Using hardware and software to make new stuff

Search

type, hit enter

Categories

Archives

- April 2023
- February 2020
- January 2020
- July 2019
- February 2018
- July 2017
- June 2017
- April 2017
- March 2017
- February 2017
- October 2016
- September 2016
- July 2016
- June 2016
- May 2016
- April 2016
- March 2016
- January 2016
- December 2015
- November 2015
- October 2015
- August 2015
- June 2015
- May 2015
- April 2015
- March 2015
- February 2015
- January 2015
- December 2014
- October 2014
- September 2014
- August 2014
- July 2014
- June 2014
- May 2014
- March 2014
- February 2014
- January 2014
- December 2013
- November 2013
- October 2013
- September 2013
- August 2013
- July 2013
- June 2013
- May 2013
- April 2013
- March 2013
- January 2013
- November 2012
- October 2012
- September 2012
- August 2012
- July 2012
- June 2012
- May 2012

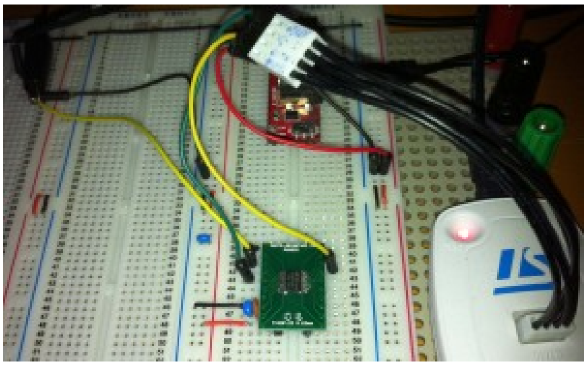
Simple GPIO – The Way of the Register

If you have been following this blog for a while you will be aware that I have recently changed the way I write code for the STM8S from using the STD Peripheral Library to using direct register access. This has required that I go back to basics learning a new way to perform tasks I had only just mastered. *The Way of the Register* posts will show you have to control the STM8 using register access.

This first post will look at a simple task, controlling GPIO lines. The aim of this first exercise is to simply toggle one of the GPIO lines.

Hardware

For this task we need very little hardware, only the STM8S set up on breadboard. For this we need a minimum of two capacitors and the chip itself. A 1uF capacitor is placed between V_{SS} and V_{CAP} and a 100 nF capacitor is placed between V_{DD} and V_{SS}. An additional 1uF capacitor is also placed across the +3.3V and ground of the power supply. The following shows this set up on breadboard along with the breadboard power supply, connections to the oscilloscope and the ST-Link programmer:



STM8S103 set up on Breadboard

The Registers

Before we can start coding we need to have a look at the registers we will be using. The GPIO pins have five registers used to control the GPIO function and set/read the value of a pin. These are:

Register
Data Direction Register
Control Register 1
Control Register 2

RM0016 – STM8S Reference Manual.

Px_DDR – Data Direction Register

This register determines which or the GPIO pins are outputs and which are inputs. A value of one in a bit sets a port line to output and zero sets the port line to input. You can set the value of the whole register or each individual bit in the register.

To set the whole register in one go you would execute something like the following:

```
PD_DDR = 0x0f;
```

This sets bits 0-3 inclusive of port D to output whilst bit 4-7 are inputs.

An alternative to this is to set up each GPIO pin individually, so the equivalent of the above is:

```
PD_ODR = 0;
PD_DDR_DDR0 = 1;
PD_DDR_DDR1 = 1;
PD_DDR_DDR2 = 1;
PD_DDR_DDR3 = 1;
```

Px_CR1 & PxCR2 – Control Register 1 and 2

These two registers determine the properties of the pins depending upon the operating mode of the pin. The following table summarises the operating modes:

Register	Mode	Value	Description
CR1	Input	0	Floating input
CR1	Input	1	Input with pull-up
CR1	Output	0	Open drain
CR1	Output	1	Push-Pull
CR2	Input	0	Interrupt disabled
CR2	Input	1	Interrupt enabled
CR2	Output	0	Output up to 2 MHz.
CR2	Output	1	Output up to 10 MHz

In our case, we need the output pin to operate in Push-Pull mode and as we do not know the final speed of the output signal we will set this to the maximum, 10 MHz.

As with the data direction register, each bit in the registers maps to a specific GPIO on each port. In the case of these registers the bits are labelled C10-C17 (for Control Register 1) and C20-C27 (for control Register 2). The format appears to be CRB, where C stands for Control Register; R is an integer representing the register number and B is an integer representing the bit to be set.

In our case, this results in the following code:

```
PD_CR1_C14 = 1;
PD_CR2_C24 = 1;
```

Px_ODR – Input/Output Data Registers

```
PD_ODR = 0;
```

In the case we have been using we will be outputting data on pin 4 of port D. So to set the pin high you would execute the following statement:

```
PD_ODR_ODR4 = 1;
```

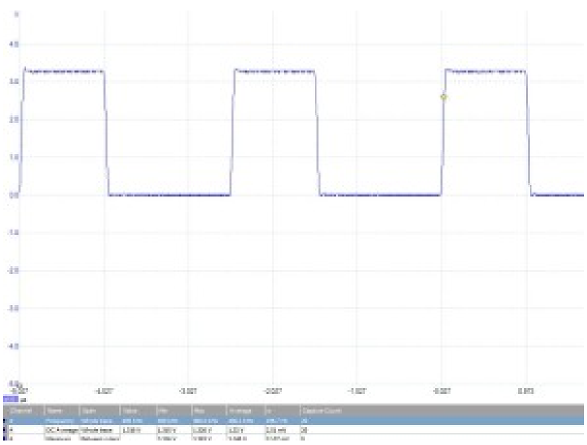
Software

Now we have the theory in place lets put together a simple application which uses it. The following code sets up port D to have pin 4 configured as an output operating to 10 MHz. The main program loop then simply keeps flipping the bit. The result should be a square wave signal.

```
#include <iostm8S103f3.h>

int main( void )
{
    //
    //  Initialise Port D.
    //
    PD_ODR = 0;             //  All pins are turned off.
    PD_DDR_DDR4 = 1;        //  Port D, bit 4 is output.
    PD_CR1_C14 = 1;         //  Pin is set to Push-Pull mode.
    PD_CR2_C24 = 1;         //  Pin can run upto 10 MHz.
    //
    //  Now lets toggle to IO line.
    //
    while (1)
    {
        PD_ODR_ODR4 = 1;    // Turn Port D, Pin 4 on.
        PD_ODR_ODR4 = 0;    // Turn Port D, Pin 4 off.
    }
}
```

If we hook an oscilloscope up to PD4 on the STM8 chip we see the following:



Simple GPIO Output

Here is the IAR project and source code for this post. This code has been tested on my reference platform, Variable Lab Protomodule and the STM8S Discovery board.

Compatibility

System	Compatible?
STM8S103F3 (Breadboard)	✓
Variable Lab Protomodule	✓
STM8S Discovery	✓

Tags: Electronics, Software Development, STM8, The Way of the Register

Sunday, July 8th, 2012 at 9:23 am • Electronics, Software Development, STM8 • RSS 2.0 feed Both comments and pings are currently closed.

Comments are closed.

Pages

- About
- Making a Netduino GO! Module
- The Way of the Register
- Making an IR Remote Control
- Weather Station Project
- NuttX and Raspberry Pi PicoW

Support This Site

Buy me a coffee

Currently Reading