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VIRTUAL KEYPAD USING IR TECHNOLOGY

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Abstract - *The People within the modern technology world are busy with tremendous workloads and that they don't have even second to waste. They struggle to cut back their everyday work by using standard computing gadgets like Desktop Computers and Laptops, in addition more advanced devices like mobile devices and PCs. To improve the movability and quality individuals tend to cut back the dimensions of the gadgets. Thus most of the mobile devices and hand-held devices contain really small keypads. A number of the individuals who use such a tool find it tough to see the letters on the keyboard. With a mobile device, a full size physical keyboard isn't ideal. But alternatives are available in the form of written recognition, speech recognition etc. however all of them lack the accuracy and convenience of a full size keyboard. So this paper presents an innovative virtual keyboard to beat the mentioned issues by using the microcontroller & IR technology, which might be a viable replacement for fold-up keyboards. The keyboard primarily based on the vision based human computer interaction concept, image capturing and image processing technique that contains virtual keys adequate to the dimensions of traditional keys within the normal QWERTY keyboard.*

Key Words: Image Capturing, QWERTY Keypad, TSOP Sensors, 89c51 Microcontroller, IR Technology.

1. INTRODUCTION

As the demand for computing environment evolves, new human-computer interfaces have been implemented to provide multiform interactions between human and machines. Nevertheless, the basis for most human-to-computer interactions remains the binomial keyboard [1]. In the embedded and computer system, we make them more innovative which is based on needs. This improves sustain life of every human being on the globe which provide the easiest way to enter into the world of science and technology. We implemented Virtual Keypad using IR Technology with simplest method. As the technology advances, more and more systems are introduced which will look after the user's comfort. Few years before hard switches were used as keys, now –a –days soft touch keypads are much popular in the market, these keypads give and elegant look, they give a better feel [4]. They are dust proof and has got much more life than the other keypads. Thus we see that the new technology always has benefits and is more users friendly, we are presenting here a next generation technology in this area which is the Virtual Keypad. Virtual Keypad is more advantageous than simple keypad. Simple keypads are also good for applications, but in that, time consuming for key-pressing is more, sound for pressing is also more and it is hence complex for working. Virtual keyboard is an application which virtualizes hardware keyboard with different layouts hence allowing user to change the layout based on application [3]. E.g. user can select different language for editor or select a specialized layout for gaming applications. User can even design his own layout in hardware version. To overcome disadvantages of simple keypad, we implement Virtual Keypad.

1.1 Objective

Input to small device is becoming an increasingly crucial factor in development for ever-more powerful embedded market. Various attempts have been made to provide the common keyboard metaphor without the physical keyboard to build Virtual Keypad [2].

1.2 Necessity

The idea of Virtual Keypad is taken in reference with the concept of Virtual Keyboard using Image Processing Technology. The Virtual Keyboard and Mouse system uses camera, blank paper for drawing the keyboard. In the method that we are using this method is easy to use less expensive and even portable such as keyboard. However, the system developed is user friendly.

In previous system the virtual keyboard used projector and camera which used bare-finger touch interaction and the captured 2D image is then recovered [3]. This leads to more consumption of battery power. Thus by using only TSOP sensor we implement the structure. The system will work in the following manner as follows,

1. The input will be given using the power supply of +5V supply.
2. The control section unit used will be microcontroller AT89C51 which will do the control operations
3. 10 TSOP IR sensors will be used which will be provided with multifunction alphanumeric keys and place on one PCB
4. LCD display will be used as the output device to visible the information.

2. SYSTEM COMPONENTS

2.1 TSOP Sensors

The TSOP 1738 is a member of IR remote control receiver series. This IR sensor module consists of a PIN diode and a pre amplifier which are embedded into a single package. The output of TSOP is active low and it gives +5V in off state. When IR waves, from a source, with a centre frequency of 38 kHz incident on it, its output goes low. Lights coming from sunlight, fluorescent lamps etc. may cause disturbance to it and result in undesirable output even when the source is not transmitting IR signals. A band pass filter, an integrator stage and an automatic gain control are used to suppress such disturbances. The TSOP module has an inbuilt control circuit for amplifying the coded pulses from the IR transmitter. A signal is generated when PIN photodiode receives the signals. This input signal is received by an automatic gain control (AGC). For a range of inputs, the output is fed back to AGC in order to adjust the gain to a suitable level. The signal from AGC is passed to a band pass filter to filter undesired frequencies. After this, the signal goes to a demodulator and this demodulated output drives an npn transistor. The collector output of the transistor is obtained at pin 3 of TSOP module. Members of TSOP17xx series are sensitive to different centre frequencies of the IR spectrum. For example TSOP1738 is sensitive to 38 kHz whereas TSOP1740 to 40 kHz centre frequency.

Fig-1: TSOP Sensor

2.2 89c51 Microcontroller

The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C51 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

3. SYSTEM DEVELOPMENT

3.1 Block Diagram

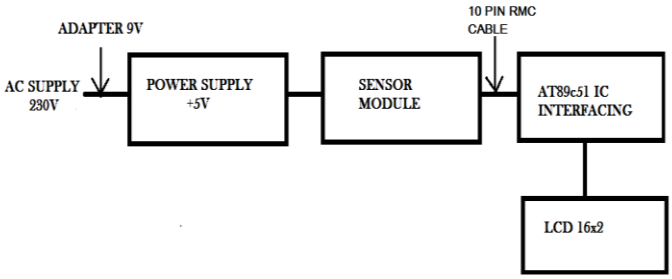

Fig-2: System Block Diagram

3.2 Working

The working of Virtual Keypad is quite simple to understand the embedded system application. In virtual Keypad, IR sensor chips are so much important to transfer and receive the signals. When power supply of +5V gives to TSOP 1738, it works as a transmitter which is ready to transmit rays. Microcontroller 89c51 also have internal power supply of +5V to ON and supplies to TSOP 1738 sensor module. Basically, detection range of IR rays is 20cm. When obstacle or finger placed on sensor module, IR rays breaks and it gets received by IR receiver. In receiver, IR filter is used to remove unwanted signal placed near IR transmitter.

On the output circuit, MAX 232 IC which is serial communication IC used to communicate between serial port DB9 connector. Tactile switch is used to reset the whole circuit and RESET switch is used to ON and OFF the circuit. For each sensor chip, there are 3-4 functions. Each sensor chip is done with programming by C language. Therefore, by placing finger for 1st time, it detects 1st value which is programmable. Finally, output is displayed on LCD.

3.3 System Features

1. Maintenance is low because even for touch and type keypads there are limited number of keystrokes are defined after which the key may stop to function, so in these unless the sensors are working the project works.

2. Low cost as compare to touch screen.

3. No noise like keys sound or beep as the output obtained is without touching.

4. It is portable device as you can carry the model easily anywhere you want.

5. Requires less space on the development board because components used are very less.

4. CONCLUSION

This system is more beneficial for public information display, automation industries and digital door locks. This project is one of the best replacements for integrated keypad. By studying on future modifications we can implement this system into keyboard using LASER to reduce the size of keyboard. Advancement in every system for each single day is to be done with new inventions & new technologies.

Thus it is very necessary to make it more smartly, with less effort for our comfort. So we will design this virtually using more advance technology of image processing & convert the keypad into keyboard with the best of our knowledge. To avoid the disadvantage that IR is affected by sunlight we can send pulses of IR light at a certain frequency instead of constant beam.

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