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Interactive Paper Interface

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ABSTRACT: *Interactive Paper Interface deals with using raspberry pi as the main brain behind using the conductive ink for Interactive applications. Nowadays, due to the increasing use of portable electronic devices, this sector came into the scene making complicated circuits to be implemented on paper easily. Conductive Ink plays a major role in making the paper useful and ready for implementation of circuits. Hence, we try to make a device which can act as a musical instrument, an interactive game or a device to assist the visually impaired using a mini computer called Raspberry Pi.*

Keywords: *Paper Electronics, Paper, Electronics, Conductive ink, Raspberry Pi,*

I. INTRODUCTION

Papertronics is formed of two words, Paper and Electronics, which means implementing electronics on paper. Using paper as a substrate offers many advantages for paper electronics since paper is available easily and offers portability. In Papertronics we basically use a paper on which we design touch keys or sensors using conductive ink. This touch keys are connected with the GPIO pins of the Raspberry Pi. The required response to the touch keys are programmed in the Raspberry Pi. Every time a user wants to change the response of the touch key he/she just needs to change the audio files in the program.

II. RASPBERRY PI

The Raspberry Pi is a credit-card size computer that was developed in the Laboratory of University of Cambridge and released by Raspberry Pi Foundation in 2012.The aim of Raspberry Pi was to stimulate the teaching of computer science at school. The Raspberry Pi has a 900MHz quad-core ARM Cortex-A7 CPU, Broadcom Video Core IV graphics, 1 GB RAM on model B. It has four USB ports in model B+, and 1 Ethernet port. It has GPIO (general purpose I\O) connectors so we can communicate with sensors, motors and other embedded systems. It has open-source Linux (Raspbian) operating system, you can also run Android, Arch Linux ARM, Firefox operating system, Google chromium, Fedora, Plan 9 ,RISC and UNIX[2] . Raspberry Pi has different usages like you can use it for watching movies, playing games etc. Raspberry Pi has a flexible platform for applying utilities and for experimentation.

III. CONDUCTIVE INK

Conductive ink is an ink that results in a printed object which conducts electricity. Conductive inks can be a more economical way to lay down a modern conductive traces when compared to traditional industrial standards such as etching copper from copper plated substrates.

There are various methods to make conductive ink. The materials required to make conductive ink includes a solvent, such as paint or mixture of CCl4 & water, Glue and material having conductive properties such as graphite powder, silver or carbon residue.

The first part of this project features conductive paint. The paint will be the base of all of the other materials. The paint makes an ideal base because of its consistency. Conductive paint sticks well to most materials, especially paper and cardboard. The two materials used in conductive paint are powdered graphite and the poster paint. A mixture of 2 parts powdered graphite to 1 part black paint worked exceptionally well. Glue is added to the mixture so that the ink sticks well on the surface.

Raspberry Pi & Conductive Ink are the two main entities of our project which give the flexibility and portability to the device.

IV. CAPACITIVE TOUCH SENSING

We are using a capacitive touch sensor called MPR121 whose inputs are connected to the conductive ink. Any touch on the conductive ink can be sensed by the the MPR121 inputs which is communicating with Raspberry Pi. The MPR121 uses a constant DC charge current scheme for capacitance measurement.

Each channel is charged and then discharged completely to ground periodically to measure the capacitance. All the channels are measured sequentially, when one channel is in the charge/discharge and measurement period the other channels are shorted to ground.

In MPR121, the touch and release threshold values can be set as per the requirement and are independent and individually programmable for each electrode, in this case conductive ink, providing hysteresis and electrode independence.

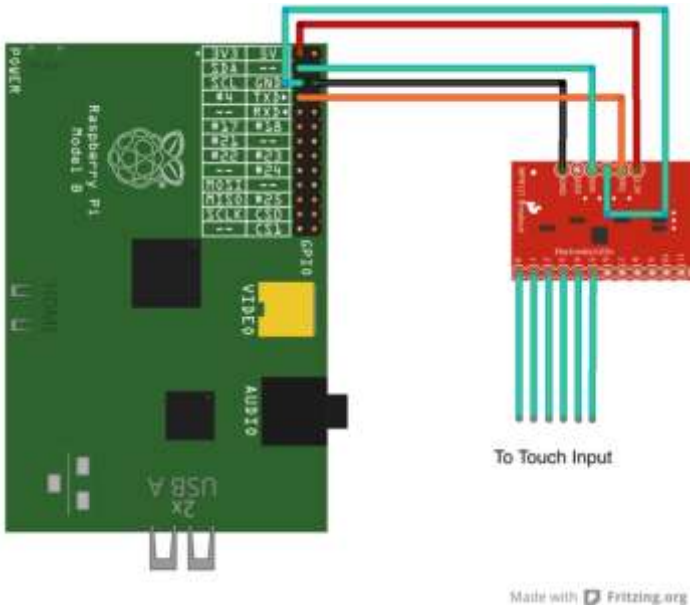

Fig. 1: Raspberry Pi connected with Capacitive touch sensor

V. CONCLUSION

In this research work, we have attempted to provide an interface to make things drawn on paper more interesting and interactive. We also work to devise a solution for the visually impaired, which will help them to learn braille language easily.

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