Mixing C and Assembly with Arduino

Neelmani Gautam and G V V Sharma*

Contents

Abstract—**This manual shows how write a function in assembly and call it in a C program while programming the ATMega328P microcontroller in the Arduino. This is done by controlling an LED.**

1 Components

Component	**Value**	**Quantity**
Breadboard		1
Resistor	$\geq 220\Omega$	1
Arduino	Uno	1
Seven Segment Display	Common Anode	1
Jumper Wires		10

TABLE 0

2 GCC with Assembly

1. Download the following folder and execute **main.c**

```
svn checkout https://github.com/gadepall/
     arduino/trunk/avr−gcc/gcc−assembly/codes
```

2. Modify **main.c** and **Makefile** to turn the builtin led on.
3. Repeat the above exercise to turn the LED off.
4. Explain how the **disp_led(0)** function is related to **Register R24** in **disp_led** routine in **displedasm.S**. **Solution:** The function argument 0 in **disp_led(0)** is passed on to R24 in the assembly routine for further operations. Also, the registers R18-R24 are available for storing more function arguments according to the Table 4. More details are avilable in official ATMEL AT1886 reference.

Register	r19	r18	r21	r20	r23	r22	r25	r24
Function Argument	b7	b6	b5	b4	b3	b2	b1	b0

TABLE 4: Relationship between Register in assembly and function argument in C

5. Write an assembly routine for controlling the seven segment display and call it in a C program.
6. Build a decade counter with **main.c** calling all functions from assembly routines.

Neelmani is an undergraduate student at IIT Bhilai. email:neelmanig@iitbhilai.ac.in. *The author is with the Department of Electrical Engineering, Indian Institute of Technology, Hyderabad 502285 India e-mail: gadepall@iith.ac.in.