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MULTI- CHIP KEYBOARD SYSTEM

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ABSTRACT

In this work the design and process for making wired keyboard into wireless keyboard is given in order to make it comfortable for the multiple users. The wireless method is done by embedding keyboard withthe msp430 microcontroller and making it wirelessby using Wi-Fi and Bluetooth technologies. The wireless keyboard gives solution for the muscoskeletal disorders and communication difficulties in real time scenarios. By making keyboard wireless and connecting it to any display device the access can be made from different distances.

Keywords: Embedded Wireless, Keyboard, Msp430, Wi-Fi, Internet-On-Things

I INTRODUCTION

In Today's present condition in colleges and in business world the conferences and meetings occur commonly. During these scenarios projector and personal computers are used for presentation. Generally one of the common input devices used in are computer and projector for the keyboard. While using these desktop computers and projectors the keyboard becomes fixed i.e. connected by cable to them hence it cannot be moved. During the group meetings, conferences and seminar if one wanted to use the keyboard in order make changes in presentation they have to move to that keyboard which connected by cable which is fixed in its position. Whenever we wanted to make changes we needed to approach that fixed keyboard which becomes difficult and waste of time. If more than one person wanted to access the data in computer or in projector for making changes in presentation it can be done by making the input device moveable so that the accessing of data becomes easier.

In order to move the input device it is done by making the input device wireless, without making cable connectivity so that it becomes easier. This project shows how the keyboard is made wireless, by making it connected to the Wi-Fi and Bluetooth technology so that it is accessible at any point of distance.

A keyboard is designed by using msp430 microcontroller for low energy consumption, scalability purpose. This wireless keyboard can be used in robot by fixing it physically to a robot and make it much more comfortable in an environment where robot is used commonly

II DESIGN

To make wired keyboard into wireless keyboard the design is given by designinga keyboard with an add-on device. The input device keyboardis connected to an add-on device. The add-on device can be Wi-Fi or Bluetooth. In the other side the projector or computer is connected to the add-on device that is Wi-Fi or Bluetooth in order to communicate each other .The block diagram is shown in Fig 1.

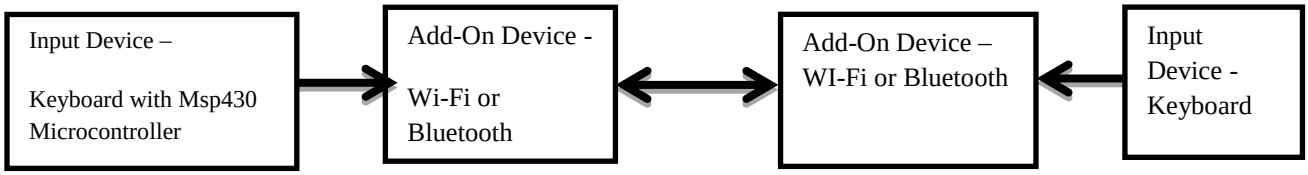

Fig 1. Block diagram of keyboard to wireless keyboard and its communication.

III KEYBOARD

The keyboard used here is designed using the msp430 microcontroller. The keyboard consists of 101keys. The keys are alphabets and numeric keys .Each keywords like a switch and pull downs are implemented on each column, keeping the idle state low. Column –interrupt approach is used. The rows are actively driven at the same time and columns are configured to interrupt the processor when any single key is pressed. This method is useful in low-power modes, because any key can wake up the microcontroller.

The system is awake due to a key press using the column-interrupt approach, the polling method is used to determine which key(s) is (are) pressed. In the polling method, each row is scanned separately driving one row at a time in sequential order. The column is then read giving the exact keys being pressed. The Fig 2 shows the schematic diagram for key switches in the keyboard.

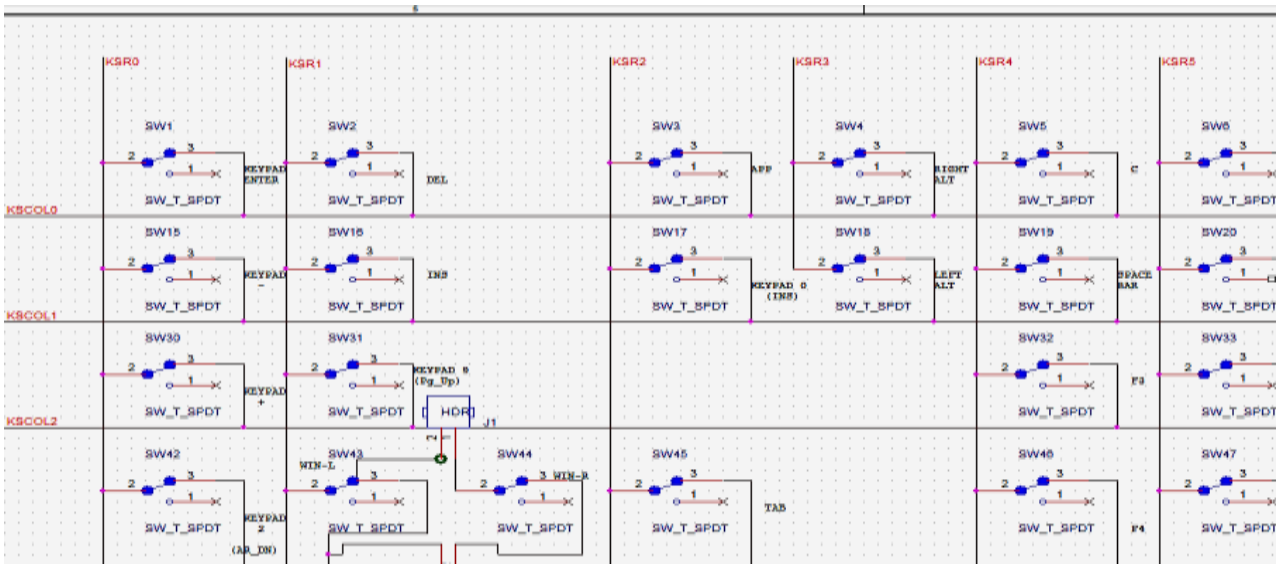

Fig 2 . Schematic diagram for key switches in the keyboard

IV Msp 430 MICROCONTROLLER

The msp430 microcontroller is ultra-low power consumption. It has program memory of 32KB. It operates at a low supply voltage of 3.3V.The controller consist of analog to digital converter, two universal serial communication interfaces (USCIs),a real-time clock(RTC), and 31 or 47 I/O pins. Used in interfacing with keyboard.

The interface can be used to send or receive any type of data to/from the host, so that the MSP430 microcontroller not only performs the job of a digital keyboard, but it can also be used to perform other jobs taking advantage of the same USB interface and the rest of the peripherals. The Timer Tick used as a time base to perform periodic polling, debounce. The response time,power consumption is the most important requirement, parameters such as debounce time, polling scan rate, microcontroller internal frequency can be adjusted to meet particular requirements. The msp430 microcontroller is shown in Fig 3.

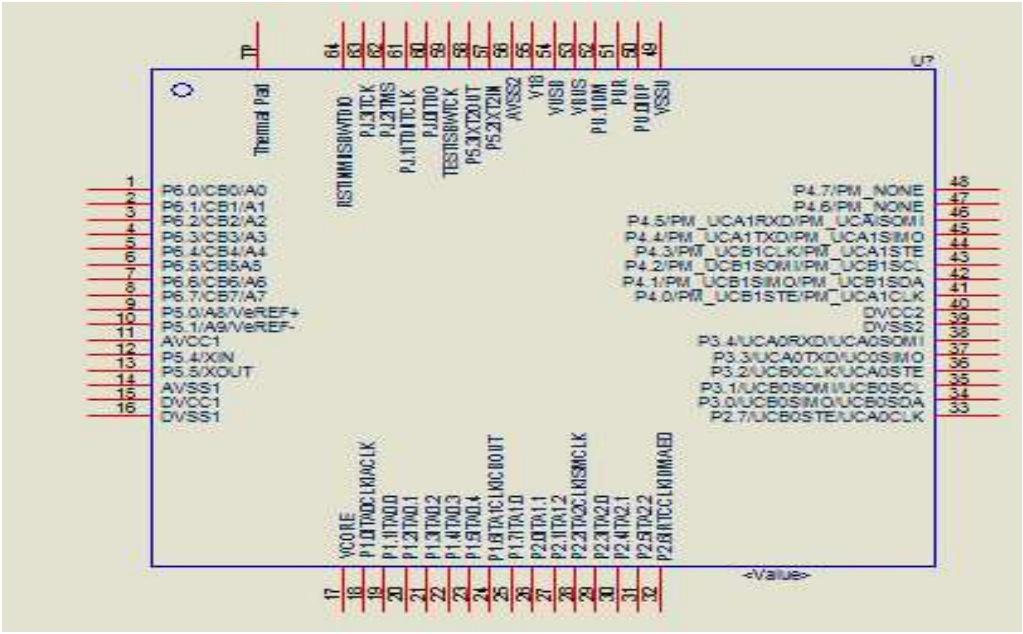

Fig 3. Design of msp430 microcontroller.

V MAPPING OF KEYBOARD SWITCHES WITH THE Msp430 MICROCONTROLLER

The rows and columns of keyboard switches is port mapped to the port pins of the msp430. The column col0 of the keyboard is mapped with the port P1.0 of the msp430. The row R0 of the keyboard is mapped to the port P2.0 of the msp430. Same way the column from col1 to col7 of the keyboard is mapped to the port P1.1 to P1.7 in the msp430 pins. Same way the row of the keyboard is mapped with the ports of msp430.The schematic for the port mapping between keyboard switches and msp430 is shown in the Fig 4.

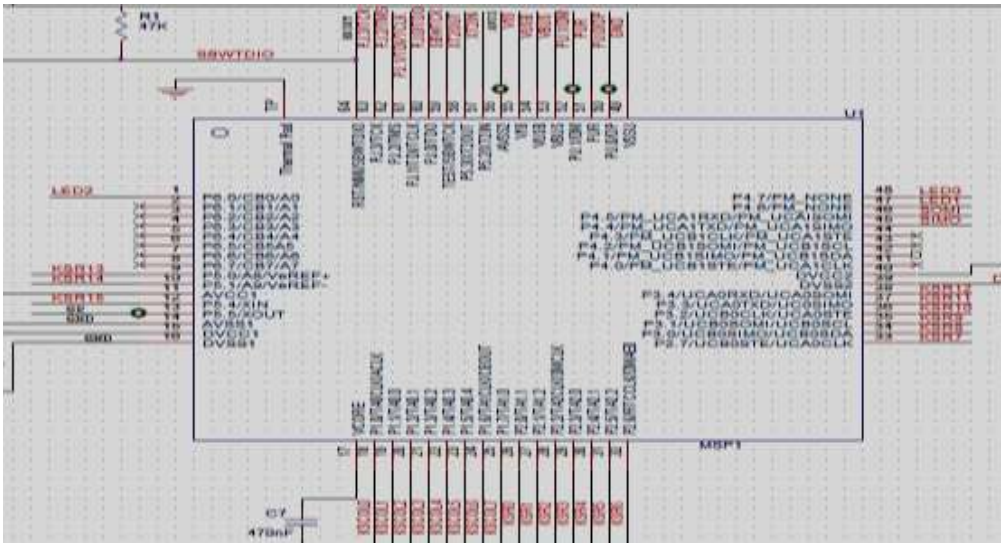

Fig 4. Schematic of port mapping between keyboard switches and msp430.

VI WIRELESS CONNECTION

To make wired keyboard into wireless we needed to use a wireless technology. The wireless technology such as Wi-Fi and Bluetooth can be used. Wireless connectivity makes the keyboard easiest input device to communicate among others at any real time environment.

6.1 Wi-Fi

Wi-Fi is one of the common technologies used in the colleges, companies, external meeting environment and many other places where the space for interaction is huge.It is used widely in internet-on-things application and in home automation largely. To make keyboard wireless by using Wi-Fi technology CC3100MODis used.

6.2 Bluetooth

Bluetooth is one of the wireless technologies whichare commonly used for short range wireless connectivity.Whencommunication to be made for short range for example to when necessity for using asingle keyboard by two or more employees in same cabin this technology can be used which is convenient and also in home automation this can be extensively be used.

VII INTERNT-ON-THINGS

The Internet of Things (IoT) is a vision. Over a billion devices will connect people at homes and offices through the Internet of Things (IoT), making people and cities smart globally. The IoT is significant because an object that can represent itself digitally becomes something greater than the object by itself. No longer does the object relates just to one person, but is now connected to surrounding objects and database data. IoT with Wi-Fi and Bluetooth makes our environment advanced and comfortable by reducing hardware utility

VIII CC3100MOD

The CC3100MOD is a Wi-Fi module that consists of the CC3100r11mrgc Wi-Fi network processor and power management subsystems. Featuring internet-on-a-chip. It includes all the required clocks, SPI flash and passives. Consist of 8 simultaneous TCP or UDP sockets and 2 simultaneous TLS and SSL sockets. Low power consumption at 3.6V. Integrated DC-DC converter with a wide supply voltage. Supports all common WI-FI security modes for personal and enterprise networks with on-chip security accelerators.Interfaces over a 4-wire serial peripheral interface (SPI) with any microcontroller at a clock speed of 20MHZ .The image of CC3100MOD is shown in Fig 5.

Fig 5 . The image of CC3100MOD

IX INTERACTION BETWEEN KEYBOARD AND CC3100MOD

The interaction between the keyboard and cc3100mod is done by connecting the SPI of the msp430 MCU and the SPI of cc3100mod. The SPI connection between them is made. The functional block diagram for the Wi-Fi connection for the keyboard is given Fig 6.The schematic image of the cc3100mod is given in Fig 7.

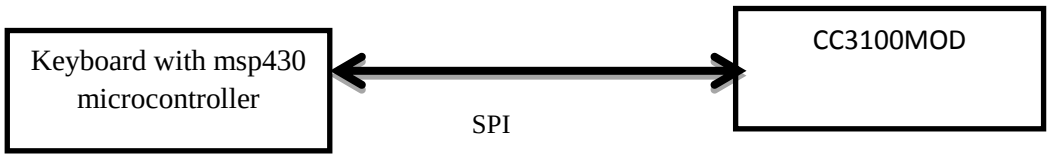

Fig 6. The functional block diagram for the Wi-Fi connection for the keyboard.

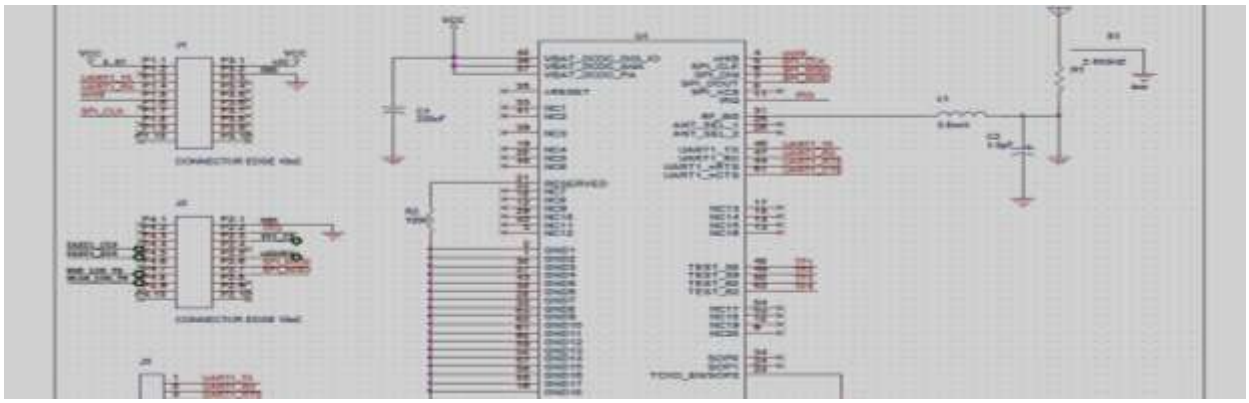

Fig 7. The schematic image of the cc3100mod

X EXPERIMENTAL SETUP FOR WIRELESS KEYBOARD

The experiment consists of keyboard with msp430 microcontroller and the cc3100mod .The image of keyboard with msp430 microcontroller and CC3100MOD is given in Fig 8.

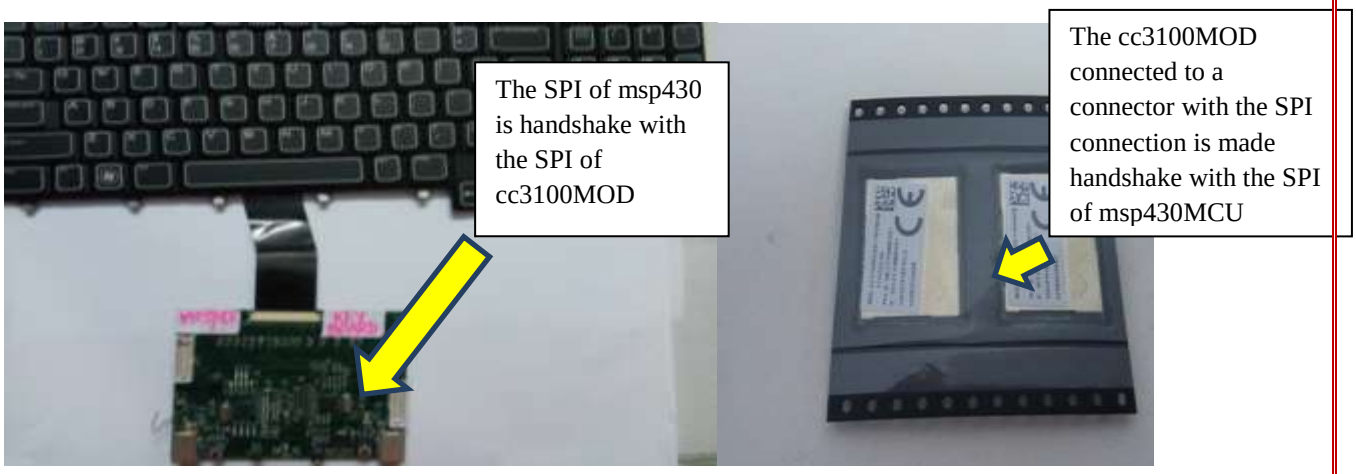

Fig 8. Experimental setup using keyboard with msp430microcontroller and CC3100MOD.

XI CONCLUSION

The embedded wireless technology gives a wide range of application in real environment. The current emerging trends are Internet-On-Things. The design idea given here gives the solutions for real time working environment were the internet-on-things can be applied completely. People with physical disability can use this idea and make there working environment comfortable. This wireless keyboard can be attached in robot arm and can be made movable in case completely electronic place. This also gives solution for better physical interaction during the seminar, conferences and meetings. The working space in real time environment can be used completely.The experimental setup shown in Fig 8 used by Wi-Fi can be done by replacing with a Bluetooth module. When one of the Wi-Fi/Bluetooth module is connected to projector and other Wi-Fi/Bluetooth module connected to the keyboard connected will start communicating when the data gets accessed , when data gets accessed the changes and work done by using keyboard will start appearing on the projector there by accessing the content can be done during the meeting and conferences at any point.

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