Skill AP
APSSDC

Andhra Pradesh State Skill Development Corporation

Embedded systems

Interfacing LED to ARM7 _ LED blinking

3.LED Blinking

Aim: To Blink a led using keil.
Software:
Keil uVision 5

Magic Flash Tool
Before getting into the project we must know few things about the led modes of operation and about the led Hex codes

Components required:
ARM7-LPC2148 Microcontroller board
Led
resistor
Breadboard
Connecting Wires
Micro USB cable

Theory: LED: A light-emitting diode (LED) is a semiconductor device that emits visible light when an electric current passes through it. The light is not particularly bright, but in most LEDs, it is monochromatic, occurring at a single wavelength. The output from an LED can range from red (at a wavelength of approximately 700 nanometers) to blue, violet (about 400 nanometers). Some LEDs emit infrared (IR) energy (830 nanometers or longer); such a device is known as an infrared-emitting diode (IRED).

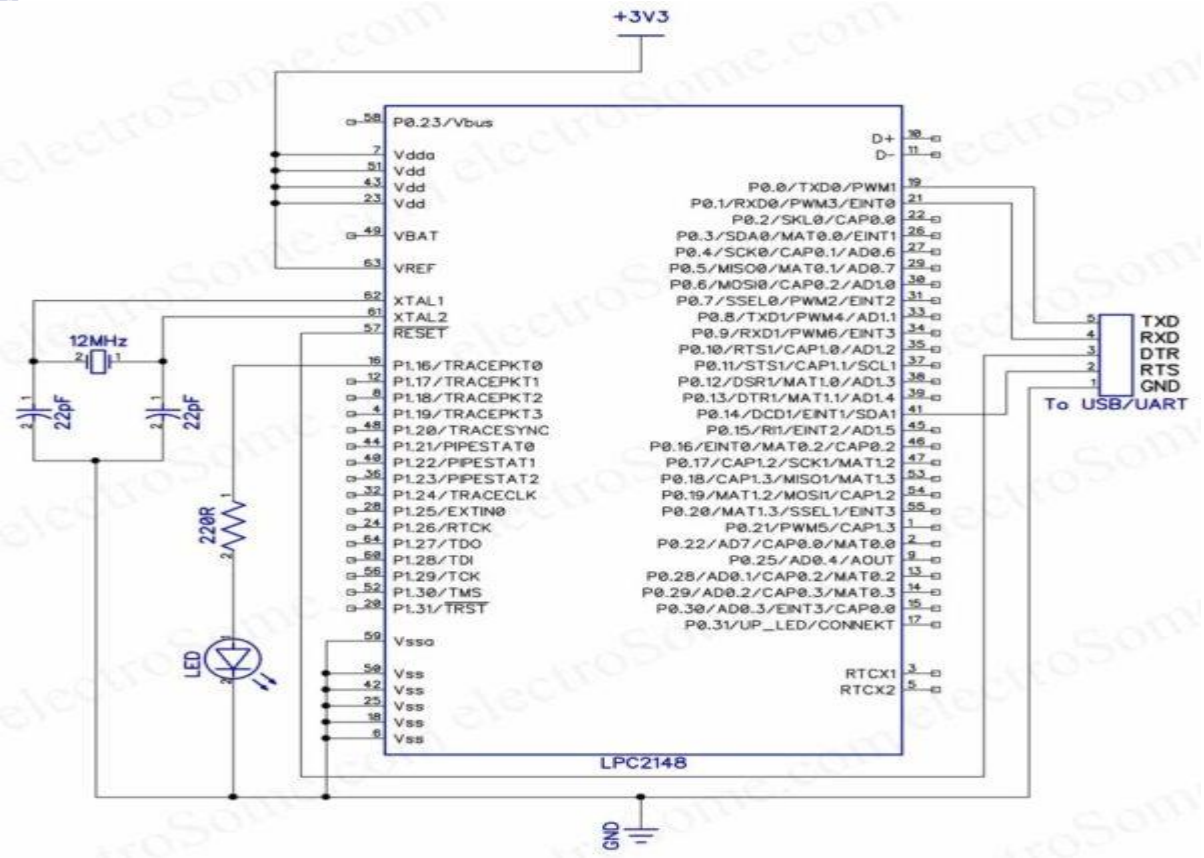
Advantages of LED's.

- Low power requirement: Most types can be operated with battery power supplies.
- High efficiency: Most of the power supplied to an LED or IRED is converted into radiation in the desired form, with minimal heat production.
- Long life: When properly installed, an LED or IRED can function for decades.

Applications:

- Indicator lights: These can be two-state (i.e., on/off), bar-graph, or alphabetic numeric readouts.
- LCD panel backlighting: Specialized white LEDs are used in flat-panel computer displays.
- Fiber optic data transmission: Ease of modulation allows wide communications bandwidth with minimal noise, resulting in high speed and accuracy.
- Remote control: Most home-entertainment "remotes" use IREDs to transmit data to the main unit.
- Optoisolator: Stages in an electronic system can be connected together without unwanted interaction.

Circuit Diagram:



Procedure:

Registers

In this section we will learn about different registers used for configuring or controlling a pin of an ARM microcontroller. In microcontrollers, pins are divided in to different PORTS. Usually a 32-bit microcontroller will have 32 pins per PORT (sometimes it may vary). We have 2 PORTS in LPC2148, P0 and P1. Each pin of these ports are named as P0.0, P0.1, P0.2, P1.0, P1.2 etc.

IOxDIR

This register is used to control the direction (input or output) of a pin, once is it configured as a GPIO pin (General Purpose Input Output) by using PINSELx register.

IOxPIN

IOxPIN is GPIO port pin value register. This register is used to read the current state of port pins regardless of input or output configuration. And it is also used to write status (HIGH or LOW) of output pins.

IOxSET

IOxSET is GPIO output set register. This register is commonly used in conjunction with IOxCLR register described below. **Writing ones to this register sets (output high) corresponding port pins**, while writing zeros has no effect.

IOxCLR

IOxCLR is GPIO output clear register. As mentioned above, this register is used in conjunction with IOxSET. **Writing ones to this register clears (output low) corresponding port pins**, while writing zeros has no effect.

Code:

```
//include header file
#include<lpc21xx.h>
//define user sub function for delay
void delay(unsigned int);
// assign address of pin to the variable name
#define led 0x00000001
// start main function
int main(){
// initially all pins are declared as input
// above led pin change to output
IODIR0|=led;
// start continues loop
while(1){
//assigne 1 to pin for on led
IOSET0|=led;
// call delay function for delay
delay (1000);
// assigne 0 to pin for off the led
IOCLR0|=led;
// call delay function for delay
delay (1000);
}
}
void delay (unsigned int a){
int x,y;
for(x=0;x<a;x++)
for(y=0;y<1000;y++);
}
```

Result : LED blinks continuously.