

I'm not robot!

Prepare for Liftoff!

However you came here, we're glad that you did! In the following pages, we're going to learn a lot about a little red board that we call the MSP430 LaunchPad Evaluation kit. For the purpose of this book, we'll call our new friend "LaunchPad".

We've got a long way to go, but if you stick with us, we think that you and the LaunchPad can become the best of friends. This could be the beginning of a special bond filled with flashing LEDs, buzzing buzzers, and spinning motors!

May you embark on a journey full of discovery and wonder as you conquer the ultimate quest alongside your trusty LaunchPad.

1.1 WHO SHOULD READ THIS BOOK?

The LaunchPad is a great introduction to the world of microcontrollers. Interested readers from all experience levels may find this book a great resource to help guide them through their journey with the LaunchPad.

You came to the right place if:

- You are a student or a curious reader without any background or experience with electronics or microcontrollers.
- You are a hobbyist who wants to get their hands dirty making new electronics by yourself. This book can help you get started.
- You are an electrical engineer who has focused on circuits and hardware but have not yet had a chance to step into the world of embedded programming. This book can reveal the simple steps needed to get started with coding and giving your design some intelligence.
- You are a software developer who can write code in your sleep but have not had a chance to touch the hardware side of things. This book can show you how easy it is to make the first step over to the hardware side.

À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ à á â ã ä å æ ç è é ê ë ì í î ï ñ ò ó ô õ ö ÷ ø ù ú û ü ý þ ÿ [B]eretta, the blogger from mspsci.blogspot.com has an amazing series for getting started on the MSP430. He starts right from the basics of his hardware setup to software, your first program, timers and then moves to other modules of the MSP. Each blog post comes bundled with source code and the occasional schematic.To make things easier for 430h readers, below is a list of his tutorial series. Thanks [B]eretta, keep them coming!Hardware Software Writing your direct program eAAA Blink an LED Configuring Inputs and OutputsTutorials TheÀ ÁMSP-EXP430G2 is a Development ToolÀ Áa.k.a LaunchPad provided by theÀ ÁTexas InstrumentsÀ Áto learn and practice on how to use their Microcontrollers. This board falls under the MSP430 Value Line category where we can program all the MSP430 series Microcontrollers. LearningÀ Áhow to use TI MicrocontrollersÀ Áwould definitely be a mighty tool up in our sleeve because TI is really huge and has a wide verity of MCUCeÀÁAs to choose from for a very less competitive price. We already covered detailed article on using Energia IDE with MSP430. In this tutorial we will learn about Code Composer Studio and how it is used to program MSP430. This tutorial is written for very beginners and no hardware is required except the MSP430 board and a computer. At the end of this tutorial we will be able toÀ ÁBlink the onboard LED of MSP430. MSP-EXP430G2 Development Board: The gorgeous red colour board is the MSP-EXP430G2 Development Board. This board can program TI Microcontrollers that fall under the MSP430 series. The main purpose of this board it to upload code from the computer to the MCU and read serial data from the MCU for debugging purpose. It also provides the pin-out for each pin of the MCU and also two LEDs and a push button to make development easy. The board has evolved a lot since its launch and the one shown below is theÀ ÁMSP_EXP430G2 Rev1.5.À Á TheÀ ÁMSP430G2553 has better Than the other series. It also features an uart module that would be very useful when debugging the oo of the composer studio code. Therefore, in this series of tutorials, we will pray the MSP430G2553 to explore all the features of this development kit. feeding and testing the development board: before we start anything you would already have loaded a sample program on your MSP430G2553 microcontroller, then let us feed the frame and check if it is working. you can connect to the mini ob jack and after you do this, you should notice the leds (red and green) in the lower left corner of your plate shining alternatively. you can press the pressure button connected to the P1.3 to check if the internal temperature sensor is working. Yes, the msp2553 has an internal temperature sensor, after pressing the button, just rub your fingers to warm it and put it on the ic. you may notice that the red led turns on to indicate the temperature increase. Cool! Okay now, let's go to the software environment. programming software (ide) for MSP430 launchpad: texas instruments allows us to program your microcontrollers through a variety of environments. The official is the code composer studio, known as ccs. this software is available for free. In addition, it requires a minimum level of experience with microcontrollers. Don't worry, we will approach all the steps to familiarize ourselves with ccs. There is one more ide available to write our program, u.e. energy ide, then, what is the difference between ccs and ide energy. We have already covered the energy ide in our previous tutorial. energy ide vs. composer studio code: energy is an open source and free environment that allows us to easily program the microcontrollers ti. the main goal of energy is to facilitate the programming of ti mcu. therefore, energy is an equivalent tothat supports Texas Instruments microcontrollers. 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Then, let's go À Álook at the first window we will see. This is a simple interface where you can see Getting menu started in which you can start doing your project. next to start, there is a resource explorer. This is an incredible characteristic of this software in which you can find all the details of a ti product such as spreadsheets, documentation, etc. There is no need to find data sheets on the Internet, just click the resource explorer and click on the device you want to explore after you can see all the details about the product. Creating First Project at Code Composer Studio: Blink an LED: Creating CCs Project: Step 1: -Click File -> New -> CCS Project. As shown below Step 2:- Next, you have to choose the MSP card you are using. I am using MSP430G2553 So, I will choose this as shown. Dã# Name to your project and click Finish. As soon as you click on, a new window will be open with a few lines of course written in it. CCS Code in CCS: Let's see the structure of the Code that is already given. FIRST LINE IS OUR HEAD FILE that depends on the variant we chose when creating the project. As I said I'm using MSP430G2553, I will rename the File. In the main function you will see the initialization of the Watchdog timer. MSP430 and another IT -based microcontroller has a special type of timer that is known as Watchdog timer. The work of this timer is the microcontroller when it begins to hang or stop responding. In our way, we will not use the Watchdog timer because it is above the beginner's perspective. When on the microcontroller, Watchdog Timer is on pattern, we have to hurt this timer by writing this line WDTCTL = WDTPW | WDTHOLD; Now we have to write blinking on board LED that is connected to P1.0. There is another LED connected to P1.6. We will only use the first LED. You are able to write a way to alternate alternating two LEDàÁÀAs also after you understand the blink program. First, we have to declare these PINS as we are using these as INPUT or OUTPUT. There are many type of Registers i.e. memory blocks used to control PORTS. So, for defining PORT as INPUT or OUTPUT, PXRDIR (X is port no.) (Data Direction Register) register is used. If PXDIR is 1 it acts as OUTPUT and 0 for INPUT. Our LED is at port no. 1 so we will write as P1DIR. We need to configure PIN 0, as our LED is connected to this PIN and it is OUTPUT. Each port has 8 bits and we want Bit0 as HIGH to make it OUTPUT. So, we assign P1DIR as P1DIR = 0b00000001; it is in binary , we can also write it in Hexadecimal i.e. P1DIR = 0x01; Next, we have to set the particular pin of particular port as high or low. For this purpose we have to useÀ ÁP1OUT register, 1 for high while 0 for low. Initially, I make the LED ON by setting BIT0 as 1 other remains zero. P1OUT=0b00000001; P1OUT = 0x01; /m hexadecimal As there is no inbuilt function of delay in MSP430 so, we have to use for loop to provide delay. So, in next step, we have to declare a variableÀ ÁAcÀÁÀicÀÁÀÀÀ Àfor delay purpose which can be written as Unsigned int i; First, we will make PIN0 HIGH and give some delay using FOR loop after that make the PIN LOW. In this way, we get blinking effect. We write program like this: P1OUT=0X01; //make bit0 HIGH for(i=0;i- nuR me euqilC ,amargorp od daolpu rezaf ed aroh À , "odanimret dliuB" jÀrartsom elE ,alenaj ad roirefni etrap an elosnoc ed axiac an oÈÀÁÀalipmoc ed oir³Ataler o euqifireV ,odut riurtsnoc >- otejorp on euqile esse arap ,ogid³Àc osson riurtsnoc/ralipmoc euq somet ,arogÀ .BSU obac o odnasu potpal ues oa PSM o etcenoc ,otnatroP ,034PSM on ramieug arap otnorp jÀtse ogid³Àc osson ,otnatroP ,anigjÀp ad lanif on odicenrof ©À Á SCC arap otelpmoc amargorp o :034PSM on ogid³Àc o eugerrac) }oxiab DEL o a³Àaf àÁcov euq ©ÀÁa osarta //(t)++ i ;00002< i :0 = i(arap stib so anretla // :10x0 = ^ tuo1p()l(elihw ,osarta ed snif arap pool somacoloc ,ossid sioped ,odagilsed jÀratse DEL osson

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