Home Automation Using Capacitive Based Switches

Supriya Sonde, Esha Bijutkar, Apurva Chavare

Abstract — Capacitive touch sensors are being widely used in for home based applications and even industrial, commercial applications. The advantages of capacitive touch sensors are numerous compared to mechanical switches. The factors behind such a huge demand for the touch sensors are because of their durability and robustness; they are also low in cost. Touch sensors does not have moving parts. This property of touch sensors make them durable than mechanical switches. As there are no ways for humidity and dust to enter in them, these Touch sensors become more robust. With the deep understanding and research on sensor technologies we have introduced Capacitive based touch switches for multiple area usage. Touch switches could be used in Normal house switch boards, home appliances, Medical applications and Industrial purpose. Touch switches also have a compact switch board and are completely shock proof thus they provide safety to the users.

Index Terms — Smart Home, Home Automation, Automatic switches, Capacitive touch, Touch sensors

I. Introduction

A very important sensory channel in many animals and some plants is the touch sense. As we know touch sensing input devices offer numerous possibilities for novel interaction techniques. Mechanical objects like keyboards and switches are being replaced by touch sensors. A touch is detected by touch sensor or just the proximity without depending on the physical contact. Touch sensors are building their own way into number of applications such as mobile devices, remotes, and controlling panels etc. Present day mechanical buttons can be replaced by touch switches. They are more use friendly and do not to use without moving circuitry.

II. Proposed System

Fig. 1 gives the block diagram of system. The microcontroller used is the Cypress CY8C4245 microcontroller. The 230V - 5V converter has been connected to mentioned microcontroller. . Further it is followed by the 3. 3 V regulator which gives input to the microcontroller.

The 5V regulator also provides power supply to the 5V 1A mobile charger. The microcontroller gets four inputs from the touchscreen front panel. The outputs of the microcontroller go to the 5 TRIAC connected. The TRIAC get their input power from the 230 - 5V converter with 230V input. The TRIAC gets signal from the microcontroller and 230V input from the main supply. The TRIAC are connected with a two pin connector with a live and one neutral wire. Therefore the 230V output generated by the TRIAC is used by the connector to switch on the light. This same process takes place for fan dimming. A. Fig. 1 Block Diagram of Proposed System TRIAC 5 has a connector which is connected to fan whereas TRIAC 1, 2, 3 and 4 has connectors joined to the lights

A. System block diagram

Upto 10-90% dimming facility can be Current design supports 4+1 Switches and 1 FAN. There is 5 Level of FAN speeding control. FAN speed control could be extended up to 10Levels. It can be customized to any number of switches. Voltage 100V - 300V AC 50/60Hz, Maximum 12ACurrent. The Working temperature range is -100C-+800C B.

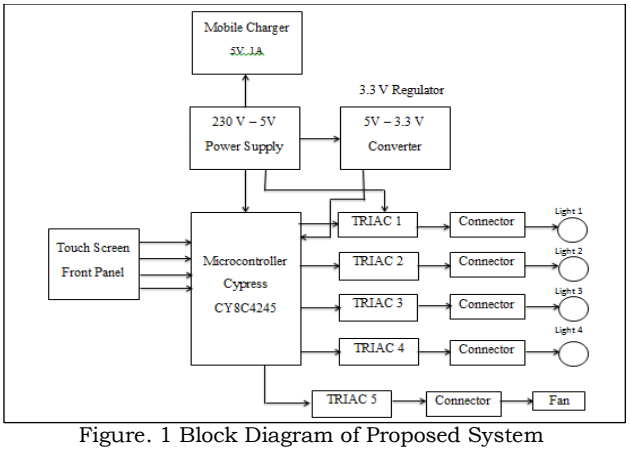

Figure. 1 Block Diagram of Proposed System

B. Software description

PSoC Creator is one Integrated Design Environment (IDE) that gives the ability of concurrent firmware and hardware editing as well as compiling and debugging of PSoc systems. Applications can be created using graphic capture and above 150 pre-verified, peripheral components. •It has communication library containing I2C, UART, USB, CAN,SPI, Bluetooth etc. •The used peripherals are very powerful image configuration tools • Widespread analog signal support with filters, amplifiers, DAC and ADC • Dynamically generated libraries of API • Free compiler for C source code which does not have any limitation on code size •Built-in debugger for C.

C. Components

Components are analog as well as digital peripherals which are represented using a symbol that users can drag-and-drop in their designs as well as configure so that it suits a an array of requirements of applications. After the configuration of the peripherals, firmware is written and then it is compiled and debugged with PSoC Creator and finally exported to the Integrated developments environments like as IAR Embedded Workbench®, Eclipse™. Users can also develop custom made components using the state diagrams or Verilog for optimization of energy and hardware usage.

D. Requirements

Capsense touch sensors • Resistors • Cypress microcontroller CY8C4245 • TRIAC • Power Supply • LEDs • Connecting wires • MOC3021 • Capacitive touch board E.

E. Abbreviations and Acronyms

- PSOC- Programmable System On Chip
- TTP – Touch pad capacitive sensors
- IDE – Integrated Development Environment
- API- Application programming Interface

F. Equations

Equations 1. C= Q/V 2. Xc= 1/2.* pi* fc 3.

C= (A *?0* ?r)/ D Where, Xc is the capacitive reactance in ohms. E = 8.85 x 10-12 F/m (permittivity of free space) Q is the charge held on the plates in coulombs. V is the potential across the plates in volts.

ADVANTAGES AND APPLICATIONS

The Touch switches have self-calibration capabilities and work in harsh environment • LED Illuminated switches. Easy to operate in night. • No Mechanical or Electromechanical Parts. Life of switches and other hardware is extremely high.

We don't use Electro-Mechanical relays any more.

- Hardware is light, compact and Modular.• Futuristic design. Easy to implement in Home automation projects.
- Cost competitive.
- Reduces wiring complexities.
- Safety to users
- Fast in time response with low power consumption. conclusions This project is a useful tool for the safety of old people and small kids. The ease of operation and the project is robust

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