopping more enjoyable, and more optimizing energy generation. We implemented Touché which is a touch sensitive approach, based on swept frequency capacitive sensing. Through this technology we are proving gesture to our system. Conventional touch sensing operates on single frequency which shows that it is binary i.e. either ON or OFF, whereas touché sweeps over a range of frequency, which gives different ranges of frequency for different touch and provide a wide variety of touch gesture.

We focus on developing Future Internet (FI) applications for gesture recognition systems utilizing cloud technology, There are wide range of applications of this system, as IoT based applications are the current technology requirement.

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Our project is a form of HCI advancement i.e. HCII(Human Computer Intelligent Interaction) along with Internet of Things(IoT) therefore, there is a wide scope for numerous applications which can be implemented through this system.

II. RELATED WORK

Following are the few popular systems:

- A. Vision-based Gesture Recognition -The input of this gesture recognition takes hand gesture image as an input which that taken by a webcam or camera, firstly, gray scale image converted into equal binary form or frames. As some error is introduced in binary image and hence there is a need remove these errors. After finding the real binary image, features extraction is performed. Then this detected feature makes it possible to enhance the edges, which is mapping to the hand gesture to recognize different gestures.
- B. Motion Capture Sensor Recognition - Such recognition technique made it possible to implement an accelerometer based system to communicate an robotic arm wirelessly. This work focuses on gesture recognition by analyzing data obtained by motion sensors (e.g., the Microsoft Kinect1, the ASUS Xtion PRO2 and the Leap Motion3 sensor which can track only the hands with more accuracy). The output of these sensors is streams of data with vectors of features describing the human body with every change in position or posture.
- C. Accelerometer-based Gesture Recognition - This Gesture Recognition methodology has become extremely popular. A sensor is used which is integrated to a tri-axes accelerometer chip as a hand held input device. When gesture is performed, the sensor accumulates the data by accelerometer, and sends it is send to PC by a wireless protocol. Several research and study has been done under Artificial Neural Networks (ANNs) for this system's implementation.
- D. Conventional Capacitive Sensing- The basic principles of operation in most common capacitive sensing techniques are quite similar. When user touches the electrode, a weak capacitive link is formed between the electrode and conductive fluids inside the human hand, this alters the signal supplied by electrode. This happens because the user body introduces a new path for flow of charges, acting as a charge sink .By measuring the degree of this signal change, different touch can be detected. It is a very simple and cost effective method ,all it requires is a simple conductive element ,this implies almost all the objects can be make touch sensors.

Camera based system to detect gesture have one disadvantage that their efficiency reduces in low light, They may even not function when there is no light. Considering other gesture recognition systems, all other system is are way costlier than Arduino based touché system, also they do not offer greater efficiency.

Talking about the conventional touch sensor, it detects the presence or absence of touch. Touché, a form of capacitive touch sensing, achieves the above mentioned function and also obtains more complex information such as the hand gesture or body posture of the user by employing the Swept Frequency Capacitive Sensing technique. One important limitation is that capacitive sensing lacks expressiveness; it can only detect when a finger is touching the device and sometimes infer finger proximity.

III. EXPERIMENTAL RESULTS

Our system is IoT based system, to which we provide input in the form of touch gesture from object and share data over the cloud for further analysis. After the analysis the cloud notifies all the contacts of user which is saved in the cloud database. Our proposed system can transform our lives, our businesses and our world in countless ways like for improving medical outcomes, setting this system to car which can sense the accident and can notify contacts of victim.

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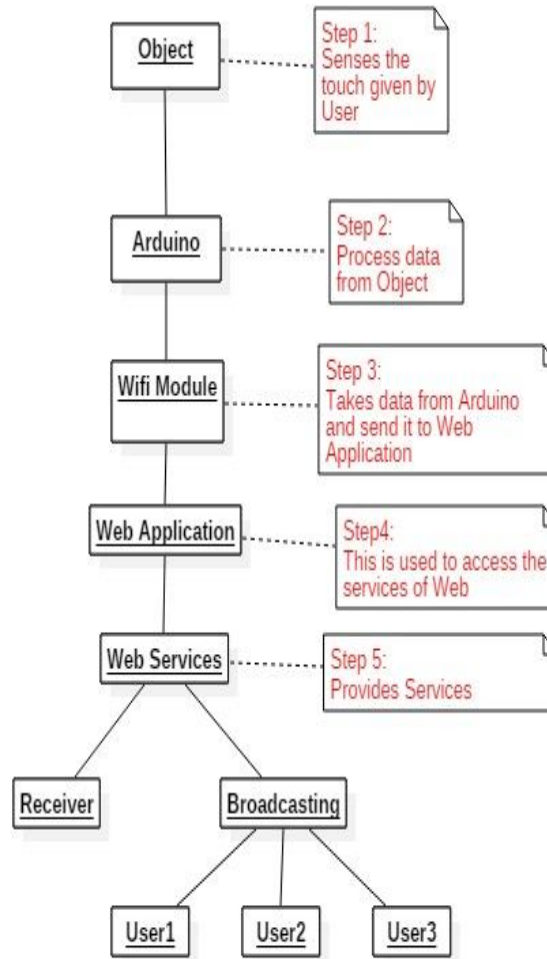


Fig.1. System Architecture

Working

1. Object senses the touch gesture given by the user to it and reads the swept frequency of touch by user and then it forwards that data to Arduino Uno.
2. Arduino then process the data which was provided by user. It recognizes the type of gesture that user had provided. It processes the data on the basis of baud rate which it has been assigned. It then sends it to WiFi module for further process.
3. In our system we used WiFi module ESP8266 which can create hotspot as well as can also access the internet through WiFi. We used this WiFi module to share data with cloud.
4. Cloud is a virtual environment which provide us storage unit. Cloud creates virtual storage unit, which you can access anytime from anywhere. So we created one web application which we are hosting on cloud. This web application decides what type of web services to be provided to the user.
5. Web services are a part of web application which provides different services like receiving or broadcasting.
6. When user send gesture then, web application provide receive web service.
7. After receiving the gesture it checks the user id with data base and notifies all the contacts of user by using broadcasting web service.

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IV. ADVANTAGES AND DISADVANTAGES

1. ADVANTAGES

- Easy to use
- The sensor object can be anything, enables us to make things around us recognize intricate configurations of the hand or body that is doing the touching.
- Use of Touché enables us to recognize intricate and variety of gestures which means each of these gestures can be mapped to different services.
- Inexpensive (IoT enabler)Wi-Fi module(ESP 8266).
- Wide variety of applications.

2. DISADVANTAGES

- Uninterrupted internet access.
- System needs to be active all the time.

V. APPLICATIONS

- The doorknob can be made smart by this, such that it can analyse whether it is being grasped, touched with one finger or two, or pinched. This means that the door can be programmed to lock or unlock using a “gesture password”. By this doorknob the user can either let a guest come in the room or play a "DO NOT DISTURB" message.
- Using electrodes worn on both wrists that communicate wirelessly with a computer or mobile device using Bluetooth. The system was able to detect body gestures easily, such as touching fingers, grasping hands and covering the ears. Such movements are helpful to control a mobile device such as a smart phone.
- Attaching a single electrode to a vessel containing any form of liquid like water, milk etc. allows the detection of gestures, such as the submerging of a fingertip, hand and the placing of a hand on the bottom of the vessel i.e. fully submerged. This can be used in food training system to guide the students the right way of eating different things.
- In medical field it can be used to provide emergency healthcare services.
- Ordering lunch by providing gesture at home.
- For people with special needs: This can also serve as a help to the blind, deaf, dumb people for their normal life activities without being dependent on someone else.
- Smart traffic congestion management system.
- Building smart cities and environment.

There are numerous applications of this system, as IoT based applications are the current technology requirement. Our project is a form of HCI advancement along with IoT this means there is a wide range of possibilities of applications.

VI. CONCLUSION

A conventional touch sensor detects the presence or absence of touch. In this project we have introduced a novel system which can recognize gestures and perform necessary computation i.e. sending emergency message to the user's contacts saved on user's cloud. We are using Touché, a form of capacitive touch sensing, it has the same principle underlying the types of touchscreens used in most smartphones. But instead of sensing electrical signals at a single frequency, like the typical touchscreen, Touché monitors capacitive signals across a wide range of frequencies it achieves the mentioned function of capacitive sensing and also obtains more complex information such as the hand gesture or body posture of the user by employing the Swept Frequency Capacitive Sensing technique. The sensor object can be anything which enables us to make things around us recognizes complex configurations of the hand or body that is doing the touching. An object thus could sense how user it touching it, or might sense the body configuration of the person doing the touching. We achieve the same by using an Arduino board. This is a cost effective alternative when compared to high frequency wave generators controlled by higher frequency microcontrollers. Though this might affect the precision a bit, the touch event can be smoothly. DevStack is an opinionated script to quickly create an OpenStack development environment. OpenStack software controls large pools of compute, storage, and networking resources throughout a data center, we have used this to create the cloud so as to integrate our system to cloud.

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