Lab Report

Familiarization with STM8S105C6 Development Board and Demonstration of Desired LED Pattern

Exp-1 Embedded Systems Lab **2016H140099 & 2016H140101**

Objective – To design a LED pattern repeating infinitely using STM8S105C6 microcontroller, 4 LEDs and a tactile switch such that the first LED glows when the tactile switch is pressed for the first time, the second glows on the second press of the switch and so on till all the led glows. The pattern must repeat itself infinitely upon pressing the switch after 5 times.

Project Workspace: -

- Used ST Visual Develop with embedded C coding and used ST Visual Programmer for programming the STM8S micro controller
- In this project we have to create a LED pattern that run infinite times, so that an LED glows every time we press the switch and after 4 LEDs are ON, on the fifth press of the switch all LEDs should be off and this pattern must be repeated infinitely.

Critical Issues: -

- At the press of the switch, it was taking the input as several times, so we have to create a loop such that it stays in the loop till the tactile switch has pressed down.

Flow Chart: -

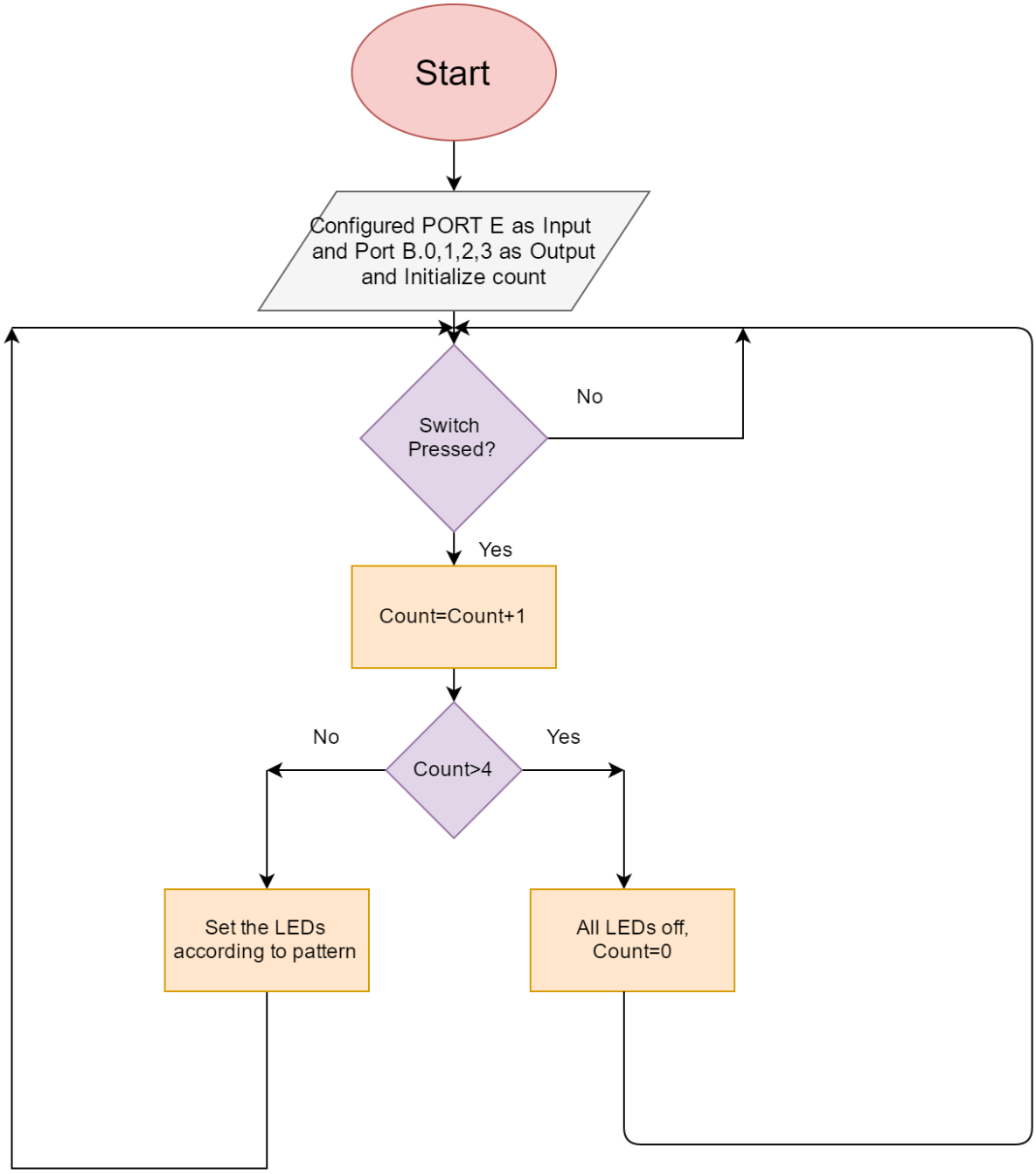
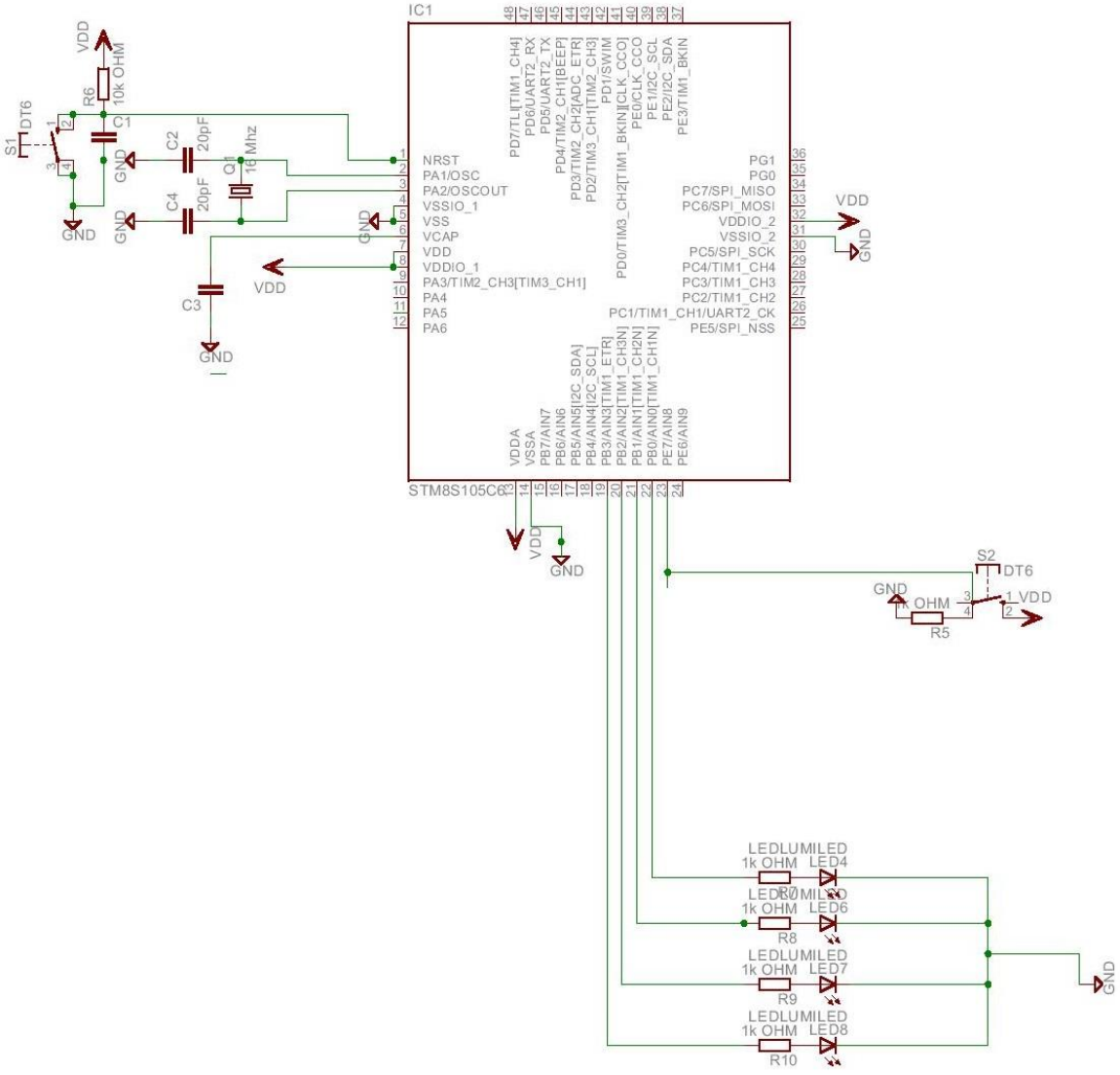


Figure 1 Flow chart for the procedure followed to make LEDs glow in a desired pattern

Methodology – Connected a tactile push down switch on port E bit 7 of microcontroller. 4 LED'S are connected to port B as outputs. The LED blinking code of required pattern was written in STVD compiled using

Cosmic compiler and then burn into STM8S105C6 Microcontroller using STVP.

Hardware Design – Used 4 LED's and connected them to port B. Output resistors of value 1k are also used to limit the current. The LED's are driven by the STM8S105C6 microcontroller and the input is received by tactile switch as shown in figure below.



(Semantic Diagram of the Processor STM8S105C6 along with the Connections)

Software Design – Used General Purpose Input Output (GPIO) function to control the input (tactile switch) and output i.e. LED's by making use of Data Direction Register (DDR), Input Data Register (IDR), Output Data Register (ODR), and Control Register 1 (CR1).

C code for stated task is listed below, it is commented wherever necessary.

Explanation –

- Header <STM8S.h> is containing all the register definitions which enables us to use register names instead of Memory location of every SFR.
- As shown in Figure 1, Since LEDs are connected to PORT B (0) – B (3) we must declare it as an output port, which is done using DDR register. All bits of GPIOB -> DDR from 0 to 3 are made 1 which tells that these pins will be used as output.
- Switch statement is used to turn on specific led when we press the Tactile switch button.

Mode	DDR bit	CR1 bit	CR2 bit	Function	Pull-up	P-buffer	Diodes	
							to V_{DD}	to V_{SS}
Input	0	0	0	Floating without interrupt	Off	Off	On	On
	0	1	0	Pull-up without interrupt	On			
	0	0	1	Floating with interrupt	Off			
	0	1	1	Pull-up with interrupt	On			
Output	1	0	0	Open drain output	Off	Off		
	1	1	0	Push-pull output		On		
	1	0	1	Open drain output, fast mode		Off		
	1	1	1	Push-pull, fast mode	Off	On		
	1	x	x	True open drain (on specific pins)	Not implemented		Not implemented (1)	

(I/o Port Configuration)

Address offset	Register name	7	6	5	4	3	2	1	0
0x00	Px_ODR Reset value	ODR7 0	ODR6 0	ODR5 0	ODR4 0	ODR3 0	ODR2 0	ODR1 0	ODR0 0
0x01	Px_IDR Reset value	IDR7 x	IDR6 x	IDR5 x	IDR4 x	IDR3 x	IDR2 x	IDR1 x	IDR0 x
0x02	Px_DDR Reset value	DDR7 0	DDR6 0	DDR5 0	DDR4 0	DDR3 0	DDR2 0	DDR1 0	DDR0 0
0x03	Px_CR1(1) Reset value	C17 0	C16 0	C15 0	C14 0	C13 0	C12 0	C11 0	C10 0
0x04	Px_CR2 Reset value	C27 0	C26 0	C25 0	C24 0	C23 0	C22 0	C21 0	C20 0

(GPIO Register Map)

References: -

- RM0016 – STM8S105C6 user manual
- STM8S Datasheet for connections.

Observations – As STM8S105C6 is 8 bit architecture, its Data bus is 8 bit wide that's why we need to deal with registers and Data word with length of 8 bit (e.g. 0xFF).

Result – The LEDs are made to glow in the desired pattern infinitely using STM8S105C6.