Abstract:

Security is primary concern for everyone. This Project describes a design of effective intelligent security system which can monitor a particular area, if anything comes near to it, the sensor can sense the object and gives the analog signal to the PSOC MCU, the on-chip ADC converts this analog values and converts into digital. With unique array of configurable digital and analog blocks, the Programmable System-on-Chip (PSoC) is a true system level solution, offering a modern method of signal acquisition, processing, and control with exceptional accuracy, high band width, and superior flexibility. This project senses the human movement using PIR Motion sensor. Whenever security system is activated the PSoC Controller will continuously monitor the PIR output. The change in the PIR Motion sensor will be detected and alarming circuit will be activated.

Keywords:
PIR sensor, lighting system, Psoc.

I. INTRODUCTION:

Due to increasing number of crime and burglary, the need of security system is very essential. The security system that monitors the area throughout the time and reacts effective to the threat is in need. We have lots of security systems in the market for both indoor and outdoor applications such as ultrasonic detectors, CCTV, microwave detectors, photoelectric detectors, infrared detectors etc. However, one or the other systems have the limitations of being expensive, more electrical power consumption, more memory space utilization of the recording system and complex circuitry, etc. A solution to overcome these problems could be by using a sensor of low cost which has the ability to detect the intruders as they come within the sensor’s detection range and generates an output.

The proposed system basically consists of two parts viz. hardware part and software. These two parts are interfaced to work with each other according to the response of the PIR sensor.

A. Hardware parts:

The hardware part consists of PIR sensor, power supply, amplifier, window detection circuit, webcam and the computer.

1) PIR Sensor: The PIR sensor is the core part of the system. The system basically function based on infrared radiation, which is emitted from human body. PIR sensor is widely used in security system to detect the motion of human. Infrared (IR) light is electromagnetic radiation with a wavelength between 0.7 and 300 micrometres.
Humans beings are the source of infrared radiation. It was found that the normal human body temperature radiate IR at wavelengths of 10 micrometre to 12 micrometre [5][6]. PIR sensors are passive electronic devices which detect motion by sensing infrared fluctuations [7]. It has three pins (gate, drain and source). After it has detected IR radiation difference, a high is sent to the signal pin. PIR sensor is made up of crystalline material that generates a surface electric charge when exposed to heat in the form of IR [5]. This change in radiation striking the crystalline surface gives rise to change in charge. The sensor elements are sensitive to radiation of wide range but due to the use of filter window that limits the sensitivity to the range 8 to 14 micrometre which is most suitable to human body radiation [5].

![Fig. 3 Working of PIR sensor.](image)

**PSOC MIXED SIGNAL ARRAY:**

PSO C (Programmable System-on-Chip) is a family of integrated circuits made by Cypress Semiconductor. These chips include a CPU and mixed-signal arrays of configurable integrated analog and digital peripherals. PSoC Block Example Using configurable analog and digital blocks, designers can create and change mixed-signal embedded applications. The digital blocks are state machines that are configured using the blocks registers. There are two types of digital blocks, Digital Building Blocks (DBBxx) and Digital Communication Blocks (DCBxx). Only the communication blocks can contain serial I/O user modules, such as SPI, UART, etc. Each digital block is considered 8-bit resources that designers can configure using pre-built digital functions or user modules (UM), or, by combining blocks, turn them into 16-, 24-, or 32-bit resources. Concatenating UMs together is how 16-bit PWMs and timers are created.

There are two types of analog blocks. The continuous time (CT) blocks are composed of an op-amp circuit and designated as ACBxx where xx is 00-03. The other type is the switch cap (SC) blocks, which allow complex analog signal flows and are designated by ASCxy where x is the row and y is the column of the analog block. Designers can modify and personalize each module to any design.

**Piezo Electric Buzzer:**

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or electronic. Typical uses of buzzers and beepers include alarms, timers and confirmation of user input such as a mouse click or keystroke. A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.

**SOFTWARE ARCHITECTURE AND IMPLEMENTATION:**

**OrCAD:**

OrCAD is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly to create electronic prints for manufacturing of printed circuit boards, by electronic design engineers and electronic technicians to manufacture electronic schematics. The name OrCAD is a portmanteau, reflecting the software’s origins: Oregon + CAD.
Program:

```c
#include <m8ch.h> /* part specific constants and macros */
#include "PSoCAPI.h" /* PSoC API definitions for all User Modules */
#include "stdio.h"

/* Macros for Port numbers */
define PORT_0 0x00
#define PORT_1 0x01
#define PORT_2 0x02

/* Macros for LED pin */
define LED_PORT PORT_0
define LED_PORT_DR PRTODR
define LED_PORT_DM0 PRTODM0
define LED_PORT_DM1 PRTODM1
define LED_PORT_DM2 PRTODM2
define LED_PORT_PIN 0x01
define LED_PORT_SHADOW Port_0_Data_SHADEV

#define RESOLUTION 12 /* ADC resolution */
define SCALE_BG (( 1 << RESOLUTION)/55) /* Bar-Graph scale factor */

/* Shadow register used for SW port */
extern BYTE Port_0_Data_SHADEV;

int iResult,i1,i2; /* ADC result variable */
char Res;
char buffer[20];

void conv(unsigned int a)
{
    charBuff[20];
    unsigned int a1,a2,a3,a4;
    a1=a/100;
    LCD_1_WriteData(a1);
    a2=a%100;

    a3=a2/10;
    LCD_1_WriteData(a3);
    a4=a2%10;
    LCD_1_WriteData(a4);
    LCD_1_WriteData("1");
    LCD_1_WriteData("C");
}
```

```c
void main(void)
{
    charBuff[10];
    /* variable to get the LED pin drive mode */
    BYTE ledPinState;
    BYTE bgPos; /* BarGraph position */

    PGA_1_Start(PGA_1_MEPower); /* Turn on PGA power */
    ADCINC12_1_Start(ADCINC12_1_MEPower); /* Turn on ADC power */
    ADCINC12_1_GetSamples(0); /* Sample forever */

    LCD_1_Start(); /* Init the LCD */
    LCD_1_InitBG(LCD_1_SOLID_BG);
    LCD_1_Position(0,0);
    LCD_1_PrCSTRING("PSoC INTELLIGENT");
    LCD_1_Position(1,0);
    LCD_1_PrCSTRING("SECURITY SYSTEM");

    for(i1=0;i1<=100;i1++)
    {
        for(i2=0;i2<=1000;i2++)
        {
            iResult = ADCINC12_1_iSampleData(); /* Get result, convert to unsigned and clear flag */
            ADCINC12_1_ClearFlag();

            while(1) /* Main loop */
            {
                if (ADCINC12_1_fIsDataAvailable() == 0) /* If ADC sample is ready... */
                {
                    iResult = ADCINC12_1_iSampleData(); /* Get result, convert to unsigned and clear flag */
                    ADCINC12_1_ClearFlag();
                }else
```
iResult=iResult/10;

}  
  LCD_1_Position(0,0);
  LCD_1_PrCString("SECURITY SYSTEM");
  LCD_1_Position(1,0);
  if(iResult<40)
  {
    SET_PIN_wSHADOW(LED_PORT_DR, LED_PORT_PIN, LED_PORT_SHADOW);
    LCD_1_PrCString("STATUS: SAFE ");
  }
  else
  {
    CLEAR_PIN_wSHADOW(LED_PORT_DR, LED_PORT_PIN, LED_PORT_SHADOW);
    LCD_1_PrCString("STATUS: IN-TRUDER");
  }
}

CONCLUSION:

This project presents a Proximity Sensor Based Intelligent Security System Using Psoc Mixed Signal Array is designed and implemented with PSOC Controller in embedded system domain. Experimental work has been carried out carefully. The result shows that higher efficiency is indeed achieved using the embedded system. The proposed method is verified to be highly beneficial for the security purpose and industrial purpose.

REFERENCES:


