2EC701

Microcontroller Interfacing

Report On:

“Clap Counter”

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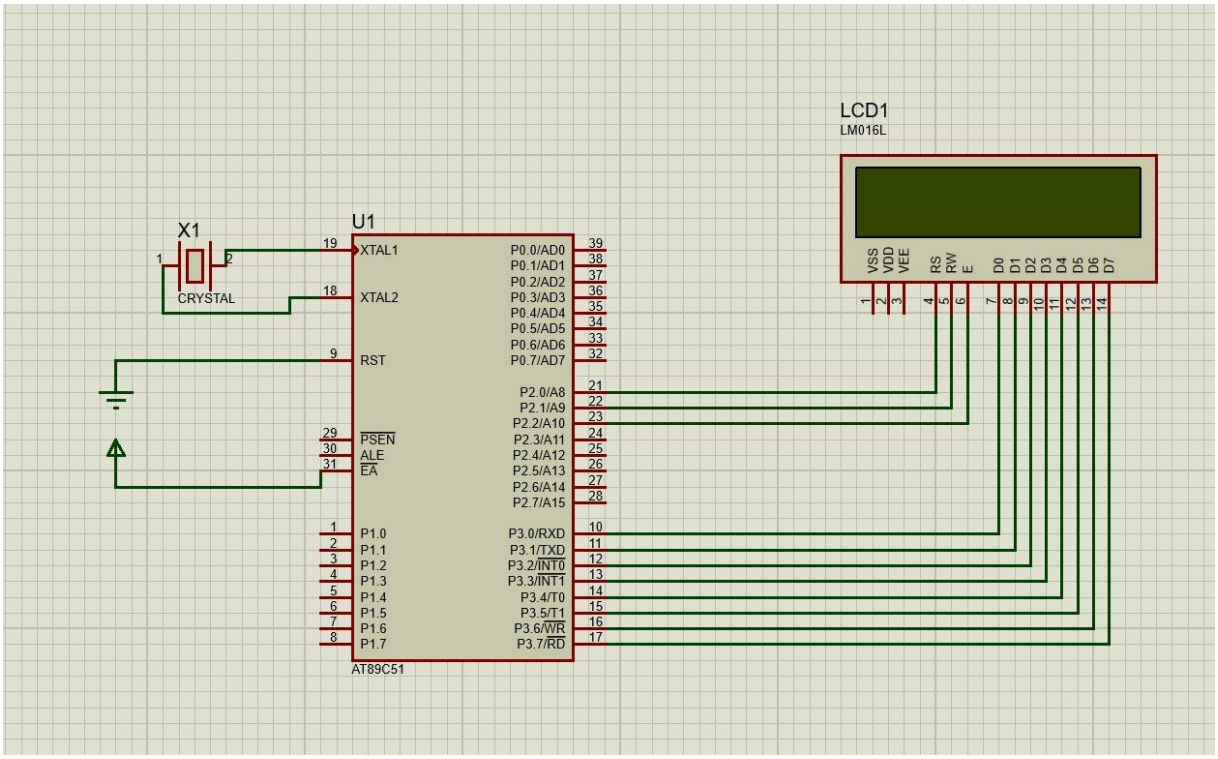
Introduction

- The Clap Counter is an innovative project that harnesses the capabilities of an 8051-microcontroller coupled with a clap sensor. This hands-free system accurately identifies and logs clap occurrences, offering a seamless and precise counting method. This project exemplifies the fusion of embedded systems principles, including sensor interfacing, signal processing, and display control. It underscores the versatility of microcontrollers beyond basic arithmetic operations, showcasing their ability to interact with external sensors, process input signals, and deliver meaningful real-time output.

Diagram



Working

1. The condenser mic (clap sensor) is connected to the microcontroller's input pin (P1.0).
2. When a clap is detected, the sensor sends a signal to the microcontroller.
3. The microcontroller uses debounce logic to avoid multiple counts for a single clap.
4. It increments the clap count and updates the lcd display to show the count.
5. Overflow handling ensures the count resets after reaching 99.

Code

```c
#include<reg51.h>
#define lcd P3

sbit SOUND = P1^0;

sbit rs = P2^0; //register select
sbit rw = P2^1; //RW
sbit en = P2^2; //enable

unsigned int count = 0; // Global counter variable

void lcd_init();
void cmd(unsigned char);
void dat(unsigned char);
void delay();
void lcd_string(char *s);

void main()
{
    lcd_init();
    while(1)
    {
        if(SOUND == 1)
        {
            count++; // Increment count on sound detection
            cmd(0xc0); // Move to the second line
            lcd_string("Count: "); // Display label
            cmd(0xc7); // Move cursor to the count position
            dat((count/100) + '0'); // Display hundreds digit
            dat(((count/10) % 10) + '0'); // Display tens digit
            dat((count % 10) + '0'); // Display ones digit
            delay();
        }
```

```c
void lcd_init()
{
    cmd(0x38);
    cmd(0x0e);
    cmd(0x06);
    cmd(0x01);
    cmd(0x80);
}

void cmd(unsigned char a)
{
    lcd = a;
    rs = 0;
    rw = 0;
    en = 1;
    delay();
    en = 0;
}

void dat(unsigned char b)
{
    lcd = b;
    rs = 1;
    rw = 0;
    en = 1;
    delay();
    en = 0;
}

void lcd_string(char *s)
{
    while(*s)
```

```
78  }
79
80  void delay()
81  {
82      unsigned int i;
83      for(i = 0; i < 20000; i++);
84  }
85
```

Results & Applications

The project was tested using a clap sensor and a lcd display. Claps were accurately detected, and the count was displayed correctly on the display. The Clap Counter has practical applications in areas where hands-free counting is required, such as:

- Attendance systems - Traffic monitoring - Industrial automation - Home automation systems - ...and many more!

Summary

The Clap Counter project showcases the integration of an 8051 microcontroller with a clap sensor to create a hands-free counting system. By detecting and tallying clap instances, it offers a practical solution for contactless counting needs, such as in attendance systems or traffic monitoring. This project highlights key embedded system principles like sensor interfacing, real-time data acquisition, and display management. It also serves as an educational tool for understanding microcontroller programming concepts like debounce logic and overflow handling. Overall, the Clap Counter project demonstrates the versatility and applicability of microcontrollers in developing tailored solutions for diverse industrial and consumer applications.