International Journal of Computer Science and Informatics

Volume 3 | Issue 3 Article 3

January 2014

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ANDROID APPLICATION FOR MEASURING HUMAN BODY TEMPERATURE AND FORCASTING FUTURE ILLNESS

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Abstract— Android Application for measuring human body temperature is a new age mobile thermometer. This kind of application already exists but requires manual feeding temperature. In our project, we propose an application which will measure the body temperature automatically while the user is operating the mobile device. It has an in-built function which can trigger alert messages whenever the temperature becomes critical more than normal human body temperature. The display segment of the device is made up of capacitive touch screen, which can act upon the bioelectricity produced by human body with each and every touch. This application requires Android Operating System Version 2.2. It will also diagnose the other diseases the user might have depending upon the symptoms entered.

Keywords-*Android; capacitive touch screen; capacitance; bioelectricity; temperature;*

I. INTRODUCTION

The human body temperature measuring application makes use of the very popular and versatile android technology. Android operating system is used as it is an open source platform where applications can easily be customized as per the user's requirement. The capacitive touch screen of the android smartphones is sensitive to human touch. The bioelectricity flowing continuously through our body is responsible for the touch detection. This application makes use of the capacitive touch screen along with the human electricity to measure and display the body temperature with the probable illness. It has an internal database with information about the symptoms of various diseases and their associated temperature ranges. The main advantage of this application –

- It can act as a medical kit complete with thermometer.
- It is easy to install and use.
- You can carry it easily as you don't have to worry about the fragility of a glass tube.

This application can be used for all Android versions starting from version 2.0 (Android Eclair).

This application also asks the user if he is experiencing any other symptoms and takes those in. Diseases along with their associated symptoms are stored in the database. Hence, based on the body temperature and the symptoms, it will display the disease that user might be experiencing.

CAPACITIVE TOUCH SCREEN

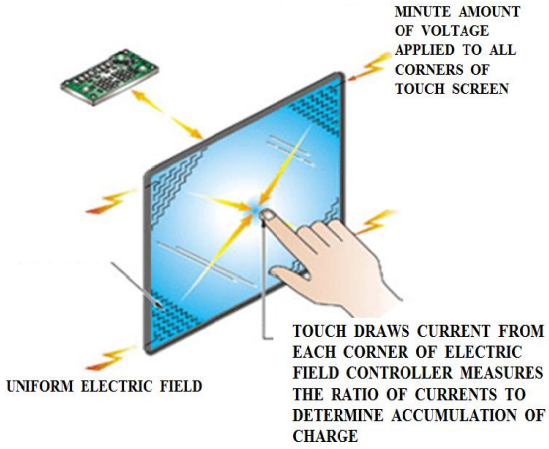

Fig 1. Capacitive Touch Screen

Capacitive touch screen are popularly used in electronic devices such as cellular phones, laptop touchpad etc., making use of the touch technology. These touch screens are sensitive to human touch or any other conducting material. Capacitive sensing makes use of the bioelectricity [8] [9] (continuous electric flow through the body) as a conducting medium along with a steady electric current already flowing through the screens' lower layer.

Capacitive touch screens [2] come in varieties such as Surface capacitance, Mutual-Capacitance, Self-Capacitance. Multi-touch and Gesture-Based technologies also make use capacitive sensing [1] [5]. Android phones make use of the self-capacitance touch screen.

In our application, we make use of the self-capacitance touch screen where the human finger acts as a conductor along with the conductor present in the device, thus, completing the circuit.

LAYERS OF CAPACITIVE TOUCH SCREEN

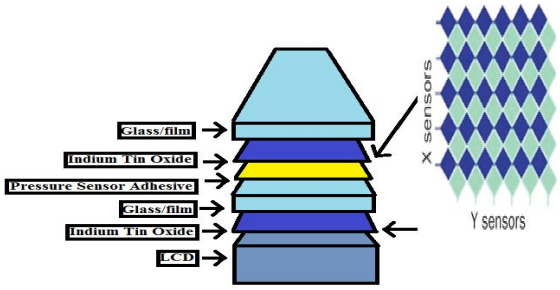

Fig 2. Layers of Capacitive Touch Screen

The capacitive touch screen [2] is made up of the following layers such as Substrate , Set of Electrodes, Panel made of nonconductive material as glass.

The substrate acts as a base for carry the electrodes. The substrates should be nonconductive and should no retain water contained in the atmosphere. Materials such as glass are excellent for these purposes. A constant voltage is passed through the electrodes, usually ITO (Indium Tin Oxide). The two layers of electrodes glued together using a pressure sensitive adhesive (PSA) to reduce the air gap. The air gap works as an insulator and reduces the touch sensitivity. The layers form a matrix of rows and columns, the X-Y grid. The current is passed through the rows and columns independent of each other [7] [17].

When the user touches the screen, a voltage drop is created at the point of contact and the capacitance of the touch screen at that point decreases. The current from all the four corners rushes to that point and the capacitive touch sensor located the position of the touch with the help of the X-Y grid. This information is then sent to the micro controller which then takes the required action [5].

II.SYSTEM ARCHITECTURE

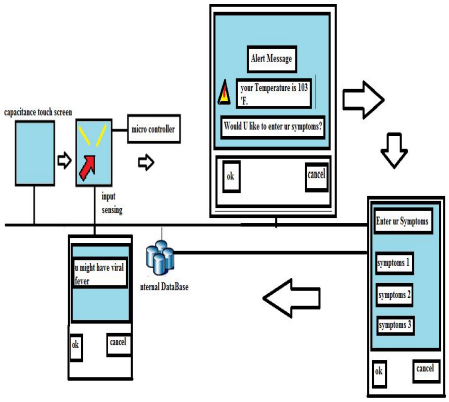

Fig3. System Architecture

In our paper, we use the property, capacitance increases with increase in temperature. The finger is first placed within the indicated area on the cell phone screen for a particular time period i.e. 10 milliseconds which is responsible for accumulation of charge on the screen. This creates a drop in capacitance of touch screen as constant voltage from the four corners of the screen rushes towards the point of contact. The X-Y co-ordinates of the contact point are detected by the capacitive touch sensor. The sensor then, relays the information to the microcontroller [5]. The capacitance drop is measured against the usual drop and the respected temperature is calculated and displayed onto the screen. The user is then asked whether he is experiencing any other symptoms besides high temperature. The symptoms are then matched with the information stored in the internal database. The disease associated with the entered symptoms is then displayed to the user.

III. DATA FLOW DIAGRAM

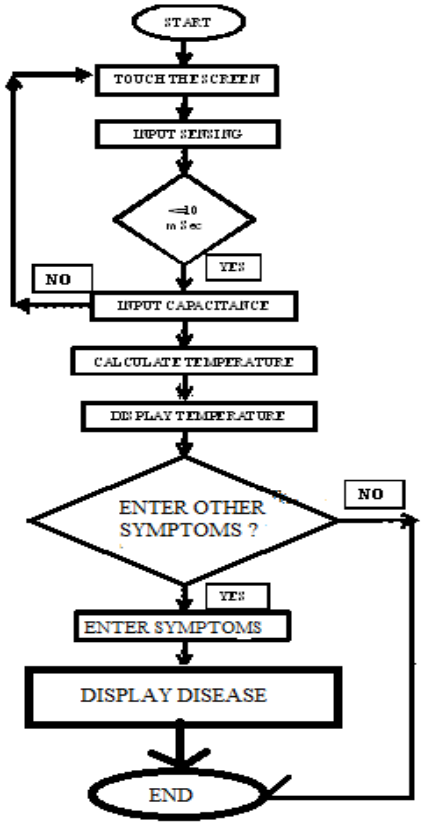

Fig 4. Data Flow Diagram

The user should touch the indicated area for about 10 milli seconds or till he hears a beep. If the contact is less than the indicated time or if the position of the finger is incorrect, the user will be asked to touch the screen again. The capacitance drop is measured by the capacitive touch sensor which relays this information to the microcontroller [5]. The temperature as per the capacitance drop is calculated and displayed onto the screen.

INPUT SENSING

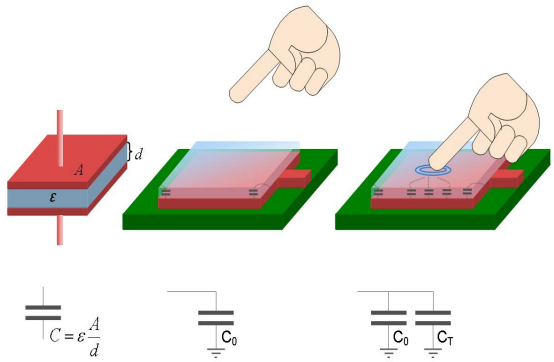

Fig 4. Input Sensing

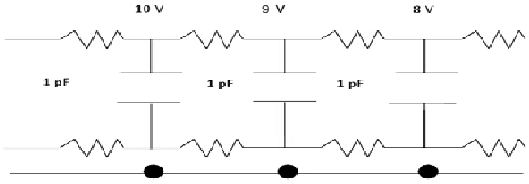

Fig 5. Untouched Capacitance

The capacitance of the touch screen, when not being touched by the user. It is caused by the constant electric flow through the electrodes.

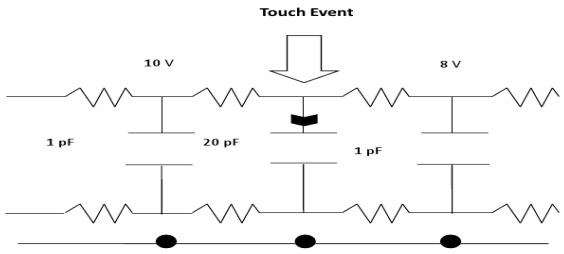

Fig 6. Capacitance After Touched

When the screen is touched, the capacitance at the point of contact decreases as the electric field flowing through electrodes is disturbed.

A constant voltage continuously flows through the lower layer of the glass in a capacitive touch screen. This voltage also has a constant capacitance say 1pF. When the upper glass layer is touched, the electric field of that particular area is disturbed. Hence, there is a drop in capacitance at the point of contact which is detected by the capacitive touch sensor using the X-Y grid.

In general, when the temperature of the human body raises, its electrical activity increases [8] [9]. Hence, when someone with a fever touches the upper glass layer, the drop in the capacitance is relatively less as capacitance increases with increase in temperature. Thus, this decrease in capacitance drop is measured against the usual drop and the body temperature is displayed.

IV. CALCULATE TEMPERATURE

The changed capacitance is stored in a variable. It is compared with the already stored value taken for normal body temperature i.e. 37.5^0C.

The temperature is calculated as per the formula.

- **Q=I*t**
- **C=Q/V**
- **ΔC=Co-Ct;**

Where,

Q=Charge Accumulation on screen, I=Amount of bioelectricity

t=Specified time, V=amount of applied voltage from screen corner, ΔC=Change in capacitance of screen, Co=Untouched Capacitance, Ct=Touched Capacitance

V. DISPLAY TEMPERATURE AND DISEASE

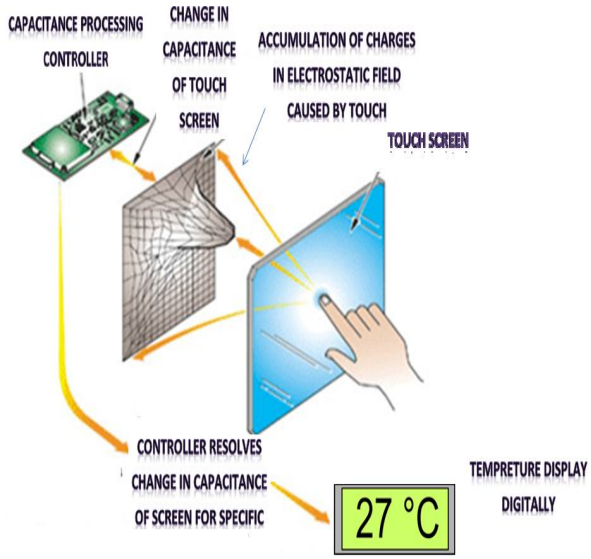

Fig 7. Temperature Display Diagram with Variation of Screen Capacitance

Once the capacitance drop is measured and the temperature is calculated, it is displayed onto the screen on a Fahrenheit (°F) scale.

It asks if there are any other symptoms besides fever that the user experiences and takes in those symptoms. It then searches its internal database for the possible illness the user might have [11] [12] [13] [14] [15] [16].

Table 1. Disease Table

S. No.	DISEASE	TEMPERATURE	SYMPTOMS
	Viral Fever	38 - 39 °C (99.5 - 102.2 °F)	Body and muscle ache, redness of eyes, running nose, headache, cough

	Dengue Fever	40^0 C (104^0 F)	Chills, headache, pain upon moving the eyes, and low backache.
	Pneumonia	40^0 C (104^0 F)	Shaking chills, Sneezing, Sour Throat, Cough with Sputum production(Discoloured or bloody), change in skin colour
	Typhoid	Gradual rise to 40^0 C	Headache, cough, profuse sweating, loss of appetite
	Brain Damage	Above 105^0 F	Severe headache, stiff neck, nausea, vomiting, discomfort looking into bright light, sleepiness, and confusion.

Once it identifies the illness, it displays it to the user so he/she can take the necessary precautions and medication.

VI. CONCLUSION

The capacitive touch screen works on the principle of change in capacitance on contact with a conductor such as human finger. The human body has electric current flowing through it continuously which acts as a conductor for the capacitive sensing. The increase in temperature leads to increase in capacitance. Hence, we can conclude that rise in body temperature will lead to decrease in capacitance change and this change can be measured in order to calculate and display body temperature.

VII. FUTURE ENHANCEMENTS

This App. can be enhanced further by having an alert system which regularly reminds the user to check his/her temperature. The user can store this information in the database. We can also include the functionality of sending an SMS to the users' family doctor about the patients' medical condition. A graph can also be plotted on a day-to-day basis.

VIII. ACKNOWLEDGMENT

We sincerely thank Dr. P. Shankar, Principal and Dr. R. Nedunchelian, H.O.D of Computer Science & Engineering Department of Saveetha School of Engineering for their support and encouragement to complete our work.

REFERENCES

1. Touchscreen, *http://en.wikipedia.org/wiki/Touchscreen*
2. The Art Of Capacitive Touch Screen, *http://www.eetimes.com/design/analog-design/4009622/The-art-of-capacitive-touch-sensing*
3. Sensors for Smartphones, *http://uk.farnell.com/jsp/bespoke/bespoke7.jsp?bespokepage=common/en/technology-first/applications/sensing/smartphone-tablet-sensors.jsp*
4. Capacitors, *http://www.facstaff.bucknell.edu/mastascu/elessonshtml/LC/Capac1.htm*
5. Capacitive Sensing, *http://en.wikipedia.org/wiki/Capacitive_sensing*
6. Resistive and Capacitive Touchscreen, *http://www.allaboutsymbian.com/features/item/Resistive_vs_Capacitive_the_invisible_tech_war_in_which_both_opponents_can_win.php*
7. Todd O'Connor, Projected Capacitive Touch Screen Sensing Theory of Operation, *http://ww1.microchip.com/downloads/en/DeviceDoc/93064A.pdf*
8. Robert O. Becker, The Body Electric, *http://www.theseekerbooks.com/articles/electric.htm*
9. Human Cells Have Electric Fields As Powerful As Lightning Bolts, *http://www.dailygalaxy.com/my_weblog/2008/07/human-cells-fou.html*
10. Body Electric, *http://www.remarkablemedicine.com/Medicine/bodyelectricity.html*
11. Fever In Adults, *http://www.emedicinehealth.com/fever_in_adults/page2_em.htm*
12. Typhoid Fever, *http://www.netdoctor.co.uk/travel/diseases/typhoid.htm*
13. Pneumonia, *http://www.medicinenet.com/pneumonia/article.htm*
14. Viral Fever, *http://www.mdinfo.com/forums/15817/Signs_of_a_Viral_Fever*
15. Fever, *http://www.drrisley.com/html/fever.html*
16. Brain Damage, *http://www.emedicinehealth.com/brain_infection/page3_em.htm#Brain%20Infection%20Symptoms*
17. Guidelines For Designing Touch Sensing Applications, http://www.st.com/internet/com/TECHNICAL_RESOURCES/TECHNICAL_LITERATURE/APPLICATION_NOTE/CD00222015.pdf
18. Android Developers *Developer.android.com/guide/index.html*

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