USER'S MANUAL
FOR

STM32 M4
DEVELOPMENT BOARD

Manufactured By

LOGSUN SYSTEMS

Regd. Office & Works:
4A, Shree Sadgurunivas Soc.,16/5/1 Hingne
Khurd, Sinhgad Road, Pune- 411051
Ph. - +91 8956711765 / +91 99211 59583

Email: - support@logsun.com
Web: www.logsun.com | www.logsunonline.com

TABLE OF CONTENTS

INTRODUCTION & OVERVIEW OF STM32 M4 DVK

LOGSUN's STM32 M4 DVK is 32-bit ARM Cortex M4 Microcontroller based evaluation module. STM32 M4 DVK is a general-purpose development board for ARM Controller. STM32 M4 DVK can be used extensively to test and validate programs. At the heart of the development board is STM32F407VET6. This provides advance features like I2C, CAN & USB. The micro controller has up to 1M byte flash memory and up to 192 Kbytes of SRAM & up to 4 Kbytes of backup SRAM. The development board comes with Serial & USB interface to allow user to program microcontroller directly from PC. STM32 M4 DVK and related software routines help the system designers to rapidly design and prototype their designs based on ARM Cortex M4 Core. It provides a complete development platform with different modules interface that accelerates the task of designers to run application software on target ARM Controller hardware, thus providing a platform to benchmark their system, save time & expense of building their own application test board and enabling them to get their designs to market quickly. STM32 M4 DVK is a unique hardware and software combination, providing designers the tool to develop most advanced ARM series Microcontroller applications. The STM32 M4 DVK hardware reference and software application programs also simplify ARM based hardware and software development.

BOARD SPECIFICATION:
      1. STMF407VET6 microcontroller
      2. On board Serial & USB Connector for Programming
      3. Internal DAC & ADC interface
      4. On board 16x2 LCD & 7-Segment Display
      5. On board DC & Stepper Motor Driver
      6. On board Relay Buzzer & LED interface
      7. On board SD-Card Slot
      8. Internal RTC interface
      9. On board 4x4 Matrix Keypad
      10. 4 USART + UART Interfaces
      10. 2 x CAN, 2 x SPI Interfaces
      11. I2C, I2S, ULPI Interface
      11. GLCD, ETH, NANDFLASH, DCMI Interface

Getting Started:
      STM32 M4 Development Board Includes:
      1. Male to Female Straight Cable (DB-9) or USB to Serial Converter.
      2. 12V Power Adapter.
      4. User's Manual
      5. Compact Disc Containing:
            a) Flash Utility for IC
            b) Required Software (Keil uVision Evaluation Version)
            c) Sample Codes for development
            c) Circuit diagram and layout.
            d) Data sheet

STM32F407VET6 Features:

- Core: ARM 32-bit Cortex™-M4 CPU
- Up to 1 Mbyte of Flash memory
- Up to 192+4 Kbytes of SRAM
- 3×12-bit, 2.4 MSPS A/D converters: up to 24 channels
- 2×12-bit D/A converters
- General-purpose DMA: 16-stream DMA controller with FIFOs and burst support
- Up to 17 timers: up to twelve 16-bit and two 32-bit timers up to 168 MHz
- Up to 140 I/O ports with interrupt capability
    - (i) Up to 136 fast I/Os up to 84 MHz
    - (ii) Up to 138 5 V-tolerant I/O
- Up to 15 communication interfaces
    - i) Up to 3 × I^2C interfaces (SMBus/PMBus)
    - ii) Up to 4 USARTs/2 UARTs (10.5 Mbit/s, ISO7816 interface, LIN, IrDA, modem control)
    - iii) Up to 3 SPIs (42 Mbits/s), 2 with muxed full-duplex I^2S to achieve audio class accuracy via internal audio PLL or external clock
    - iv) 2 × CAN interfaces (2.0B Active)
    - v) SDIO interface
- 8- to 14-bit parallel camera interface up to 54 Mbytes/s
- USB 2.0 high-speed/full-speed device/host/OTG controller with dedicated DMA, on-chip full-speed PHY and ULPI

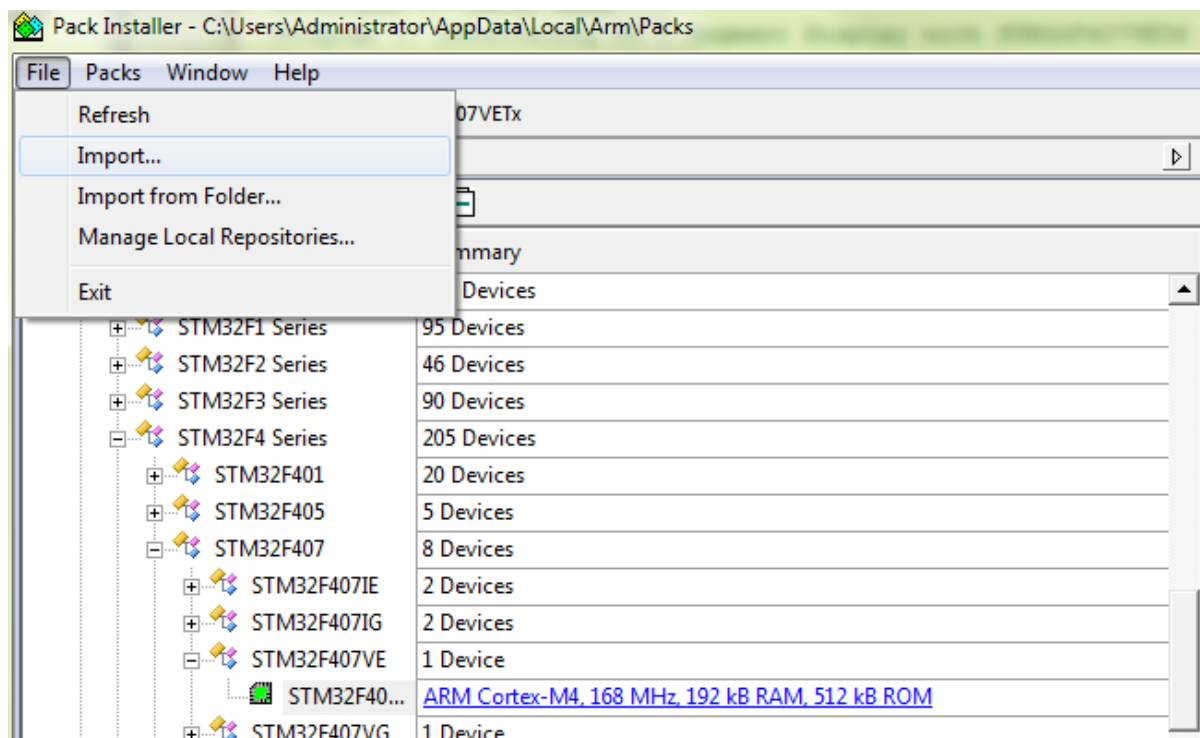## HOW TO CREATE PROJECT:
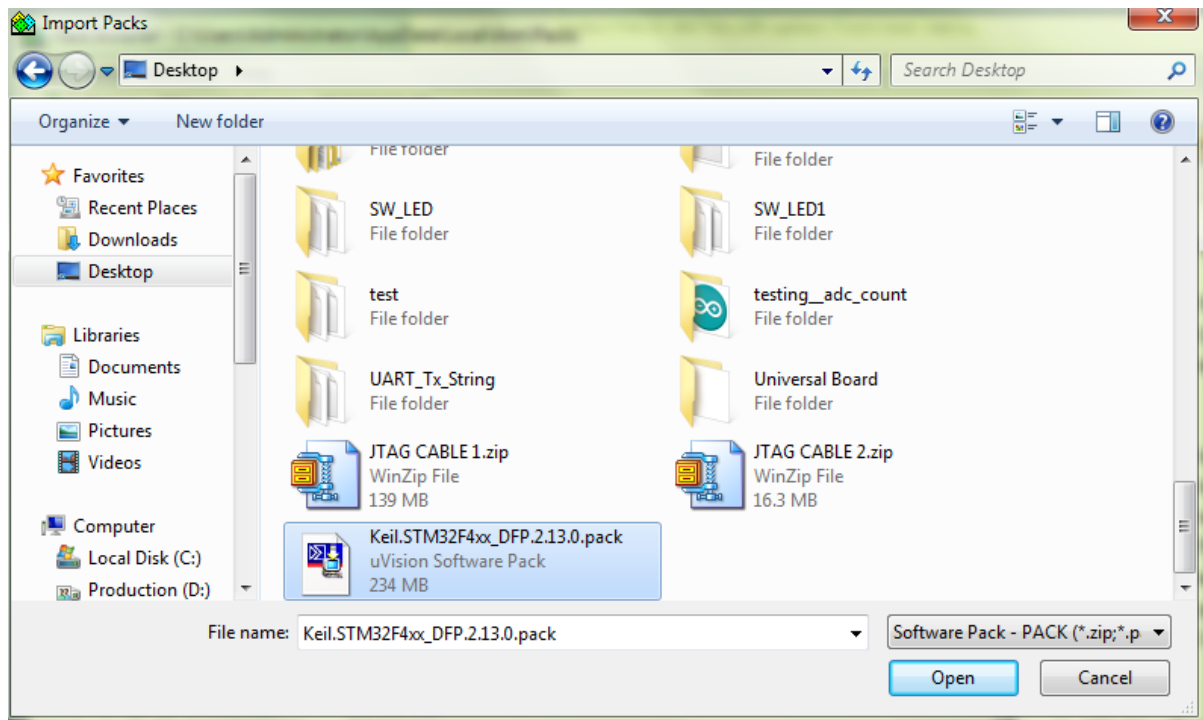## SOFTWARE USED: KEIL

Open Keil software ➔

To add software components related to STM32F 4xx we need to IMPORT KEIL-STMDFP 2.13.0 PACK.

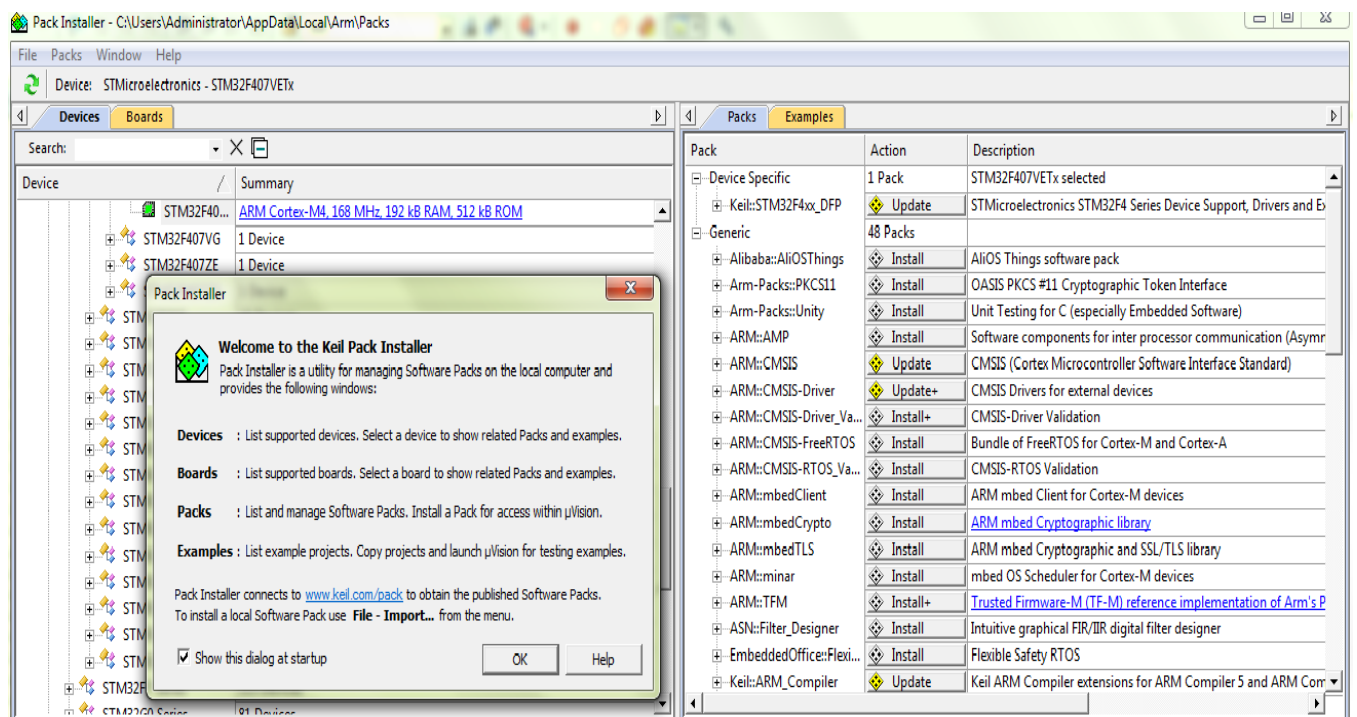Select PACK INSTALLER option from tool menu.
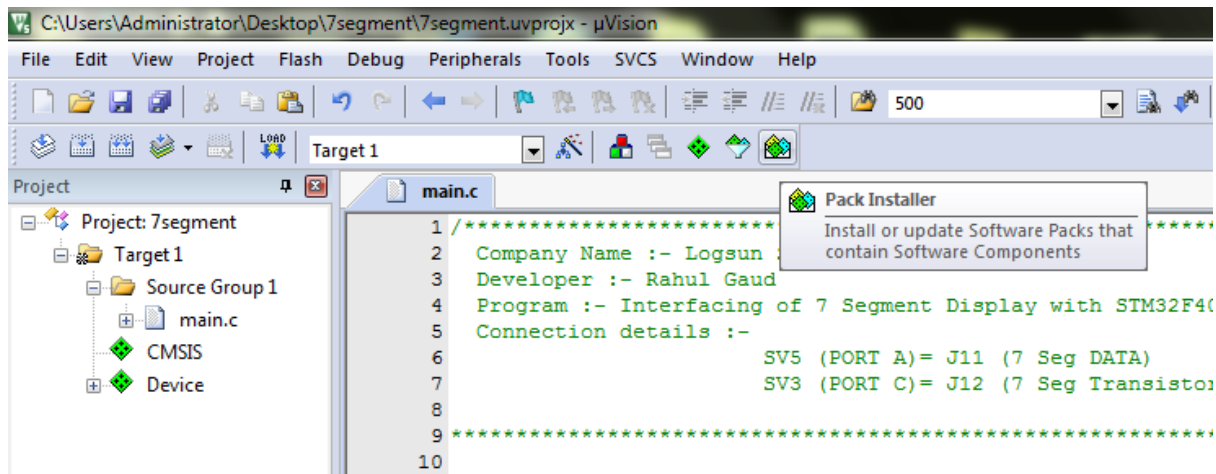
Select File –Import—Select KEIL-STMDFP 2.13.0 PACK file given in deliverable folder with the board.

Go to Pack option-- Select Device –KEIL ST M32F4xx and check the pack.

Steps to create project:

Go to project menu ➔ click on new microVision project ➔ create new folder in that you enter project name and click on save project.
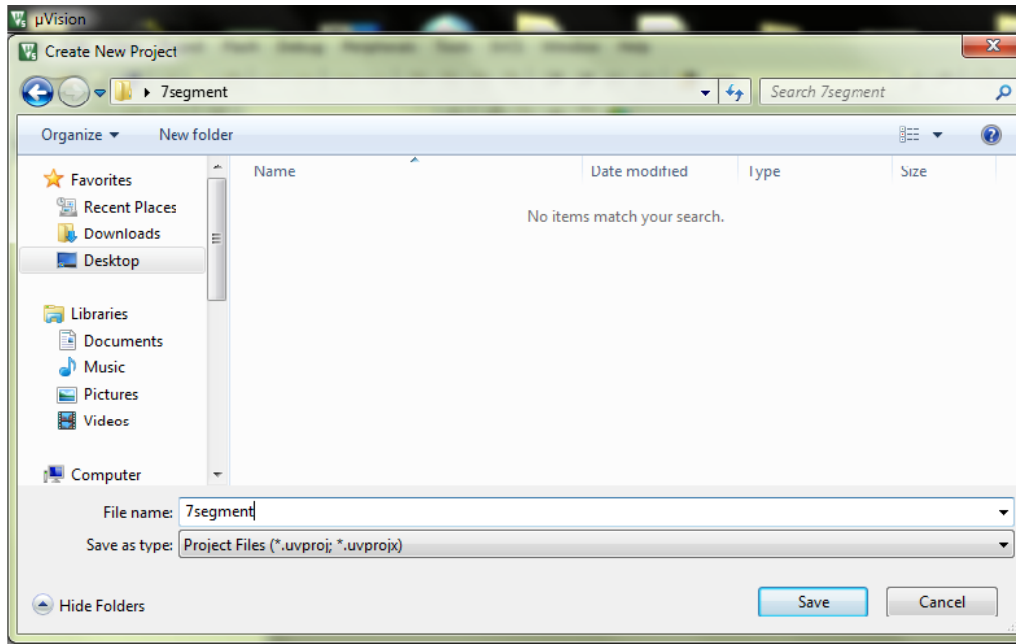
Select STM32F407VET CORE FAMILY.
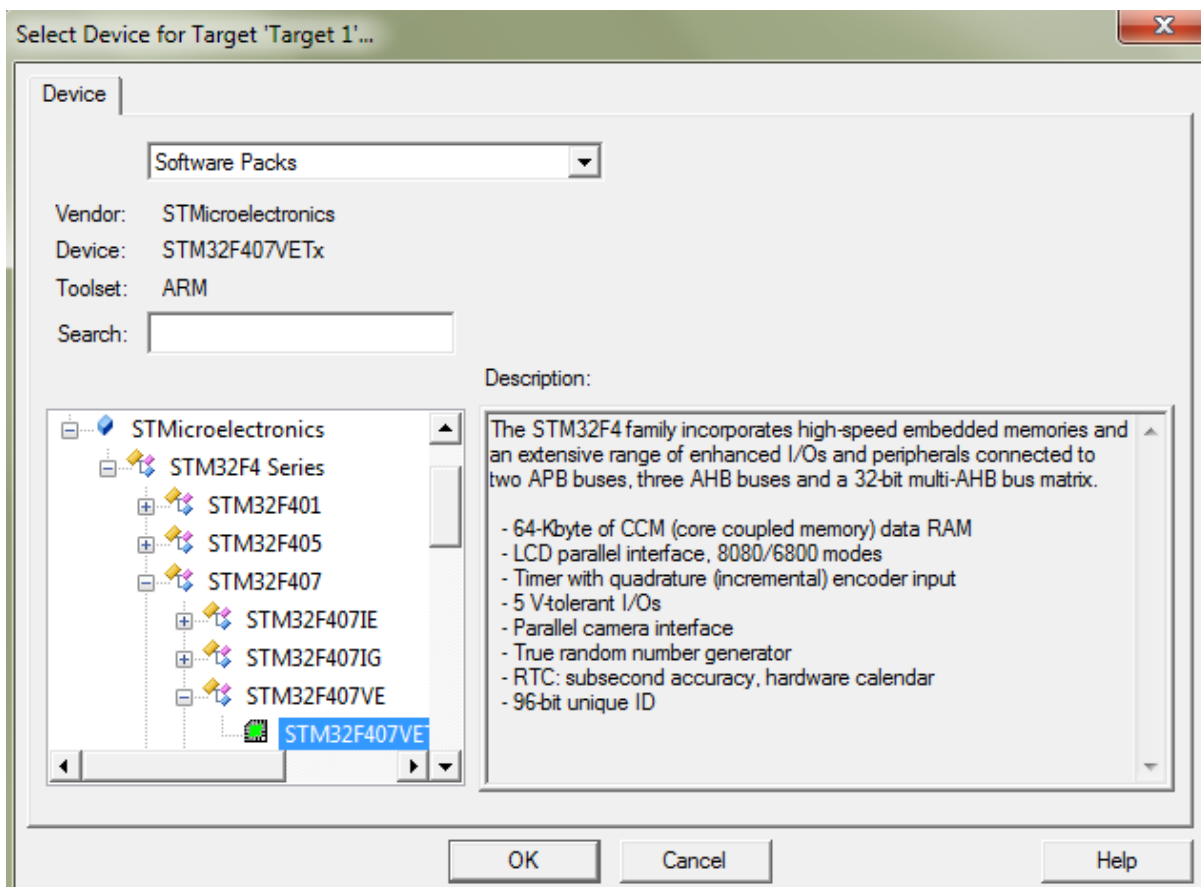
Select Board Support –STM32F Discovery

Select CMSIS –5.2.0 CMSIS CORE FOR CORTEX M

Select Device Startup –2.6.2 System Startup for STMicroelectronics
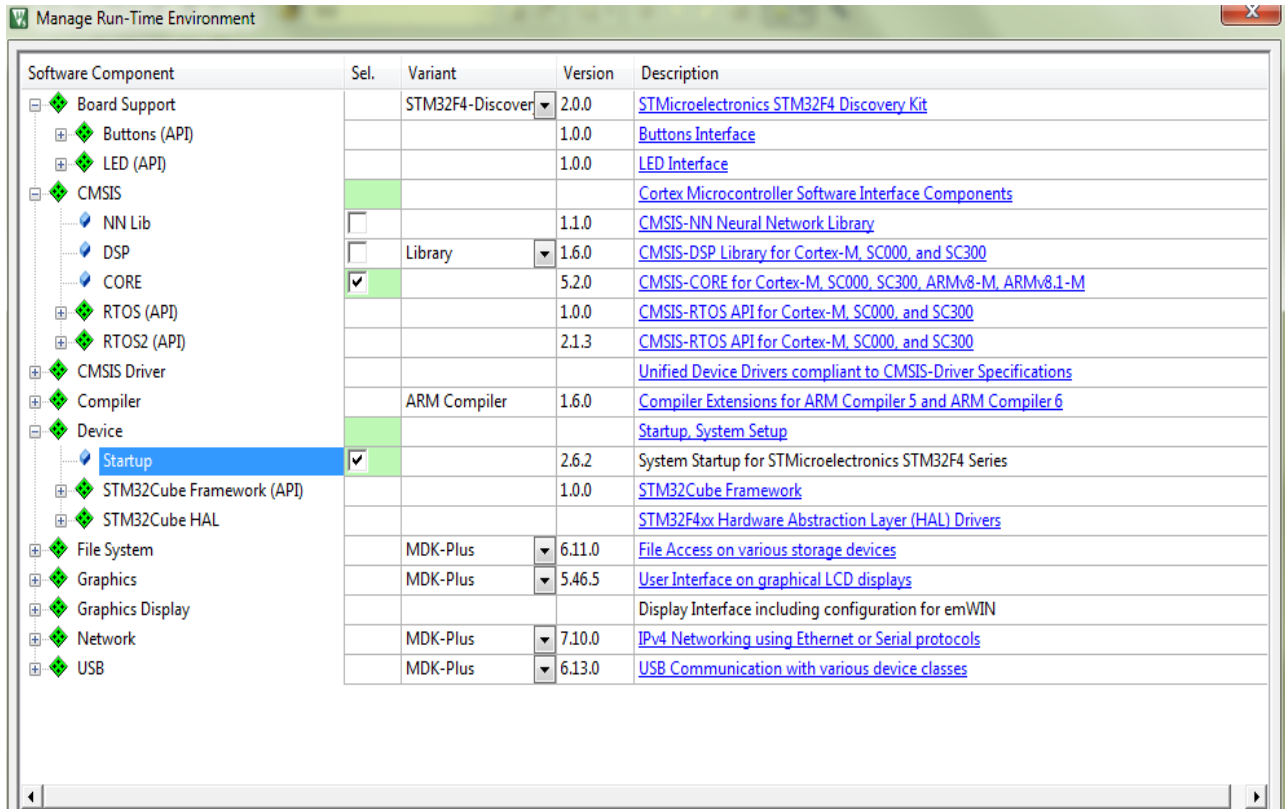
For creating hex file ➔ click on Target option ➔new window will open ➔ click on Output and select Create HEX file

Click on Options for Target
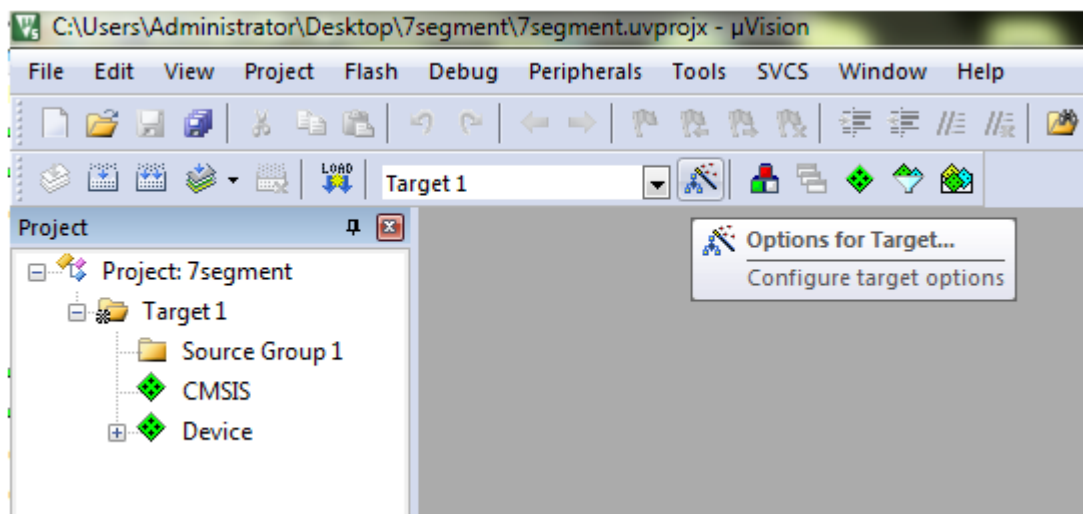
Click on Output –Select Create HEX File.
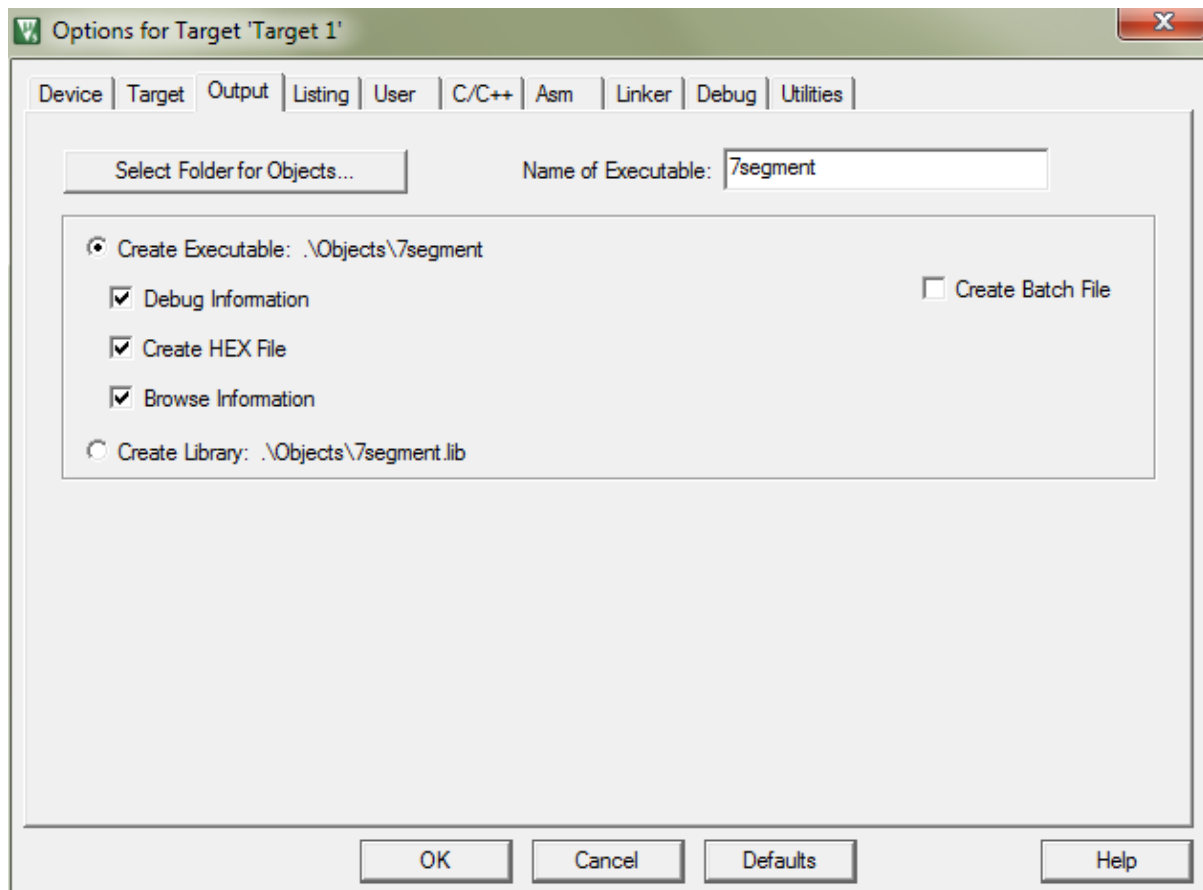
Click on File menu ➔ click on New
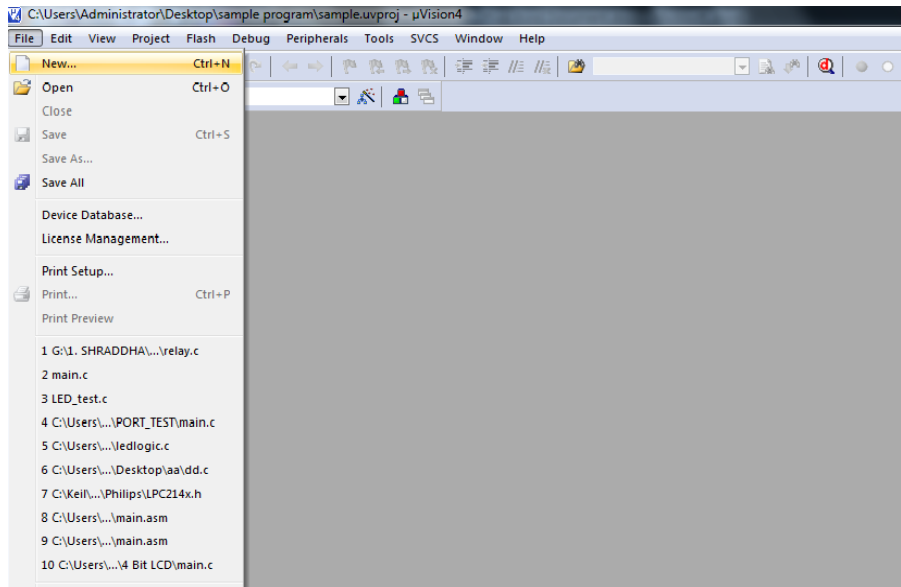
Now write your code ➔ and save your code .c extension in your project folder e.g. main.c.

And add this file to Source Group 1.
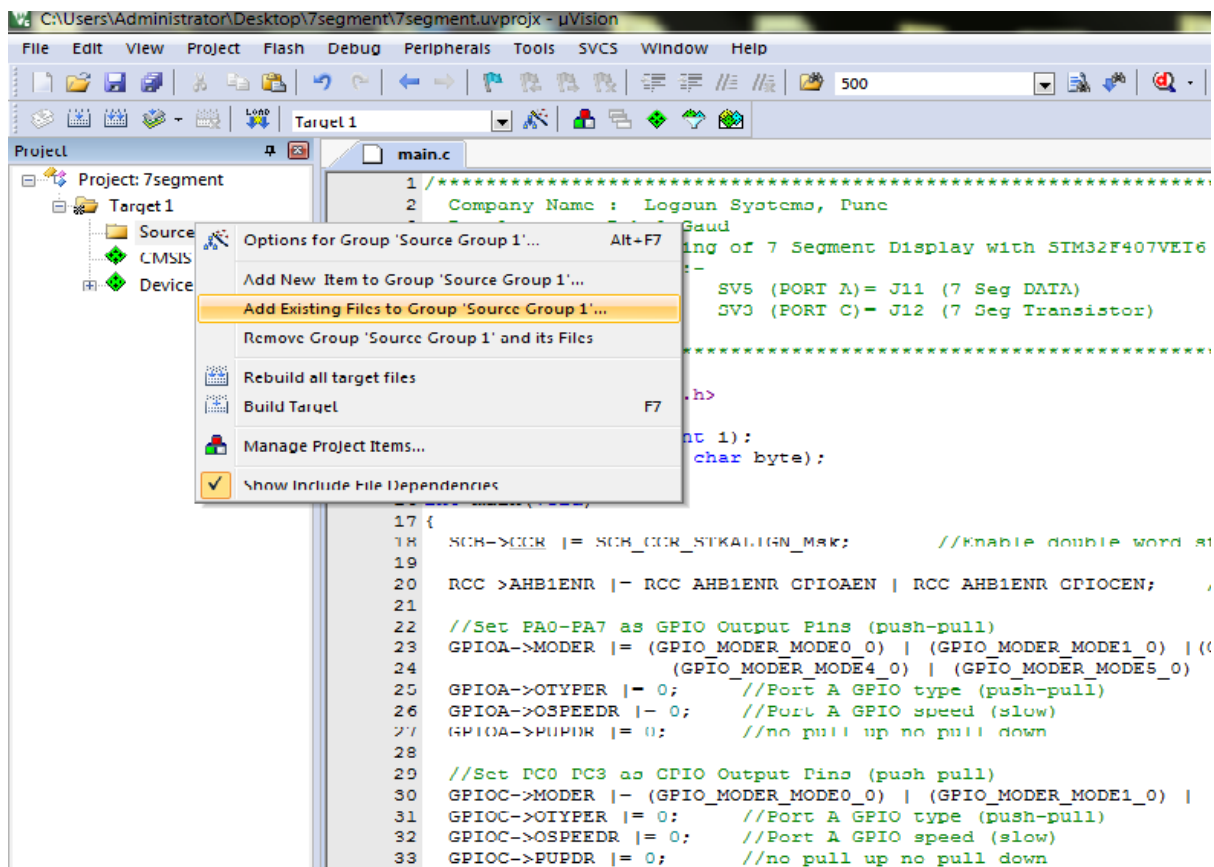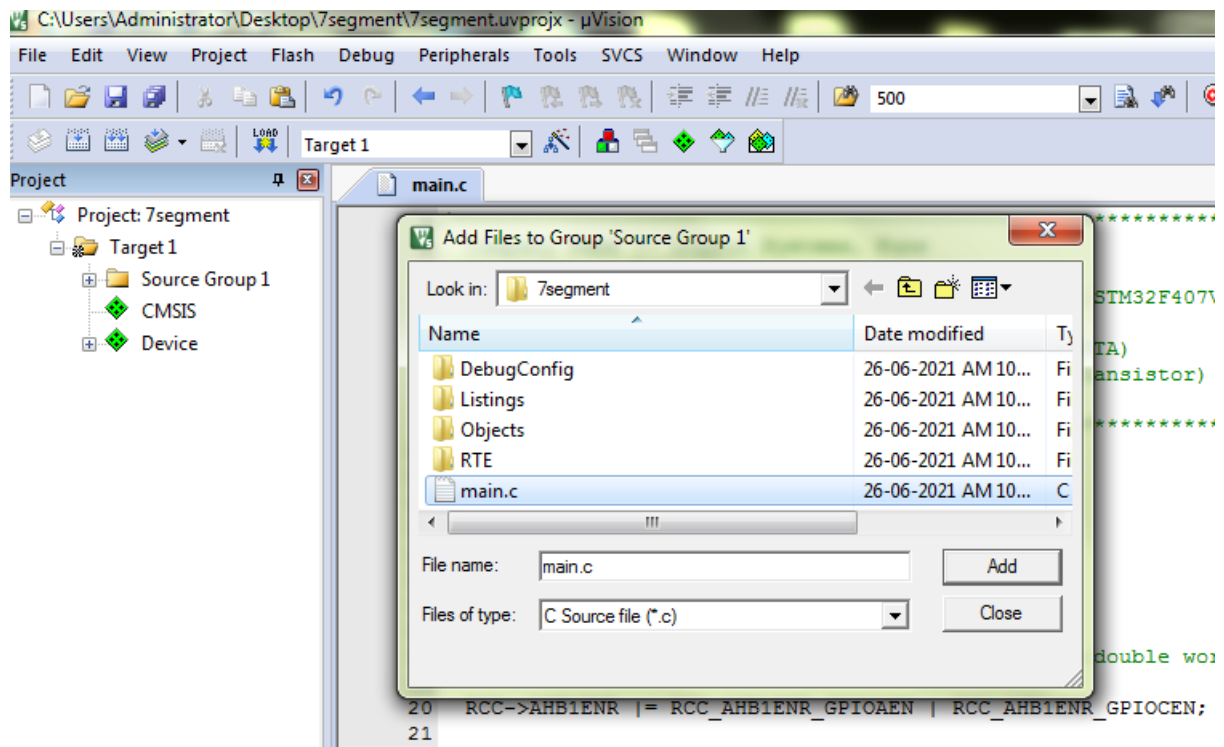
Now build this project ➔ click on icon for building the project and it creates HEX file.
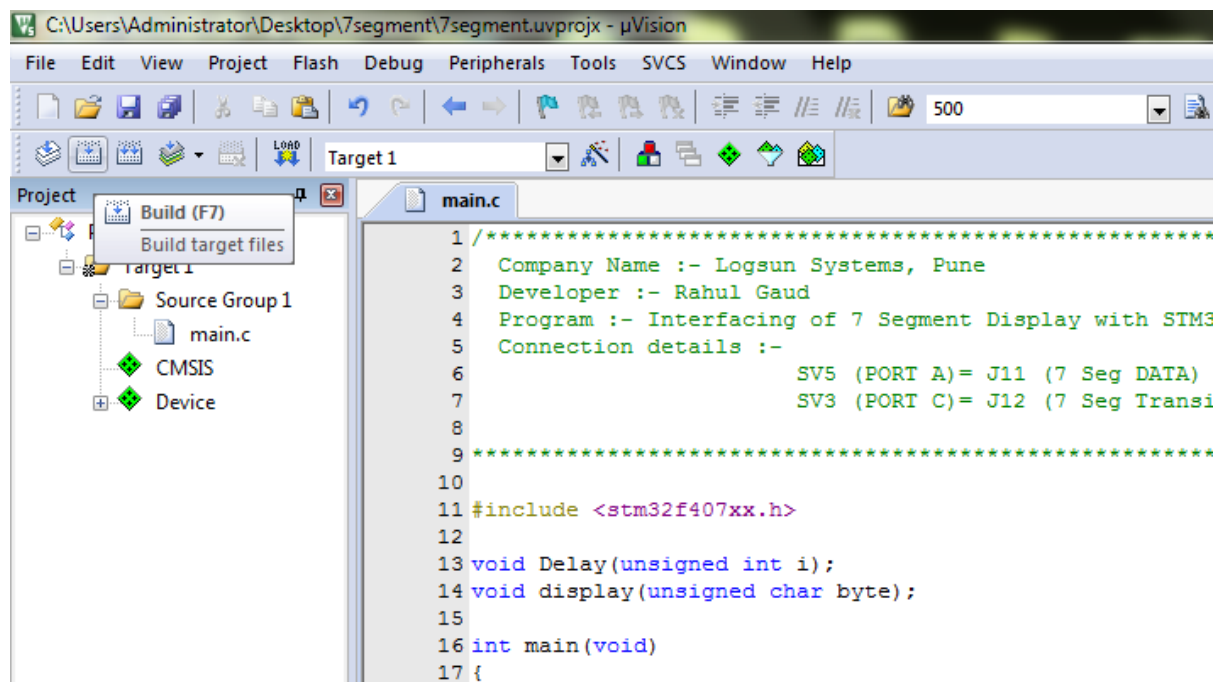
HOW TO USE FLASH LOADER?

STM32F407VET6 is used as Main Microcontroller in STM32 M4 DVK. FlashLoader Demonstrator software by STM is used to upload the firmware to the target board. To install the FlashLoader Demonstrator software, run the setup provided in the CD.

Program Uploading Steps using FlashLoader Demonstrator:
- Connect the 12V Power adaptor to the board.
- Connect the supplied A-B USB cable between the STM32 M4 DVK & computer.
- **Make sure that in UART4 Jumpers JP29 & JP30, RX is connected to PC10 & TX is connected to PC11 respectively.** Otherwise Board will not get detected in FlashLoader Demonstrator.
- Set *Boot Config* Switch on STM32 Module at *System* Mode while Programming.
- Open FlashLoader Demonstrator Software. Following window will appear.
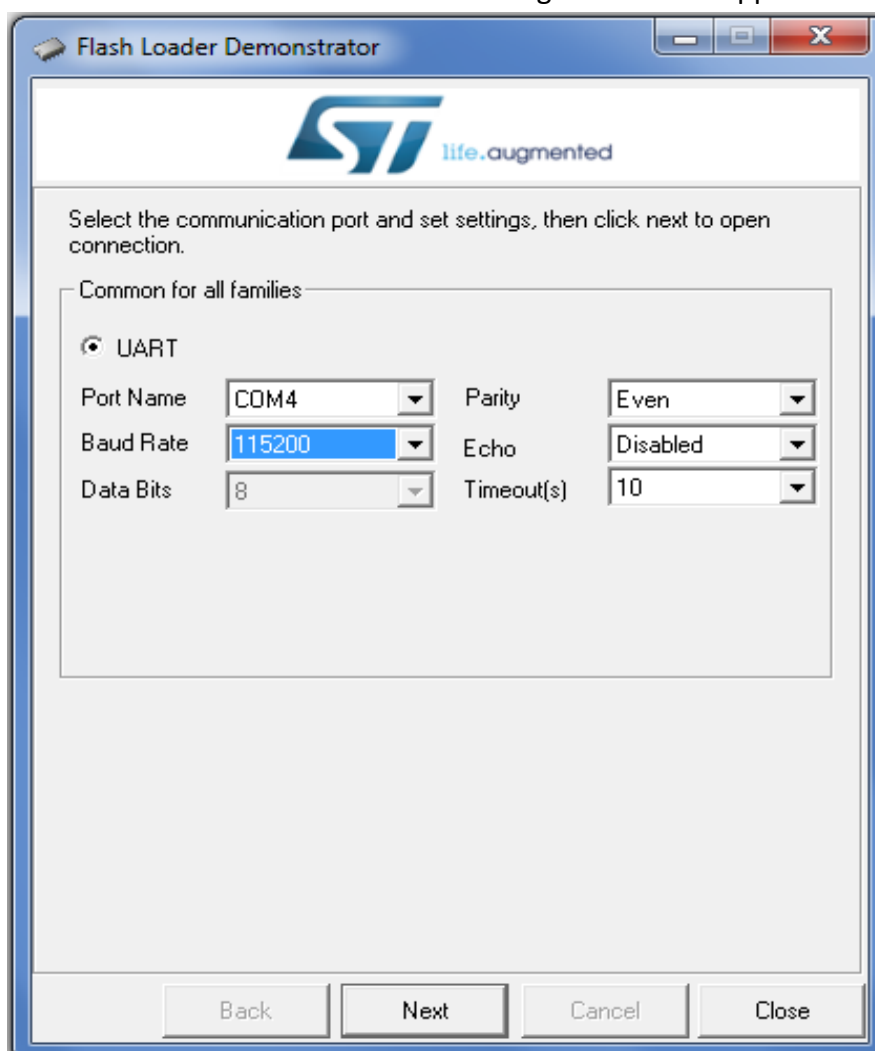
Select the following parameters:

Port Name: As per COM detected by PC	*Parity:* Even
Baud Rate: 115200	*Echo:* Disabled
Data Bits: 8	*Timeout(s):* 10 (As per requirement)

- Press *RESET* Button on STM32 Module & Immediately Click on *NEXT*. Following window will appear if STM32 DVK gets detected successfully.
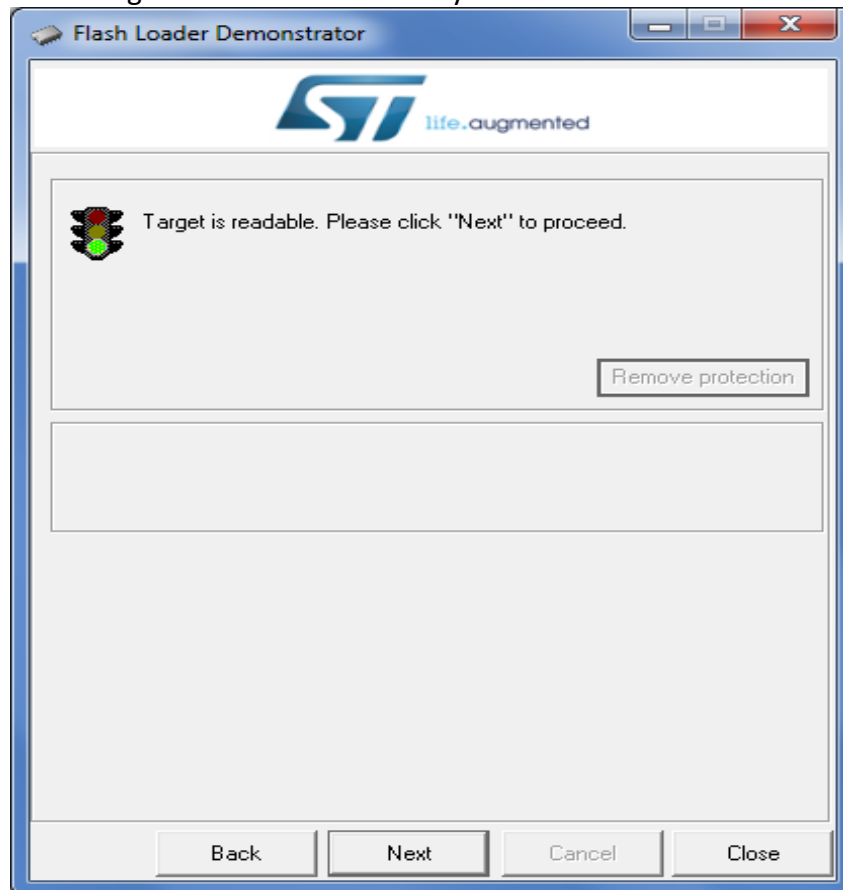
- Click *NEXT* to Proceed.
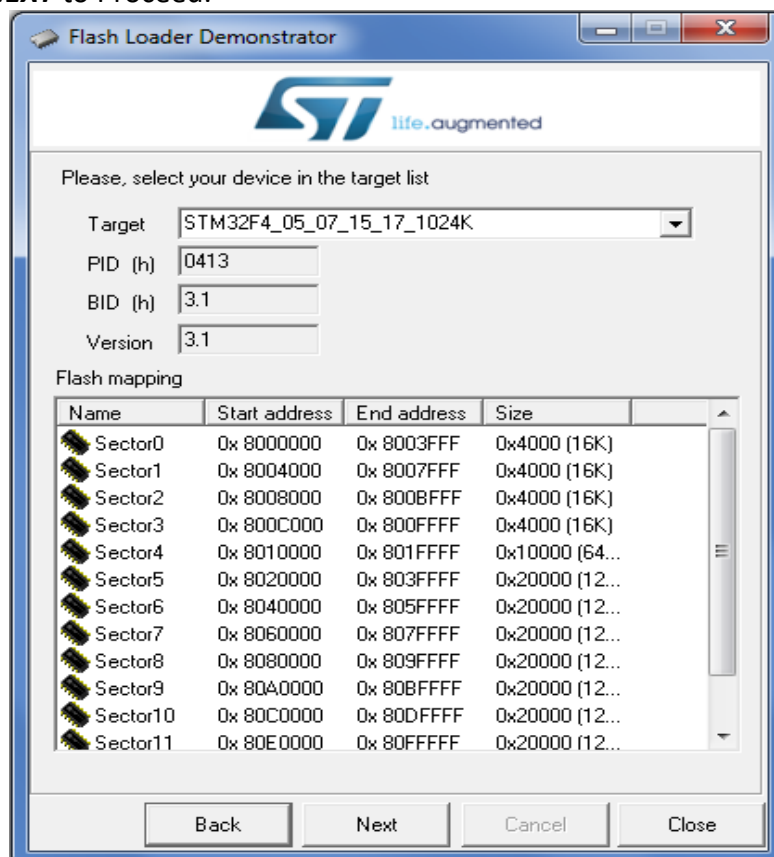
- Select Target as **STM32F4_05_07_15_17_1024K** & Click on *NEXT*.
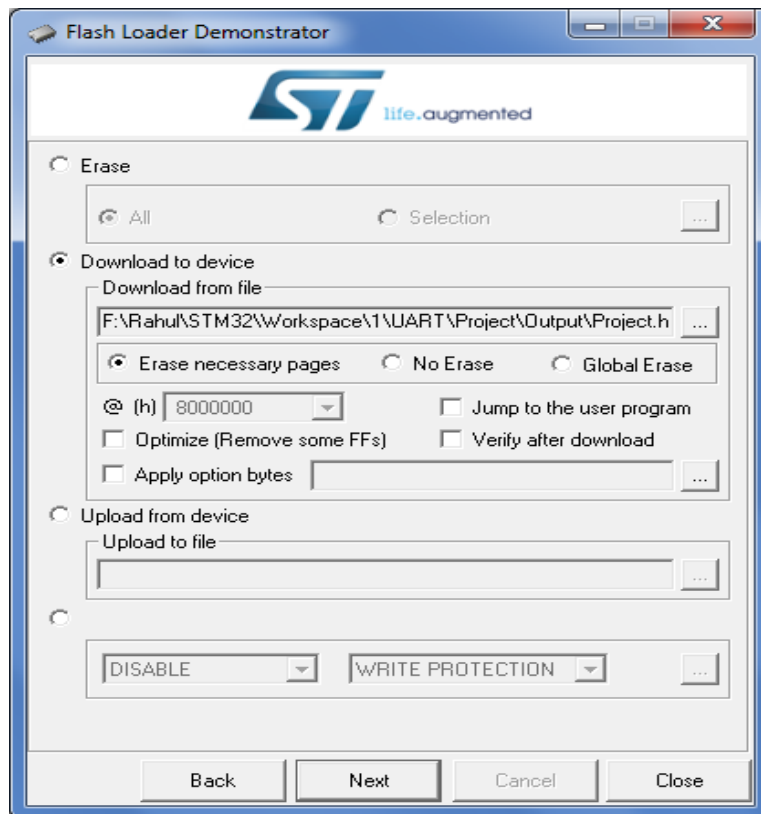
- Above window will appear. Select **Download to device** option. Select .Hex project file in **Download from file** by clicking on three dots. Select **Erase necessary pages** & Click on **NEXT**.
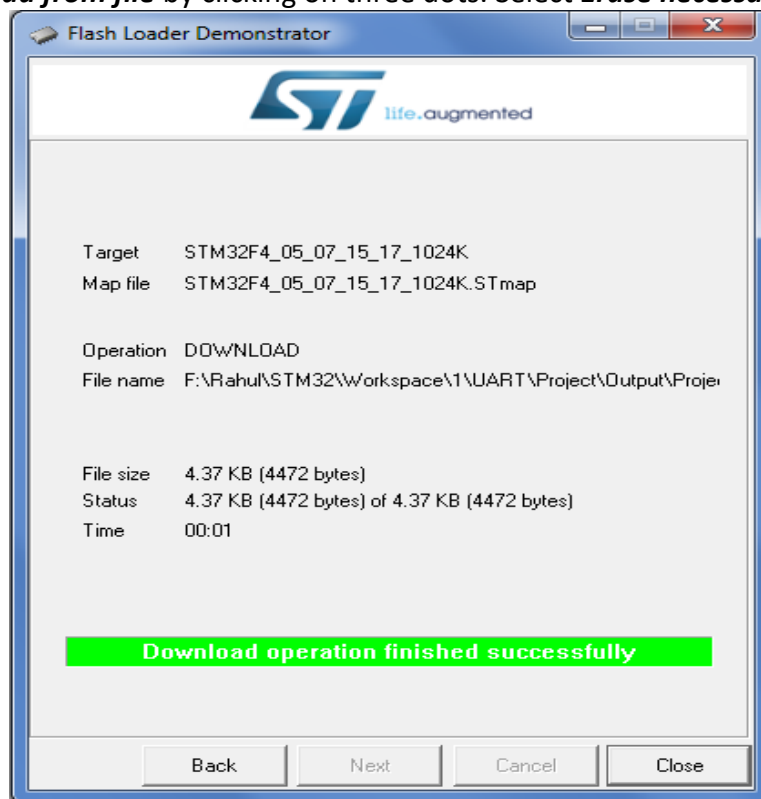
- Wait till **"Download operation finished successfully"** message is displayed.
- Set **Boot Config** Switch on STM32 Module at **Flash** Mode & Press **RESET** Button to run Program.

EXPERIMENT NO.1

AIM: - Interfacing of 8 Bit LED Logic with STM32F407VET6.

REQUIREMENT: -STM32 M4-DVK, 12V Power Adaptor, 10 pin FRC (2 Qty.), Serial or USB Cable.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the Flash Loader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Connect 10 pin FRC from SV2 (PORT D) to J21 (LED) & SV1 (PORT E) to J22 (Switches) of 8 Bit LED section.
8) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
9) Now toggle Switches & respective LED will glow.

PIN DESCRIPTION: -

SV2 (PD0-PD7)	J21 (LED)
5V	5V
GND	GND
PA0	LD0
PA1	LD1
PA2	LD2
PA3	LD3
PA4	LD4
PA5	LD5
PA6	LD6
PA7	LD7

SV1 (PE0-PE7)	J22 (SWITCHES)
5V	5V
GND	GND
PE0	R1
PE1	R2
PE2	R3
PE3	R4
PE4	C1
PE5	C2
PE6	C3
PE7	C4

EXPERIMENT NO.2

AIM: - Interfacing of 16 x2 LCD (8 Bit) with STM32F407VET6.

REQUIREMENT: -STM32 M4-DVK, 12V Power Adaptor, 10 pin FRC (2 Qty.), Serial or USB Cable.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the Flash Loader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Connect 10 pin FRC from SV5 (PORT A) to J9 (LCD Data) & SV3 (PORT C) to J10 (LCD CMD) of LCD section.
8) For 8 Bit Mode, Short Pin 2 & 3 of EN, RW & RS Jumpers near LCD.
9) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
10) Output will be displayed on LCD as   LOGSUN SYSTEMS
                                  PUNE

PIN DESCRIPTION: -

SV5 (PA0-PA7)	J9 (LCD Data)
5V	5V
GND	GND
PA0	Data0
PA1	Data1
PA2	Data2
PA3	Data3
PA4	Data4
PA5	Data5
PA6	Data6
PA7	Data7

SV3 (PC0-PC7)	J10 (LCD CMD)
5V	5V
GND	GND
PC0	RS
PC1	RW
PC2	EN
PC3	NC
PC4	NC
PC5	NC
PC6	NC
PC7	NC

EXPERIMENT NO.3

AIM: - Interfacing of 16 x2 LCD (4 Bit) with STM32F407VET6.

REQUIREMENT: -STM32 M4-DVK, 12V Power Adaptor, 10 pin FRC (1 Qty.), Serial or USB Cable.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the Flash Loader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Connect 10 pin FRC from SV5 (PORT A) to J9 (LCD Data) of LCD section.
8) For 4 Bit Mode, Short Pin 1 & 2 of EN, RW & RS Jumpers near LCD.
9) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
10) Output will be displayed on LCD as   LOGSUN SYSTEMS
                            PUNE

PIN DESCRIPTION: -

SV5 (PA0-PA7)	J9 (LCD Data)
5V	5V
GND	GND
PA0	EN
PA1	RW
PA2	RS
PA3	NC
PA4	Data4
PA5	Data5
PA6	Data6
PA7	Data7

EXPERIMENT NO. 4

AIM: - Interfacing of 16 x2 LCD & 4x4 Matrix Keypad with STM32F407VET6.

REQUIREMENT: - STM32 M4-DVK, 12V Power Adaptor, 10 pin FRC (2 Qty.), Serial or USB Cable.

PROCEDURE: -

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Connect 10 pin FRC from SV5 (PORT A) to J9 (LCD Data) as 4 bit LCD 1,2 short of & SV2 (PORT D) to J13 (Keypad Section).
8) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
9) Respective Key Pressed will be displayed on LCD as Output.

PIN DESCRIPTION: -

SV5 (PA0-PA7)	J9 (LCD Data)
5V	5V
GND	GND
PA0	RS
PA1	RW
PA2	EN
PA3	NC
PA4	Data4
PA5	Data5
PA6	Data6
PA7	Data7

SV2 (PD0-PD7)	J13 (KEYPAD)
5V	5V
GND	GND
PD0	R0
PD1	R1
PD2	R2
PD3	R3
PD4	C0
PD5	C1
PD6	C2
PD7	C3

EXPERIMENT NO. 5

AIM: - Interfacing of 7-Segment Display with STM32F407VET6.

REQUIREMENT: - STM32 M4-DVK, 12V Power Adaptor, 10 pin FRC (2 Qty.), Serial or USB Cable.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Connect 10 pin FRC from SV5 (PORT A) to J 11 (7-SEG Data) & SV3 (PORT C) to J12(7-SEG CMD) of 7 Segment section.
8) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
9) 0 to F Count will be displayed on 7 Segment as Output.

PIN DESCRIPTION: -

SV5 (PA0-PA7)	J11 (7-SEG Data)
5V	5V
GND	GND
PA0	A
PA1	B
PA2	C
PA3	D
PA4	E
PA5	F
PA6	G
PA7	DP

SV3 (PC0-PC7)	J12 (7-SEG CMD)
5V	5V
GND	GND
PC0	T1
PC1	T2
PC2	T3
PC3	T4
PC4	NC
PC5	NC
PC6	NC
PC7	NC

EXPERIMENT NO. 6

AIM: - Interfacing of 7-Segment & 4x4 Matrix Keypad with STM32F407VET6.

REQUIREMENT: - STM32 M4-DVK, 12V Power Adaptor, 10 pin FRC (3 Qty.), Serial or USB Cable.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Connect 10 pin FRC from SV5 (PORT A) to J11 (7-SEG Data) & SV3 (PORT C) to J12 (7-SEG CMD) of 7 Segment section.
8) Connect SV2 (PORT D) to J13 (Keypad Section).
9) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
10) Respective Key Pressed will be displayed on 7 Segment as Output.

PIN DESCRIPTION: -

SV5 (PA0-PA7)	J11 (7-SEG Data)
5V	5V
GND	GND
PA0	A
PA1	B
PA2	C
PA3	D
PA4	E
PA5	F
PA6	G
PA7	DP

SV3 (PC0-PC7)	J12 (7-SEG CMD)
5V	5V
GND	GND
PC0	T1
PC1	T2
PC2	T3
PC3	T4
PC4	NC
PC5	NC
PC6	NC
PC7	NC

SV2 (PD0-PD7)	J13 (KEYPAD)
5V	5V
GND	GND
PD0	R0
PD1	R1
PD2	R2
PD3	R3
PD4	C0
PD5	C1
PD6	C2
PD7	C3

EXPERIMENT NO. 7

AIM: - Interfacing of Relay, Buzzer & LEDs with STM32F407VET6.

REQUIREMENT: - STM32 M4-DVK, 12V Power Adaptor, 10 pin FRC (1 Qty.), Serial or USB Cable.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Connect 10 pin FRC from SV5 (PORT A) to J7 (Relay Buzzer Section).
8) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
9) Press Switches in Relay Buzzer Section to change the Output Pattern.

PIN DESCRIPTION: -

SV5 (PA0-PA7)	J7 (Relay Buzzer)
5V	5V
GND	GND
PA0	T5(RELAY)
PA1	T6
PA2	INT0
PA3	INT1
PA4	LD1
PA5	LD2
PA6	LD3
PA7	LD4

EXPERIMENT NO. 8

AIM: - Interfacing of DC Motor with STM32F407VET6.

REQUIREMENT: - STM32 M4-DVK, 12V Power Adaptor, 10 pin FRC (2 Qty.), Serial or USB Cable, BS2 Cable (1 Qty.).

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Connect 10 pin FRC from SV2 (PORT D) to J14 (EN-I/P) & SV1 (PORT E) to J15 (Start Stop) of DC Motor section.
8) Make both Jumper Setting as 1&2 Short & Connect DC Motor.
9) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
10) Press Switches in DC motor section to change Speed & Direction of DC Motor.

PIN DESCRIPTION: -
NOTE: - JUMPER JP6 & JP7 → 1&2 SHORT (DC MOTOR SIDE)

SV2 (PD0-PD7)	J14 (DC Motor EN-IN)
5V	5V
GND	GND
PD0	EN1
PD1	EN2
PD2	NC
PD3	NC
PD4	IP1
PD5	IP2
PD6	IP3
PD7	IP4

SV1 (PE0-PE7)	J15 (DC Motor Start Stop)
5V	5V
GND	GND
PE0	START
PE1	REV
PE2	INC
PE3	DCR
PE4	STOP
PE5	NC
PE6	NC
PE7	NC

EXPERIMENT NO. 9

AIM: - Interfacing of Stepper Motor with STM32F407VET6.

REQUIREMENT: - STM32 M4-DVK, 12V Power Adaptor, 10 pin FRC (2 Qty.), Serial or USB Cable, BS2 Cable (1 Qty.).

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Connect 10 pin FRC from SV2 (PORT D) to J14 (EN-I/P) & SV1 (PORT E) to J15 (Start Stop) of Stepper Motor section.
8) Make both Jumper Setting as 2&3 Short & Connect Stepper Motor.
9) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
10) Press Switches in Stepper motor section to change Speed & Direction of Stepper Motor.

PIN DESCRIPTION: -

NOTE: - JUMPER JP6 & JP7 → 2&3 SHORT (STEPPER MOTOR SIDE)

SV2 (PD0-PD7)	J14 (Stepper Motor EN-IN)
5V	5V
GND	GND
PD0	EN1
PD1	EN2
PD2	NC
PD3	NC
PD4	IP1
PD5	IP2
PD6	IP3
PD7	IP4

SV1 (PE0-PE7)	J15 (Stepper Motor Start Stop)
5V	5V
GND	GND
PE0	START
PE1	REV
PE2	INC
PE3	DCR
PE4	STOP
PE5	NC
PE6	NC
PE7	NC

EXPERIMENT NO. 10

AIM: - Interfacing of Internal ADC with STM32F407VET6.

REQUIREMENT: - STM32 M4-DVK, 12V Power Adaptor, Serial or USB Cable.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Short Pin 1 & 2 of JP39 in ADC Section via Jumper.
8) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
9) Now open any Serial Monitor (e.g. Hercules, TeraTerm, etc.), Select COM Port & Set Baud Rate to 115200.
10) Output can be seen on Serial Monitor by varying ADC Pot.

PIN DESCRIPTION: -

> ***NOTE: -*** *SHORT* Pin 1 & 2 of JP39

> ADC Input – PA0 (ADC1.10)

EXPERIMENT NO. 11

AIM: - Interfacing of Internal DAC with STM32F407VET6.

REQUIREMENT: - STM32 M4-DVK, 12V Power Adaptor, Serial or USB Cable, CRO.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
8) Now Connect CRO pin between PA4 & GND of DAC Section.
9) Output will be displayed on CRO.

PIN DESCRIPTION: -

DAC Output – PA4 (DAC Channel 11)

EXPERIMENT NO. 12

AIM: - Interfacing of Internal RTC with STM32F407VET6.

REQUIREMENT: - STM32 M4-DVK, 12V Power Adaptor, Serial or USB Cable.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
8) Now open any Serial Monitor (e.g. Hercules, TeraTerm, etc.), Select COM Port & Set Baud Rate to 115200.
9) Set Current Time, Weekday & Date.
10) Output can be seen on Serial Monitor after appropriate Input.

EXPERIMENT NO. 13

AIM: - Interfacing of UART with STM32F407VET6.

REQUIREMENT: - STM32 M4-DVK, 12V Power Adaptor, Serial or USB Cable.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Now set Boot Config switch of SMT32 Module on Flash & Press Reset Button.
8) Connect Serial or USB Cable to appropriate Port according to the UART selected in Program.
9) Open HyperTerminal and Select COM Port. Set Baud Rate to 115200.
10) Output will be displayed on Terminal.

PIN DESCRIPTION: -

PORT	UART	TX	RX
X15 (DB9)	UART4	PA0	PA1
X2 (DB9)	UART5	PC12	PD2

PORT	UART	TX	RX
USB Jumper setting JP29: - RX & PC10 short JP30: - TX & PC11 short	USART3	PC10	PC11
USB Jumper setting JP29: - RX & PA0 short JP30: - TX & PA1 short	UART4	PA0	PA1

EXPERIMENT NO. 14

AIM: - Interfacing of FRAM (AT24/FM24) with STM32F407VET6.

REQUIREMENT: - STM32 M4-DVK, 12V Power Adaptor, FRAM (AT24/FM24) Module, Serial or USB Cable.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Now set Boot Config switch of SMT32 Module on Flash.
8) Connect AT24/FM24 Module to **Upper Berg** of I2C Port of STM32 DVK. Make sure pins are connected properly (VCC - 3.3V, GND - GND).
9) Open HyperTerminal, Select COM Port, Set Baud Rate to 115200 & Open the PORT.
10) Press RESET Button on STM32 Module.
11) Output will be displayed on Terminal.

PIN DESCRIPTION: -

PORT	I2C	SDA	SCL	BERG
I2C Jumper setting JP1: - SDA & PB7 short JP2: - SCL & PB6 short	I2C1	PB7	PB6	Upper (Default Configuration)
I2C Jumper setting JP1: - SDA & PB9 short JP2: - SDL & PB8 short	I2C1	PB9	PB8	Lower

You will get output on HyperTerminal as follows.

EEPROM 24C02 Write Test

EEPROM 24C02 Write Test OK

EEPROM 24C02 Read Test

EEPROM 24C02 Read Test OK

EXPERIMENT NO. 15

AIM: - Interfacing of Data Flash (AT45BDXX) with STM32F407VET6.

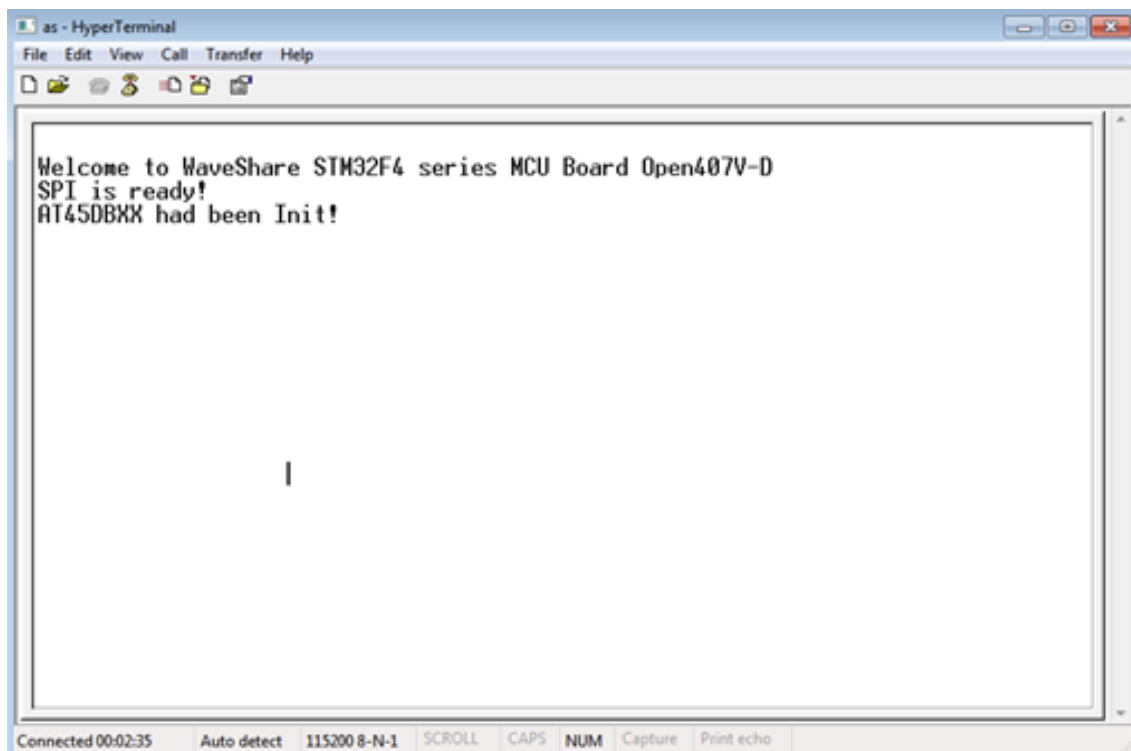**REQUIREMENT: -** STM32 M4-DVK, 12V Power Adaptor, Data Flash (AT45BDXX) Module, Serial or USB Cable.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Now set Boot Config switch of SMT32 Module on Flash.
8) Connect AT45BDXX Module to **Lower Berg** of SPI Port of STM32 DVK. Make sure pins are connected properly (VCC - 3.3V, GND - GND).
9) Open HyperTerminal, Select COM Port, Set Baud Rate to 115200 & Open the PORT.
10) Press RESET Button on STM32 Module.
11) Output will be displayed on Terminal.

PIN DESCRIPTION: -

Note: If using SPI1, Remove OTG JMP between FLG & PA5 on CORE STM32 Module, otherwise SPI won't work.

PORT	SPI	MISO	MOSI	SCK	BERG
SPI Jumper setting JP13: - MISO & PB14 short JP16: - MOSI & PB15 short JP15: - SCK & PB13 short JP14: - NSS & PB12 short	SPI2	PB14	PB15	PB13	Lower (Default Configuration)
SPI Jumper setting JP10: - MISO & PA6 short JP9: - MOSI & PA7 short JP12: - SCK & PA5 short JP11: - NSS & PA4 short	SPI1	PA6	PA7	PA5	Lower
SPI Jumper setting JP10: - MISO & PB4 short JP9: - MOSI & PB5 short JP12: - SCK & PB3 short	SPI3	PB4	PB5	PB3	Upper

EXPERIMENT NO. 16

AIM: - Interfacing of RF Board (NRF24L01) with STM32F407VET6.

REQUIREMENT: - STM32 M4-DVK, 12V Power Adaptor, RF Board (NRF24L01), Serial or USB Cable.

PROCEDURE:-

1) Connect the 12V Power Adaptor to STM32 M4 DVK.
2) Connect A-B USB cable between STM32 M4 DVK & PC.
3) Open the FlashLoader Demonstrator software and make settings as mentioned above.
4) Make sure that Boot Config switch of STM32 Module is set on SYSTEM during programming.
5) Press RESET button on STM32 Module & Immediately Click on NEXT.
6) Upload the Hex file to STM32 M4 Board.
7) Now set Boot Config switch of SMT32 Module on Flash.
8) Connect NRF24L01 Module SPI Port of STM32 DVK. Make sure pins are connected properly (VCC - 3.3V, GND - GND).
9) Open HyperTerminal, Select COM Port, Set Baud Rate to 115200 & Open the PORT.
10) Press RESET Button on STM32 Module.
11) Output will be displayed on Terminal.

PIN DESCRIPTION: -
Jumper Setting:

JP13: - MISO & PB14 short   JP10: - MISO & PB4 short

JP16: - MOSI & PB15 short   JP9: - MOSI & PB5 short

JP15: - SCK & PB13 short   JP12: - SCK & PB3 short

DVK Pins	RF Board Pins
3.3V	VCC
GND	GND
PB14	IRQ
PB4	MISO
PB15	CSN
PB5	MOSI
PB13	CE
PB3	SCK

```
USART1 & NRF2401 Initialized!
nRF24L01 Rx Mode
```



```
USART1 & NRF2401 Initialized!
nRF24L01 Tx Mode
```
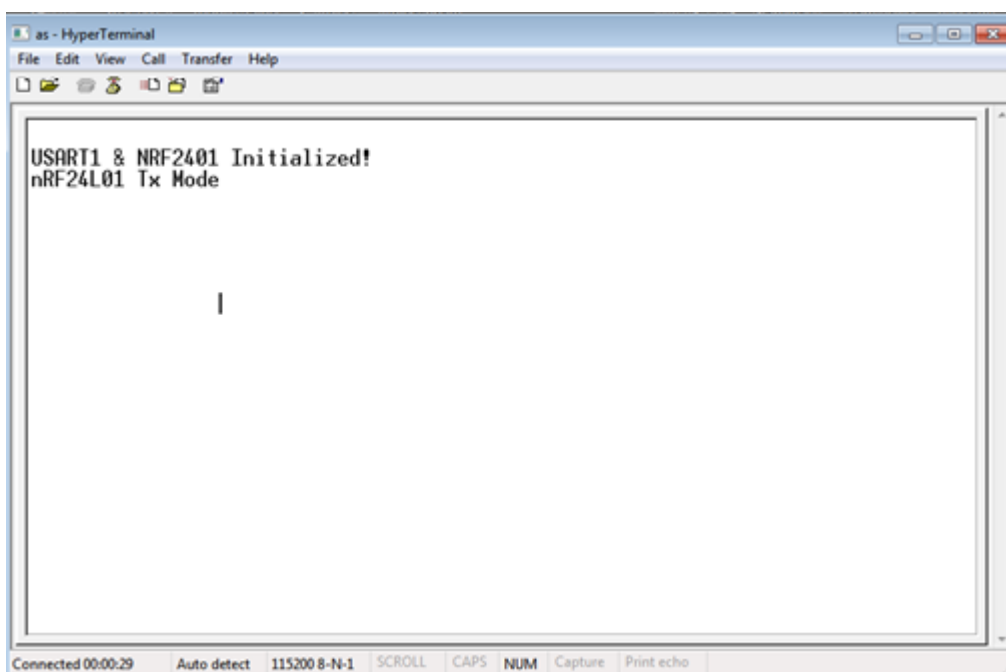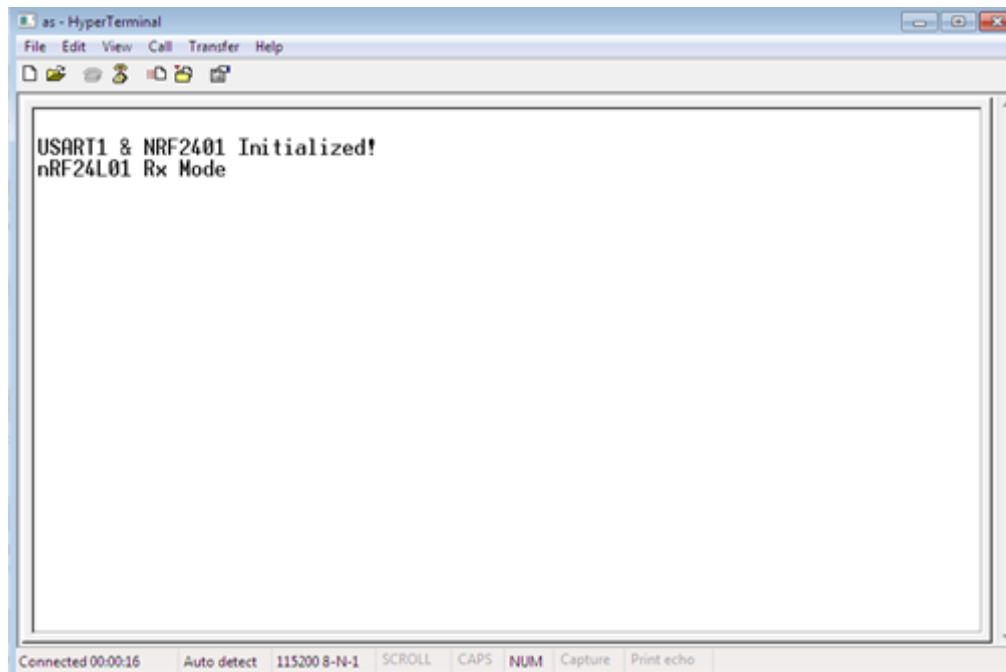
FRC CONNECTION DETAILS

Sr. no.	Experiment	STM32 M4 DVK	Interfacing Port
1	8 Bit LED Logic	SV2 (PD0-PD7) SV1 (PE0-PE7)	J21 (LEDs) J22 (Switches)
2	16x2 LCD (8 Bit)	SV5 (PA0-PA7) SV3 (PC0-PC7)	J9 (LCD Data) J10 (LCD CMD)
3	16x2 LCD (4 Bit)	SV5 (PA0-PA7)	J9 (LCD Data)
4	16x2 LCD & Keypad	SV5 (PA0-PA7) SV2 (PD0-PD7)	J9 (LCD Data) J13 (Keypad)
5	7-Segment	SV5 (PA0-PA7) SV3 (PC0-PC7)	J11 (7-SEG Data) J12 (7-SEG CMD)
6	7-Segment & Keypad	SV5 (PA0-PA7) SV3 (PC0-PC7) SV2 (PD0-PD7)	J11 (7-SEG Data) J12 (7-SEG CMD) J13 (Keypad)
7	Relay, Buzzer & LEDs	SV5 (PA0-PA7)	J7(Relay Buzzer)
8	DC Motor (Jumper JP6 &JP7 1&2 Short)	SV2(PD0-PD7) SV1 (PE0-PE7)	J14 (DC Motor EN-IN) J15 (DC Motor Start Stop)
9	Stepper Motor (Jumper JP6 & JP7 2&3 Short)	SV2(PD0-PD7) SV1 (PE0-PE7)	J14 (Stepper Motor EN-IN) J15 (Stepper Motor Start Stop)
10	Internal ADC (Jumper JP39 1&2 Short)	ADC input on PA0 via POT	-
11	Internal DAC	-	DAC Output on PA4
12	Internal RTC	USB Port	PC
13	UART	USB or Serial Port	PC
14	FRAM (AT24/FM24) (Jumper JP1 &JP2 1&2 Short)	I2C Port(Upper Berg)	AT24/FM24 Module
15	Data Flash (AT45BDXX)	SPI Port(Lower Berg)	AT45BDXX Module
16	RF Board (NRF24L01)	SPI Port	NRF24L01 Module

BOARD SCHEMATICS