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Design and Implementation of Low Cost Arm Touch Controller

Vidhya M P[1], Harikumar T[2]

[1] UG Student, [2]Asst. Professor, Department of Electronics and Communication Engineering, College of Engineering Adoor, Kerala (India)

ABSTRACT

The mobile industry started their journey with bulky handsets and huge keypads. With emerging technologies they were able to reduce the size and bring in more features. All this has been replaced by touch-screens and smart phones, with better user interface, and great features. Touch screens have revolutionized the way we communicate with electronics, but sometimes they can get a little cramped .As a next step to this evolution, here come smart phones with human skin as touch input. This technology is called skinput.Through .This paper we present a new technology to control mobile devices according to the number of taps on the hand.

Keywords- Bluetooth, Skinput, sensor, arduino, MITAppinventor.

I. INTRODUCTION

This skin-based interface allows users to use their own hands and arms as touchscreens by detecting the various taps produced when tapping different parts of the skin .This technology relies on an armband, currently worn around the biceps. It detects number of vibrations in the arm and compares them with predefined control commands (e.g. up, down, back, enter). Additionally, thanks for the sense of proprioception (the ability to sense the position of our body parts without looking), Skinput does not preoccupy the user's vision (much like touch typing). Appropriating the human body as an input device is appealing not only because any person have roughly two square meters of external surface area, but also because much of it is easily accessible by our hands (e.g., arms, upper legs, and torso).This technology can be used without any visual contact. Anybody can accurately interact with its body part in an eyes-free manner. We can use any part of our body as an input surface but for comfortable operation we need to use our arm as an input. This paper describes how to design and implement a low cost arm touch controller to control the operations of a mobile device. This intelligent system consists of a set of vibration sensors,Microcontroller ATMEGA 328P,Bluetooth module and a Accelerometer..

II. ARCHITECTURE OF THE SYSTEM

The implementation can be categorized in two sections, hardware and software. The Hardware implementation includes interfacing vibration sensor, accelerometer and Bluetooth module with with Arduino328P. The Software implementation emphasis on developing an application on MIT App inventor platform to control the device.

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2.1 Hardware Implementation

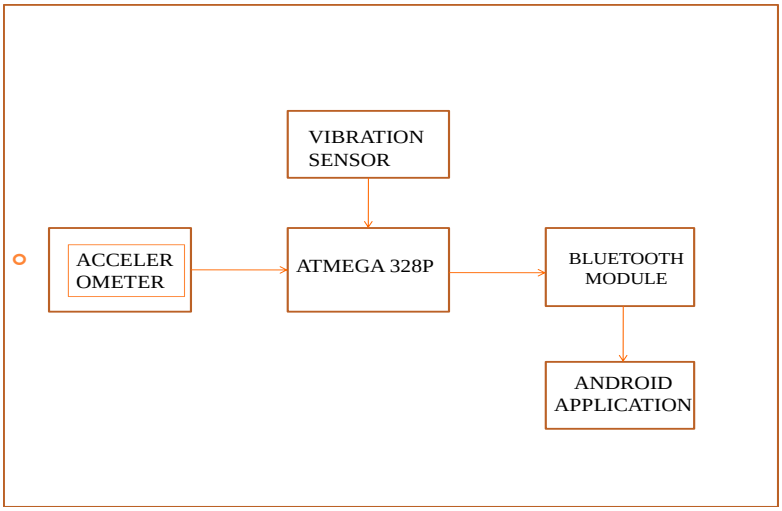
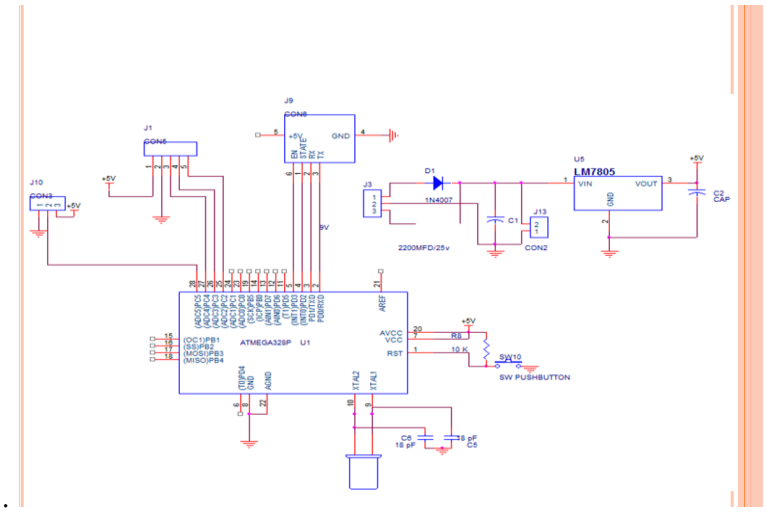


Fig. 1 Block diagram

Main functional blocks of the system are: Acoustic Sensors (catches the vibrations produced after tapping), Microcontroller (Processes the data), Bluetooth module (transmit the data to phone) and an Android phone. It includes ARDUINO microcontroller .First block which is vibration sensor, mounted on armband. User has to wear this armband for capturing the signal produces after tapping on hand. Here a generic vibration sensor can be used which is sensitive to low frequency range and produces analog output after vibrations are produced. After converting the analog output into digital, it should get store in microcontroller. The microcontroller is connected with the cell phone using Bluetooth module. So according to the number of taps on the hand, user can control any functions in the phone. Here, we uses upto five taps. So after getting sufficient accuracy in it we can extend these locations up to ten



2.2 Software Implementation

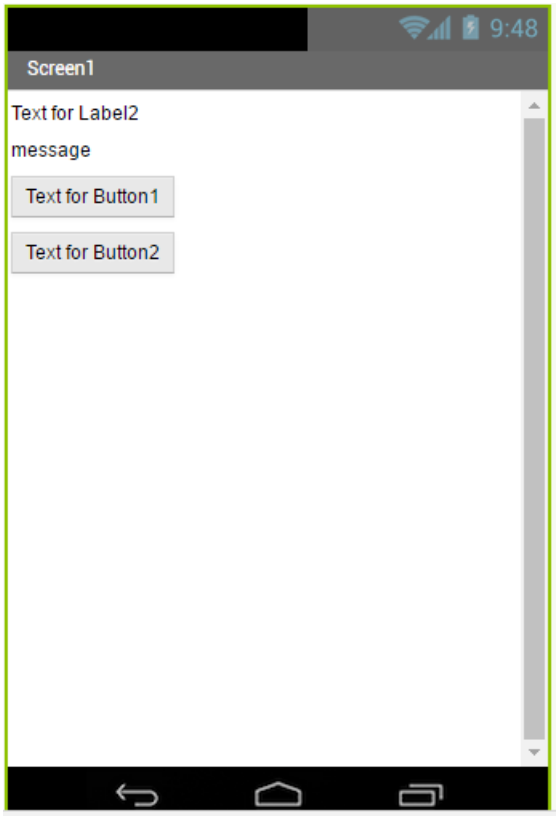
2.2.1 Arduino UNO

Arduino is common term for a software company, project, and user community that designs and manufactures computer open-source hardware, open-source software, and microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices. The project is based on

microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog I/O pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages, C and C++.

2.2.2 MIT App Inventor

MIT APP INVENTOR App Inventor for Android is an open-source web application originally provided by Google, and now maintained by the Massachusetts Institute of Technology (MIT).MIT App Inventor supports a worldwide community of nearly 3 million users representing 195 countries worldwide. The tool's 100,000 active weekly users have built more than 7 million Android apps It allows newcomers to computer programming to create software applications for the Android operating system (OS).



It uses a graphical interface, very similar to Scratch and the StarLogo TNG user interface, which allows users to dragand-drop visual objects to create an application that can run on Android devices. In creating App Inventor, Google drew upon significant prior research in educational computing, as well as work done within

Google on online development environments. App Inventor and the projects on which it is based are informed by constructionist learning theories, which emphasizes that programming can be a vehicle for engaging powerful ideas through active learning. As such, it is part of an ongoing movement in computers and education that began with the work of Seymour Papert and the MIT Logo Group in the 1960s and has also manifested itself with Mitchel Resnick's work on Lego Mindstorms and StarLogo

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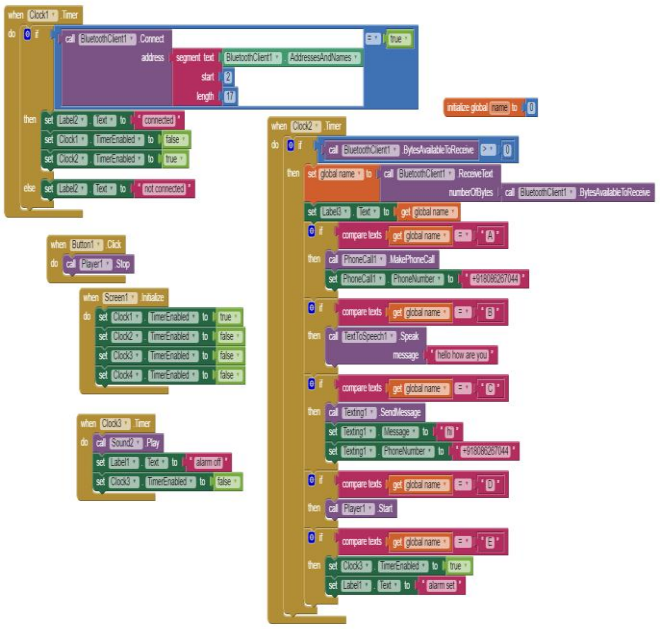
Skinput technology is very easy to understand and it's very easy to use, it takes only 20 mins to figure out how to work it. No interaction with the gadget: If we have to use any application of our mobile then we reach to our pocket take out the device, unlock it and then go to the application. By using Skinput we do not need any interaction with the gadget. We have to just tap our finger and the desired function will performed by the system. No worry about keypad: People with large fingers gets trouble while operating touch screens. Using Skinput we get very large interaction surface area. So for such people this problem will resolve. Without Visual Contact: For some operations like music players we need only 4-5 buttons. So we can use each fingertip as a button. For such operation we don't any display. We can operate such functions without any visual contact. Easy to access when your phone is not available. Through the use of a sense called proprioception after user learns where the locations are on the skin they will no longer have to look down to use Skinput reducing people looking down at their phone while driving can be reduced

III. APPLICATIONS

We can use Skinput technology in any mobile device. We just need different software for different mobiles like for mobiles which supports android operating system requires android application or Symbian operating system requires .jar or .sis software. We can use this technology in i-pods or other music devices which supports Bluetooth technology. For such music devices we just need 4 or 5 different number of taps. So we can use our fingertips as input. Like this we can operate these devices without any visual contact. Person with physical disabilities can operate this system very easily



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IV. CONCLUSION

In this paper, the new approach to appropriating the human body as an input surface is presented. A novel, wearable vibration sensing array that mounted on an armband in order to detect the number of finger taps on the forearm and hand is shown. So this technology can use the human body part as an input surface for electronic devices.

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