UNIT-V

APPLICATIONS

Capsense :-

Capasitive sensing (or CAP-SENSE) allows, a robust detection of the human finger with a light touch and without any moving parts.

- It can be used for porximity detection, detecting a finger close to a spinning blade or potential pinch point.
- capsense is ideal for an industrial environment becz the switch never wears out or needs repair
- It is inexpensive to implement and can be made in virtually any size and shape.

Applications :-

- Sliders can be used to interpolate hundereds of positions from a small no. of sensing elements, which makes it ideal for game ctrl settings adjustment and fine positioning.
- capsense can be Implemented on PCB's, flex ckts, polyester membranes and touchscreens.
- It can track multiple fingers simultaniously & can interpret movement of the fingers to add new posibilities to the user interface.

Operation :-

The capacitance measurement on the circuit is very sensitive. The ckt is sensitive to changes in temp, humidity, voltage and noon.

- The capacitive system must be tuned and adjusted for the board layout and the environment in which it operates.
- The configuration of capsense parameters relates to how much variance can be achieved in the capacitive value.
- when the finger approaches the capsense sensors, the capacitance increases because the capacitance of the finger w.r.to ckt ground in parallel with the capacitance of sensing I/o pins w.r.to ckt ground.
- The code for the capsense project establishes a baseline measurement. The baseline value is the value of capacitance measured when no finger or object is present.
- This value is subject to some natural variance from reading to reading as well as drift in average measurements due to changing environmetal conditions.
- The finger threshold is a value used to determine if the button is ON or OFF.
- If the difference between new reading and baseline is above the finger threshold, then the button is determined as ON, otherwise it is OFF.
- There is an adjustable hysteresis value around the finger threshold to handle small deivations above & below the finger threshold.

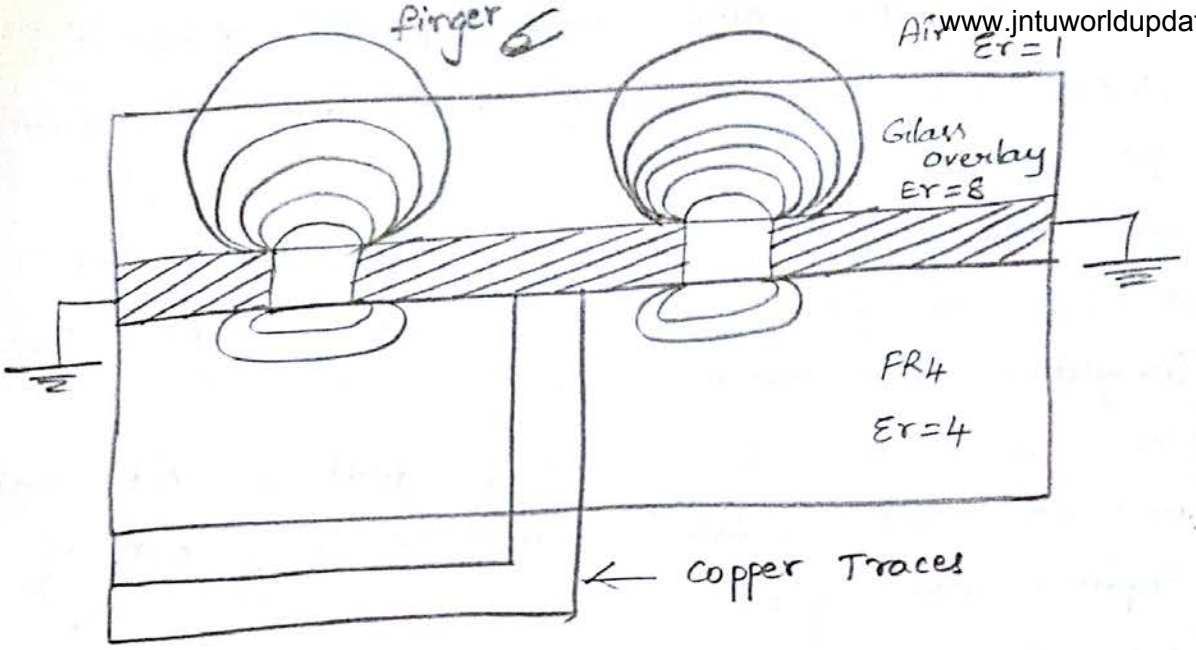

Fig: Cross section of a Capacitive sensor

Digital logic :-

This logic demonstrates the ability to add various digital logic elements into a design. The digital logic will be used to create a state machine for the riddle : farmer, corn, fox, goose.

- we will add digital logic elements to our design to create a state machine based around the riddle farmer, corn, fax.
- The riddle describes a farmer with some corn, a fox who needs to get all of these across a river.
- There is a beat (boat) for the farmer to use, but the farmer can only fit one item with him on the boat to cross the river.
- He cannot leave the goose with the corn or, bc2 the goose will eat the corn.
- He cannot leave the fox bc2 the fox will eat the goose. You need to determine what order the farmer must use to take all the

items to the other side of the river.

- There are seven steps that must be taken to get across the river.
- The logic will decode what step we are on, if an error condition occurs, and we have sucessfully completed the task
- The assignment was to construct a ckt that modeled the riddle almost entirely out of two input NAND gates.
- This solution took up two full breadboards with a rats neit of wires
- This experience helped build appreciation for more powerful logic & finally microcontrollers.
- The application of the farmer, corn, goose & fox riddle in this project implements the solution using a

Pricision Analog :—

This deals with some basic precision, analog functions available in the PSOC platform.

- A potentiometer and a voltage DAC will be used to generate analog signals. These signals are routed to an ADC for Conversion.
- The PSOC platform excels in its ability to process and manipulate analog signals and is able to accurately process very small signals.
- The high precision becomes possible with a very low noise floor through the analog system.

Operation :-

- we need to create a simple analog system that introduces the analog capabilities of the PSoC platform.
- The voltage DAC and the potentiometer are connected to the MUX that switches them to the ADC
- The project also uses an optional amplifier to show how, internal amplifier works.
- The op-amp and mux of the PSoC device allow for much of the routing to be done internally and for access to outside pins when needed to apply external components.
- To see how the ADC works we need an analog signal to convert. we are going to use a potentiometer to provide one analog signal, DAC to produce another signal, and a multiplexer to switch between them.
- A basic potentiometer provides a great diagnostic tool for analog processing since you can slowly sweep the signal through the range of the potentiometer & observe the output.
- The DAC is used to create a few basic patterns using some timing and a look up table. we will use the capsense buttons and a slider to provide the controls, and the char LCD and the UART to provide visual feed back.

Advantages of precision analog input :-

1) It has good noise immunity.

2.) Radiated noise on the ckt increases with long traces and larger ground loops. The traces on the Si of the device are much smaller and shorter than the traces on the PCB.

3.) Integrated analog also reduces device count and possibly additional Comm' circuits.

Serial Communication :- (UART) :-

- The project demonstrate how to configure a UART in the CYEC3866 and a use a 2x16 LCD display.
- The UART provides a Comm' link b/w the project & a Computer, we will need a computer with a fast COM port or a USB to RS232 converter. The LCD display is used to display some debugging information.

Operation :-

- A two way Comm' with a PC is a very powerful tool for any embedded designer
- A simple UART connection allows project to benefit from the rich info & display capabilites of a computer.
- The UART connection can serve as a real time debugging tool during operation.
- The format of Comm' for the UART makes it a good choice for a part time debugging tool.
- Since the Comm' does not require a response from the Computer In order to Continue : you can

leave a computer disconnected with the debugging code active.

- So that, a computer can be connected to the project for debugging at any time without restarting the project.

Applications :-

- For decades the UART serial communication port has been a basic link to communicate between the PC with external devices.
- The comm' is basic, simple, needs little circuitry, & requires only two data lines to transmit & receive. Transmission and reception of data can happen simultaniously since the Tx and Rx are on seperate pins.
- UART communication does not have a clock signal. Each bit is transmitted for a specific length of time. the bit time is given in the no. of bps that can be transferred
- This designation is also referred to as baud rate
- The baud rate must be determined before communication starts. Some systems implement algorithms to negotiate the current baud rate from a predetermined list by testing a received string of communication at different speeds. Each byte to communication is framed by a start bit and a stop bit.

- The start & stop bits are used to align the data so it can be properly sampled.
- The UART does allow for some variation in the stop bit length as well as how many data bits are transmitted at a time. The example uses the setting of 8 data bits and stop bit of length of one.
- The UART's continue to be common peripherals in various Embedded system. Recently the desktop and Computer Industry have been removing com port from their H/w in favour of USB. The USB information is a more complex information that is much more powerful in its abilities.
- It can easily serve as a single TX and Rx datapath to the serial communication port.
- The PSoc device can create a USB to UART bridge for your project. The USB to UART Component was not available at the commencement of project instead basic UART and RS232 voltage level translator on DVK board.

Blinking an LED :-

Application Notes :-

Blinking an LED is a common first step with any project that uses a new peripheral or all new hardware.

- Since blinking an LED is a simple task, it is easy to debug and test.

- It allows us to accomplish a simple straight forward task that generally does not require any special equipment to the programmer & developmt software.

Applications of LED :-

1) LED's can be used for indicators and signs such as LED displays, display boards on buses, taxies, indicators of vehicles, high mounted brake lights, parabolic reflectors.

2) LED's can be used for lightning such as Lamps, automotive lighting, street lights, security Cameras, video camera, mining operations.

3) Data Communication and signalling such as : In traffic lights, and during the Communication of the data from the TX to RX or vice versa.

- This project demonstrated one of many ways to create a periodic interrupt.
- The method used in this project allows us to configure system, wide resources, digital logic in USB blocks and I/o pins.
- The pwm module created a system that is easy to debug at the most sudimentary levels so that, we have a basics for the other projects.
- The timing flags create a basic task scheduler that can be easily altered to meet different periodic requirements.

- The use of timing flags set with in a timing interrupt allows the bulk of code execution to be done outside the interrupt.
- If execution of a task is very time critical and needs to be able to interrupt other task executions, that task can called from with in the timing interrupt.
- caution should be taken to make sure that any task can be called from with in the timing interrupt does not take longer to excute than the period of the timining interrupt.