HUMAN SKIN AS A TOUCH SCREEN

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Abstract: ***In today's era popularity of mobile device is increasing day by day due to advantages like portability, mobility and flexibility, there are many advantages of small size mainly we can carry it with comfort, but the limited size gives less interactive surface area. We cannot make devices large without losing benefit of small size. As computing becomes more there is an increasing need to develop more advanced input tools and methods. Screens are becoming smaller, cameras are more ubiquitous, and touch technology is everywhere. Yet entering text, choosing graphics entities, performing drag and drop, navigation in devices and so on are still difficult. One real struggle in dealing with small screens is surface area. Current mobile devices screens have enough clarity that you can detect tiny objects. Devices with small sized have some limitations. Since we cannot simply make buttons and screens larger without losing benefit of small sized. The main reason for appropriating the Human body as an input device are easily accessible by hands. We can use our skin which is largest part of our body as an input surface. Human body produces different frequency of vibrations when individual taps on different body parts. With the help of this unique property of human body, this technology uses different locations as different functions of frequencies. Skinput uses simple vibrator sensor to enable people to use their finger or forearms as touch pads to control small devices like mobile phones or music players for messaging, calling playing music etc. This approach provides an always available input, naturally portable, large surface area, and human body parts as an input system.***

Index Terms—ARM7 (Advanced RISC Machines 7), ADC (Analog to Digital Converter) VR (Virtual reality)

I. INTRODUCTION

Skinput is a technology which uses the surface of the skin as an input device. Our skin produces natural and distinct mechanical vibrations when tapped at different places. Skinput turns the body into a touch screen surface. It uses the Vibrator sensors to determine where the user taps on their skin. Skinput allows the user to simply tap their skin in order to control audio devices, play games, and make phone calls etc. As each point is touched, a specific mobile function would be activated. Devices with small sized have some limitations: Since cannot make buttons and screens larger without loosing benefit of small sized. People with larger fingers get trouble in navigating tiny buttons and keypads on mobile phones. With Skinput this problem does not occur. They don't have to worry about keypad. When the user tap on its body part, some mechanical vibrations propagates through the body, those vibrations are captured by the sensor array. The sensor array is mounted on armband which is interfaced with ARM7. ARM7 processes the data and send it to the mobile phone. Microcontroller is interfaced with the mobile phone with the help of Bluetooth module. So according to the tapped location desired operation is performed on the mobile device.
Hence, human skin is effectively used as an touch screen.

II. LITERATURE SURVEY

Skinput is a collaboration technique which majorly uses the principle of always available input, bio-sensing and acoustics and a Skinput technology provided by Microsoft that turn the body into touching interface. The technology helps in dominating the mobile application with the utilization of the skipping faucet.[1] The widespread adoption of the mobile electronic devices and the advancement of wearable devices, they contribute to encouraged the development of compact devices.[2].As computing becomes more powerful, there is an increasing need to develop the more advanced input tools and methods. Screens are smaller, cameras are more ubiquitous, and touch technology is everywhere. Yet entering text, choosing graphics entities, performing drag and drop, and so on are still di cult. One real struggle in dealing with the small screens is surface area. Current mobile-devices screens have the enough clarity that you can detect tiny objects. Skinput combines simple bio-acoustic sensor and some sophisticated machine learning to enable people to use their finger or forearms as touch pads. It has been, found that different types of finger taps on different parts of the hand and forearm produce unique acoustic signatures as per the study conducted by Carnegie Mellon University Machine learning enhance the features into a unique interpretation of the different taps. Skinput gives new meaning to the term touch typing. [3].

III. OBJECTIVES OF THE PROPOSAL

To develop technique of appropriating human body as touch surface and turn your body into a touching interface. Skinput is technology that appropriates the human body for acoustic transmission, allowing the skin to be used as an input surface. Encouraged the development of compact alternatives. The application of Skinput is to control the Mobile device without actually interacting with it. It's advantage is that it is easy to understand .We don't have to interact with the gadget directly.
No need to carry keypad for navigation in mobile device. We can control mobile device without having visual contact with it. It can also increase gaming experience of user when mobile device is connected to VR as device is not available to control directly.

IV. METHODOLOGY

Skinput depends on wearable arm-band which is worn around the arm.Vibrator sensor which is on the arm band, sense the vibration of tapped signal. The location of finger tapped on the arm or on the hand is resolved by analyzing mechanical vibrations that propagate through the body. Which is sensed by vibrator sensors worn on armband. This tapped signal is in the analog form which has to converted into digital form by 8 bit ADC which gives digital value in the range of 0-255 discrete level. The ADC is inbuilt in ARM7 microcontroller which is used to convert in digital form. This digital signal are sent to mobile devices by the help of Bluetooth. The digital signal are received by mobile device at the other end. At the mobile device there is android application is present. Which is used to match received signal with the specific

predefined task to be performed. This android application is secured by the user's user id and password. There are various predefined task is present like make calls, end the calls, play music, pause music, play the next music and read out received message which are received by the mobile. This approach provides an always available, naturally portable and on-body finger input system.

V. BLOCK DIAGRAM

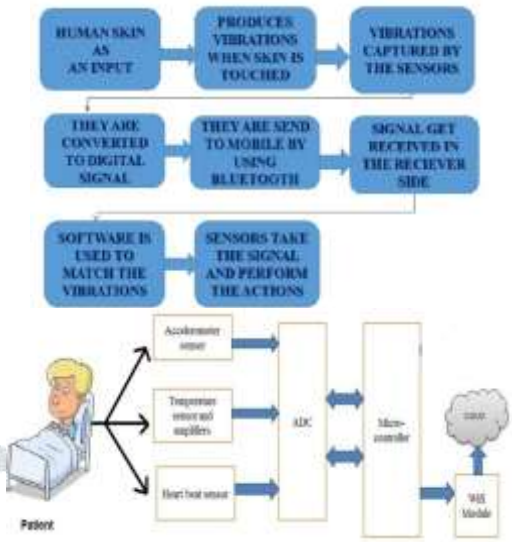


Fig. 1. System Architecture

VI. SYSTEM COMPONENTS

System components comprises of the hardware and software part of the system, which are described below:

1. Hardware Components:

VIBRATOR SENSOR

It is the arm band sensing element that captures the various sort of the vibrations. Once users tap their fingers at the skin surface. It has sensitivity upto 50mV/g and operating temperature is from 0°C to 70 °C. In our case it is connected to pin number 13 or port0.28 of ARM 7 LPC2148.

BLUETOOTH MODULE

Bluetooth is a wireless technology standard for exchanging data over short distances less than 10m.Using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz [4].HC-05 module is an easy to use Bluetooth Serial Port Protocol module project. It has sensitivity of -80dbm.It needs 3.3V to 5V power supply. It has the feature of programmable baud rate with UART interface. In our case it has a baud rate of 9600.In our case it is used to transmit digital data from ARM7 to mobile device. It's transmitter pin is connected to pin number 34 of ARM7. It's receiver pin is connected to pin number 33 of ARM7

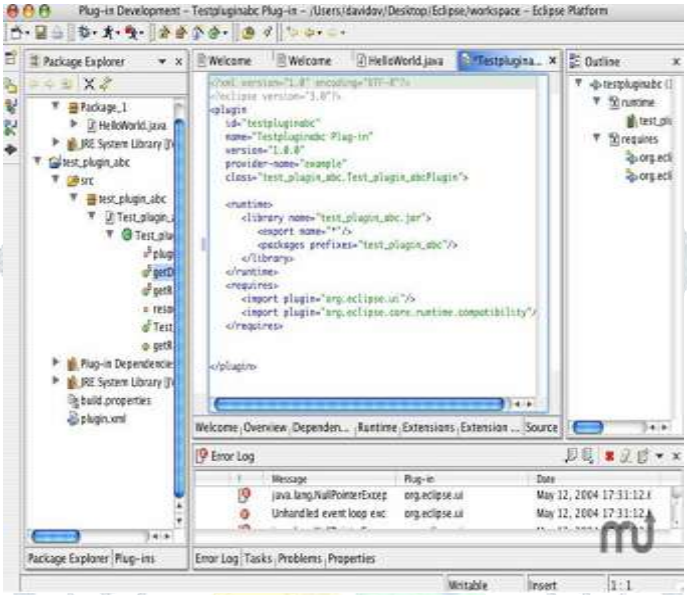
ARM7 MICROCONTROLLER

ARM7 is one of the widely used microcontroller family in embedded system application. LPC2148 is the widely used IC from ARM-7 family. It is manufactured by Philips and it is pre-loaded with many inbuilt peripherals making it more efficient and a reliable option for the beginners as well as high end application developer. It is 32 bit microcontroller with 64 pins.

2. Software Components:

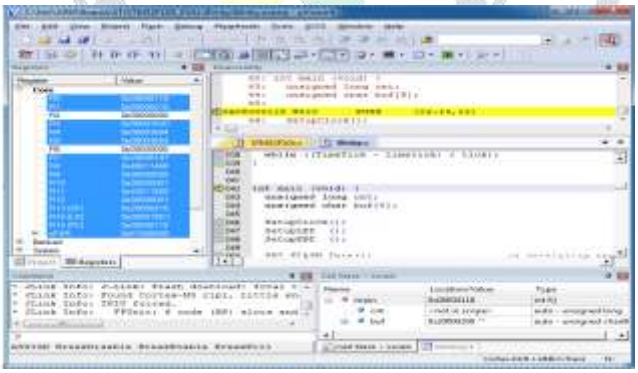
ECLIPSE IDE

Eclipse is an integrated development environment (IDE) used in computer programming, and is the most widely used Java IDE. The environment is written in Java and is compatible with many operating systems. It is used to make android applications.



KEIL IDE

Keil the complete software development environment for a wide range of Arm Cortex-M based microcontroller devices.



VII. SIMULATION AND RESULTS

The fully integrated system of human skin as a touch screen was put to a functionality test to confirm that all the hardware and software coding and interfacing were working well. We are halfway into our project and would be making an attempt of completing it at the earliest. The figure shows the full set up of the whole skinput system.

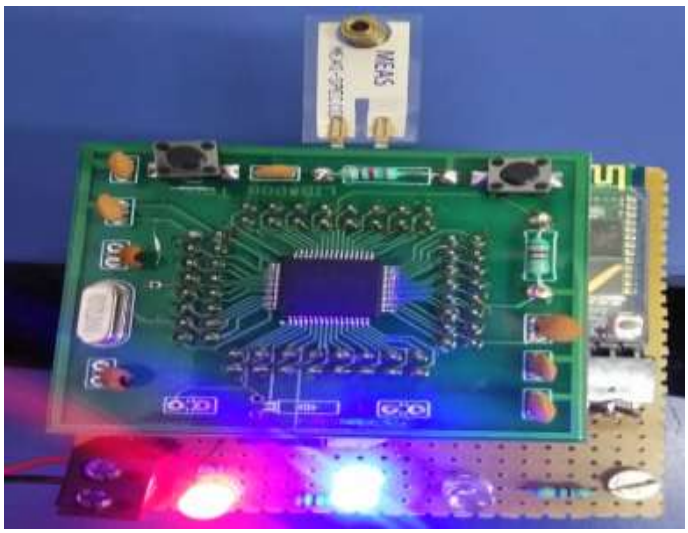


Fig. 2. Circuit on breadboard

The Meas sensor used in our system are working properly and has been tested completely. The sensor reads outs the frequency and process it to the microcontroller. The microcontroller is interfaced to the mobile application via Bluetooth. The arm band is can be wored in our hand. By tapping on the skin corresponding action is performed on the mobile. Hence skin which is a part of our human body is effectively used to perform the mobile operations.
The below figure shows the tapping frequency at different locations.

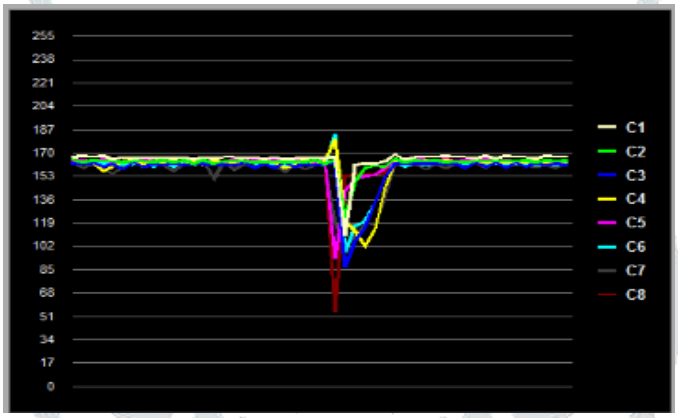


Fig. 3. Tapping frequency at different locations

If some of the parameter remained high for certain time period, an alert message was sent by the microcontroller through the cloud to the patient's relative and nearby hospital.

VIII. CONCLUSION

We have presented the approach to appropriating the human body as an input interface. We described a wearable vibrator sensor used to detect the vibrations and localize the location of finger tap on the hand and the forearm .This system performs well even when the body is in the motion. Skinput oriented systems are an emerging trend. Researches are carried out for the small wrist watched sized system arm band.

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