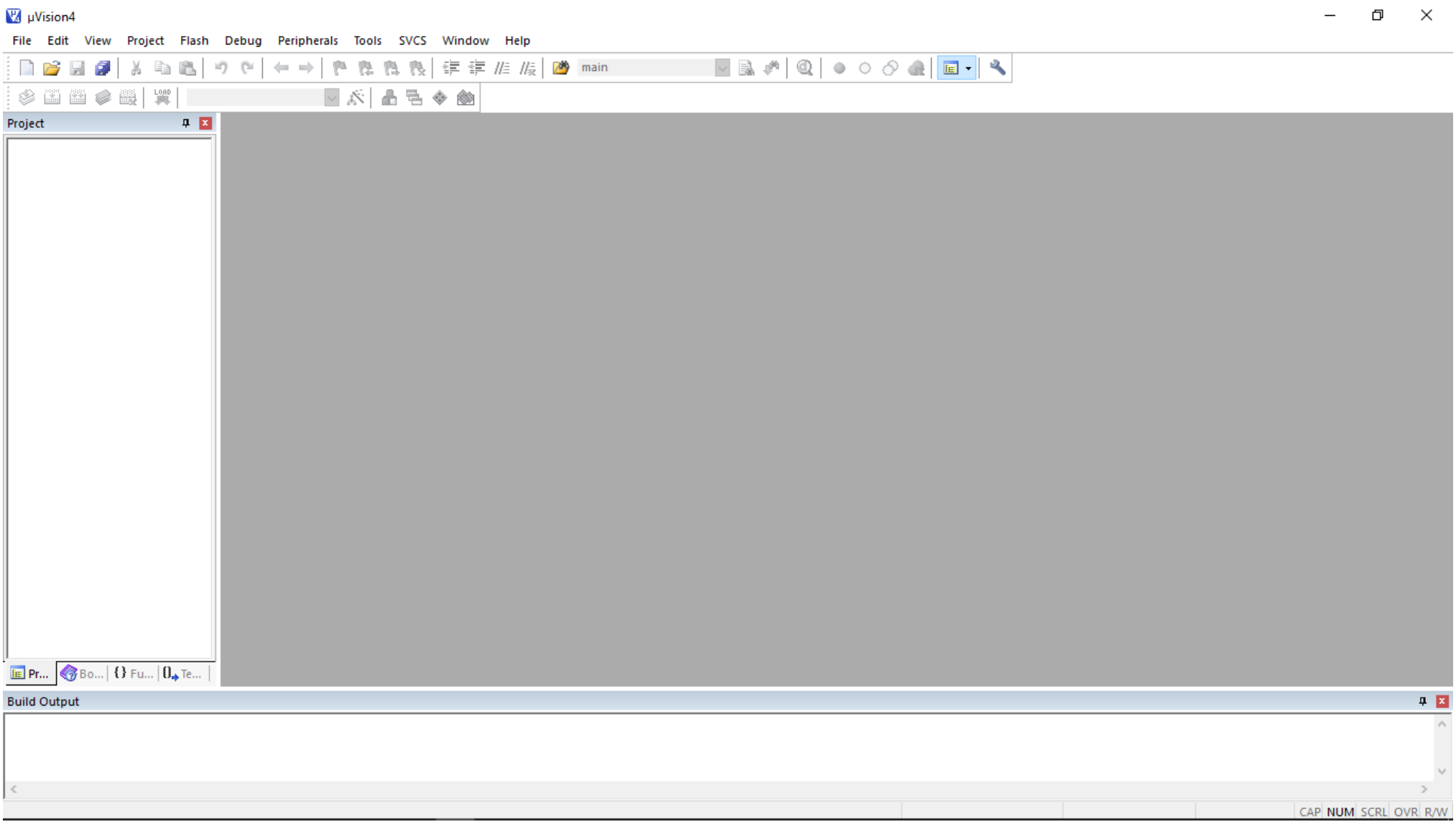
IIITD&M KANCHEEPURAM

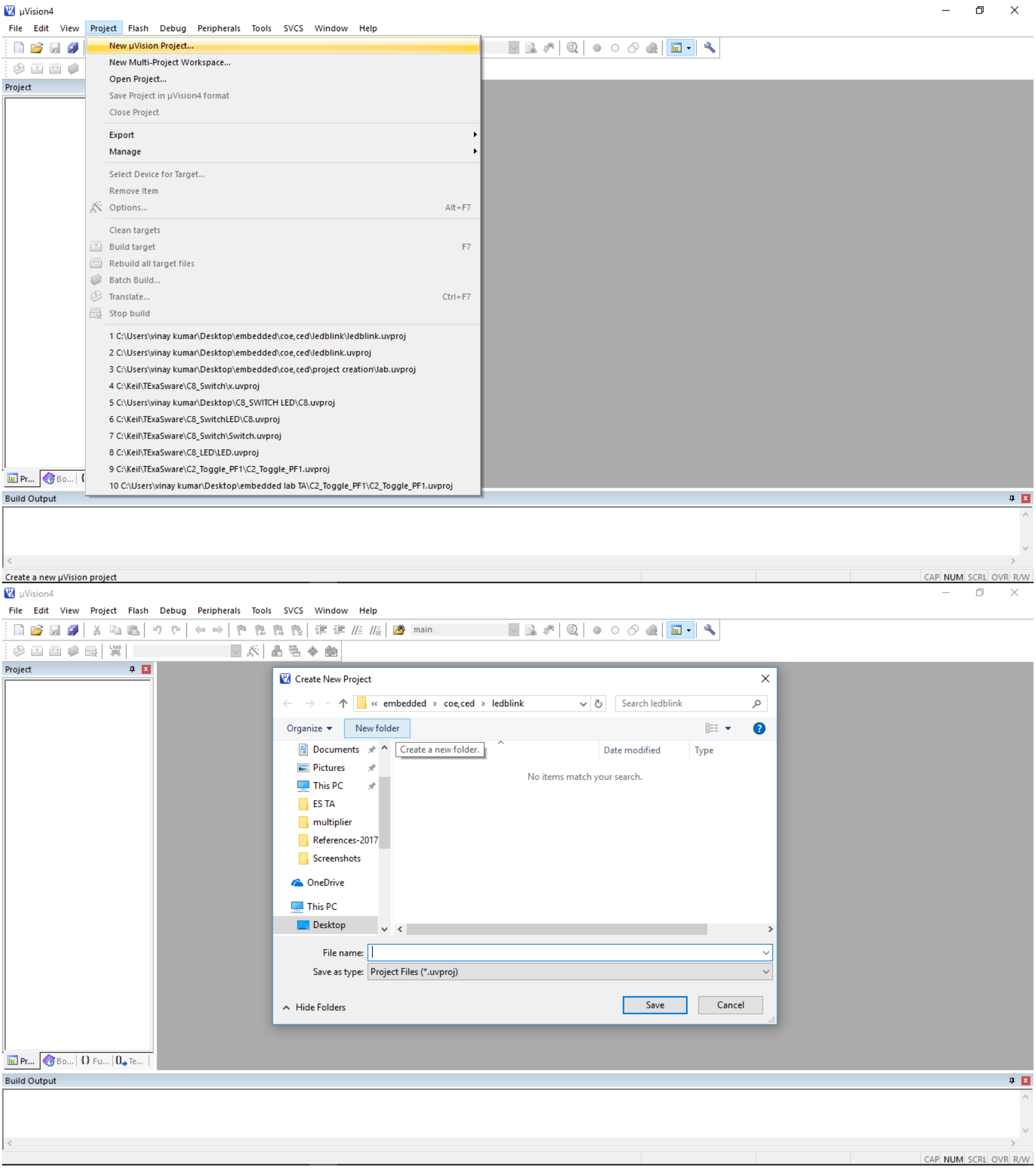
Getting started with Tiva C Series using Keil IDE

Embedded Systems Lab

1)open KEIL IDE



2)create new project



µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Project

Create New Project

« embedded › coe,ced › ledblink ›

Search ledblink

Organize New folder

Documents
Pictures
This PC
ES TA
multiplier
References-2017
Screenshots
OneDrive
This PC
Desktop

Name | Date modified | Type

ledblink | 24-01-2018 10:58 | File folder

File name:

Save as type: Project Files (*.uvproj)

Hide Folders

Open Cancel

Build Output

CAP NUM SCRL OVR R/W

µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Project

Create New Project

« coe,ced › ledblink › ledblink

Search ledblink

Organize New folder

Documents
Pictures
This PC
ES TA
multiplier
References-2017
Screenshots
OneDrive
This PC
Desktop

Name | Date modified | Type

No items match your search.

File name: blink

Save as type: Project Files (*.uvproj)

Hide Folders

Save Cancel

Build Output

CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Target 1

Project

Pr... Bo... {} Fu... 0+ Te...

Select Device for Target 'Target 1'...

CPU

Vendor: Texas Instruments
Device: TM4C123GH6PM
Toolset: ARM

Search: tm4c123gh6pm

Texas Instruments
TM4C123GH6PM

Description:

Old Part Number: LM4F230H5QR

ARM Cortex-M4F Processor Core
- 80-MHz operation; 100 DMIPS performance
- ARM Cortex SysTick Timer
- Nested Vectored Interrupt Controller (NVIC)
- Embedded Trace Macro and Trace Port
- IEEE754-compliant single-precision floating-point unit

On-Chip Memory
- 256 KB single-cycle Flash memory up to 40 MHz; a prefetch buffer imp
- 32 KB single-cycle SRAM
- Internal ROM loaded with StellarisWare software:
- 2KB EEPROM

Advanced Serial Integration

OK Cancel Help

Build Output

CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Target 1

Project

Pr... Bo... {} Fu... 0+ Te...

µVision

Copy 'startup_TM4C123.s' to Project Folder and Add File to Project ?

Yes No

Build Output

CAP NUM SCRL OVR R/W

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File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Target 1

Project

Target 1
Source Group 1
startup

Options for Group 'Source Group 1'... Alt+F7
Add New Item to Group 'Source Group 1'...
Add Existing Files to Group 'Source Group 1'...
Add Group...
Remove Group 'Source Group 1' and its Files
Manage Project Items...
Open File
Open List File
Open Map File
Open Build Log
Rebuild all target files
Build target F7
Translate File
Stop build
Show Include File Dependencies

Pr... Bo... Fu... Te...

Build Output

Add a new Item to Group

Simulation

CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Target 1

Project

Target 1
Source Group 1
startup_TM4C123.s

Add New Item to Group 'Source Group 1'

C File (.c)
C++ File (.cpp)
Asm File (.s)
Header File (.h)
Text File (.txt)
Image File (.*)
User Code Template

Create a new C source file and add it to the project.

Type: C File (.c)

Name: ex1

Location: C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink

Add Close Help

Pr... Bo... Fu... Te...

Build Output

Simulation

CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Project

- Target 1
  - Source Group 1
    - ex1.c
    - startup.s
    - tm4c123gh6pm.h
    - driverlib.lib

ex1.c* startup.s

```
/*

copy code from

        C:\Keil\TExaSware\C2_Toggle_PF1\main.c


*/
```

Build Output

```
Erase Done.
Programming Done.
Verify OK.
```

Simulation L:10 C:3 CAP NUM SCRL OVR R/W

11:51

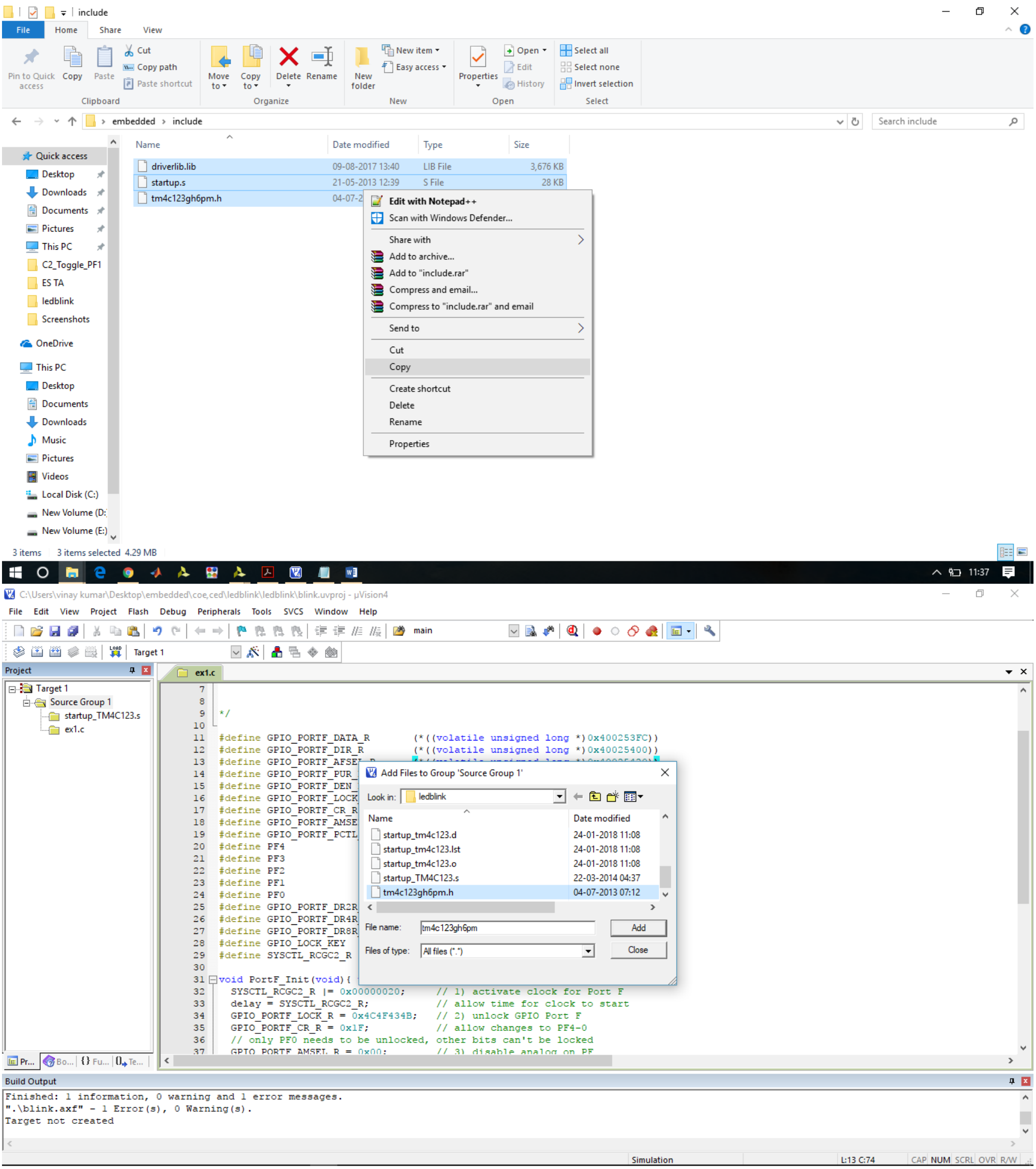
main - Notepad

File Edit Format View Help

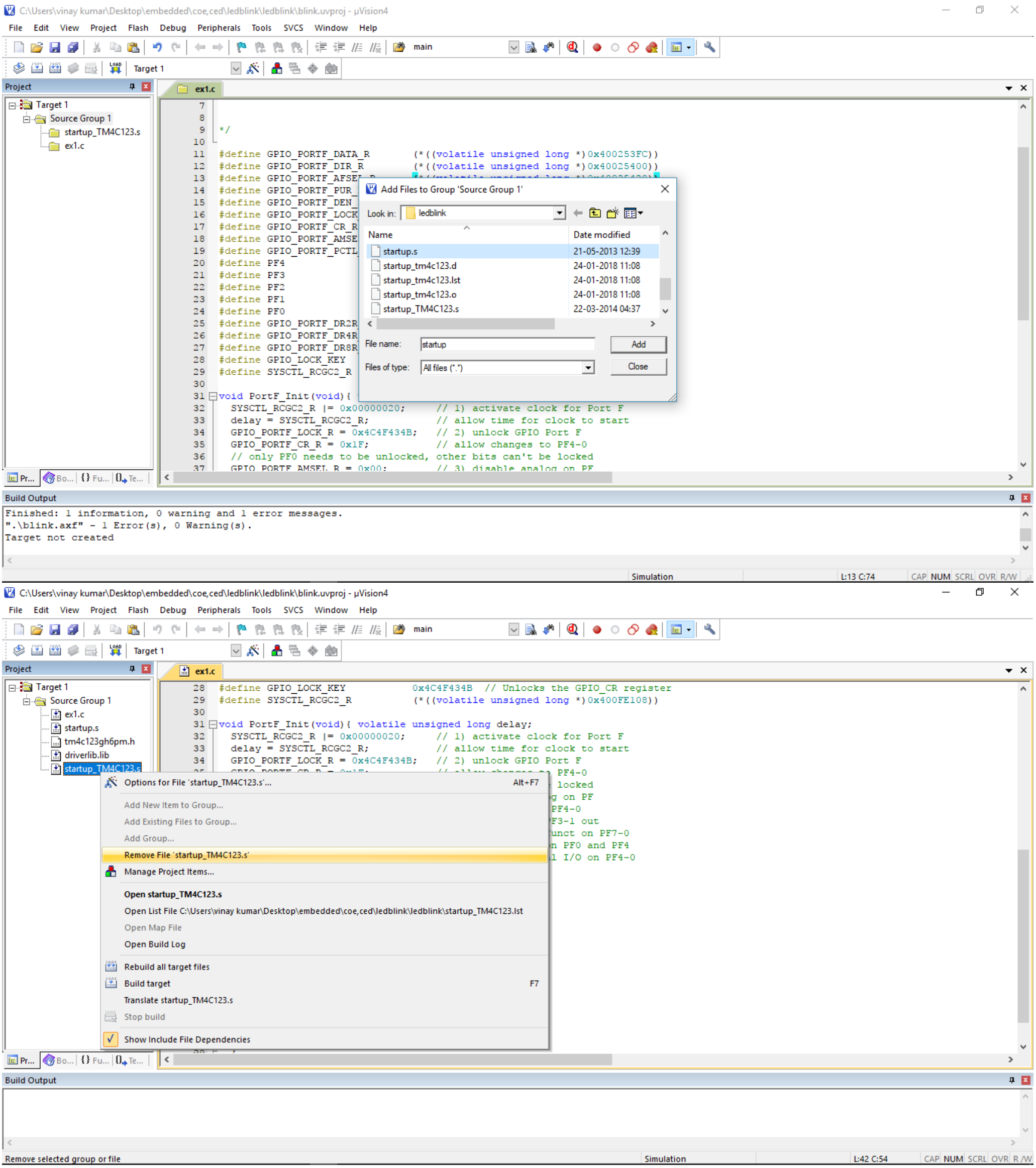
```
// SW1 left switch is negative logic PF4 on the Launchpad
// SW2 right switch is negative logic PF0 on the Launchpad
// red LED connected to PF1 on the Launchpad
// blue LED connected to PF2 on the Launchpad
// green LED connected to PF3 on the Launchpad


#define GPIO_PORTF_DATA_R       (*((volatile unsigned long *)0x400253FC))
#define GPIO_PORTF_DIR_R        (*((volatile unsigned long *)0x40025400))
#define GPIO_PORTF_AFSEL_R      (*((volatile unsigned long *)0x40025420))
#define GPIO_PORTF_PUR_R        (*((volatile unsigned long *)0x40025510))
#define GPIO_PORTF_DEN_R        (*((volatile unsigned long *)0x4002551C))
#define GPIO_PORTF_LOCK_R       (*((volatile unsigned long *)0x40025520))
#define GPIO_PORTF_CR_R         (*((volatile unsigned long *)0x40025524))
#define GPIO_PORTF_AMSEL_R      (*((volatile unsigned long *)0x40025528))
#define GPIO_PORTF_PCTL_R       (*((volatile unsigned long *)0x4002552C))
#define PF4                     (*((volatile unsigned long *)0x40025040))
#define PF3                     (*((volatile unsigned long *)0x40025020))
#define PF2                     (*((volatile unsigned long *)0x40025010))
#define PF1                     (*((volatile unsigned long *)0x40025008))
#define PF0                     (*((volatile unsigned long *)0x40025004))
#define GPIO_PORTF_DR2R_R       (*((volatile unsigned long *)0x40025500))
#define GPIO_PORTF_DR4R_R       (*((volatile unsigned long *)0x40025504))
#define GPIO_PORTF_DR8R_R       (*((volatile unsigned long *)0x40025508))
#define GPIO_LOCK_KEY           0x4C4F434B  // Unlocks the GPIO_CR register
#define SYSCTL_RCGC2_R          (*((volatile unsigned long *)0x400FE108))
```

```
void PortF_Init(void){ volatile unsigned long delay;
  SYSCTL_RCGC2_R |= 0x00000020;     // 1) activate clock for Port F
  delay = SYSCTL_RCGC2_R;           // allow time for clock to start
  GPIO_PORTF_LOCK_R = 0x4C4F434B;   // 2) unlock GPIO Port F
  GPIO_PORTF_CR_R = 0x1F;           // allow changes to PF4-0
```

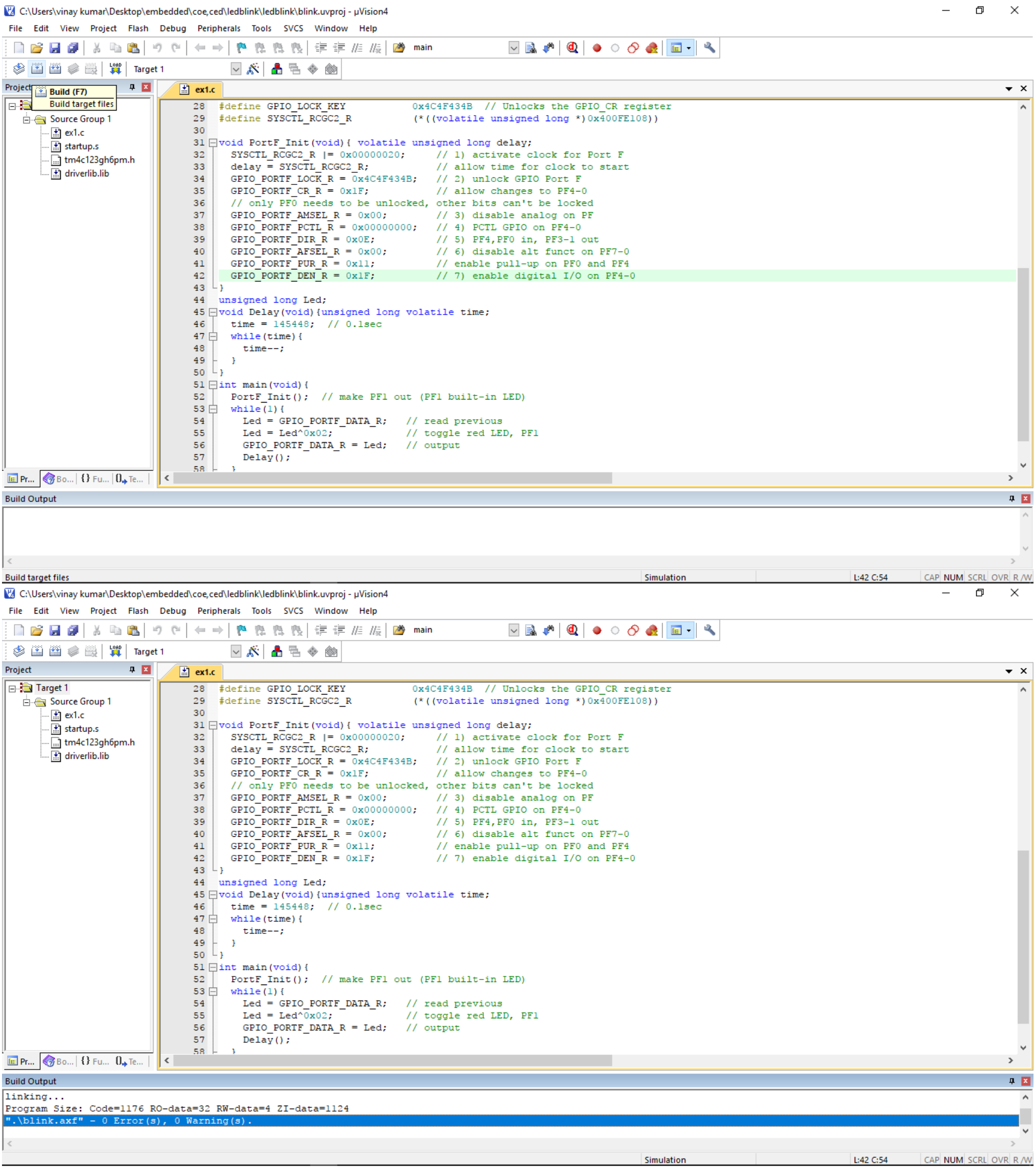
3) copy these files and paste in your project folder



4) Add startup.s and tm4c123gh6pm.h files to source group



5)build target



C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Target 1

Project

- Target 1
  - Source Group 1
    - ex1.c
    - startup.s
    - tm4c123gh6pm.h
    - driverlib.lib

ex1.c*

```
1
2
3  #define GPIO_PORTF_DATA_R
4  #define GPIO_PORTF_DIR_R
5  #define GPIO_PORTF_AFSEL_R
6  #define GPIO_PORTF_PUR_R
7  #define GPIO_PORTF_DEN_R
8  #define GPIO_PORTF_LOCK_R
9  #define GPIO_PORTF_CR_R
10 #define GPIO_PORTF_AMSEL_R
11 #define GPIO_PORTF_PCTL_R
12 #define PF4
13 #define PF3
14 #define PF2
15 #define PF1
16 #define PF0
17 #define GPIO_PORTF_DR2R_R
18 #define GPIO_PORTF_DR4R_R
19 #define GPIO_PORTF_DR8R_R
20 #define GPIO_LOCK_KEY
21 #define SYSCTL_RCGC2_R          (*((volatile unsigned long *)0x400FE108))
22
23 void PortF_Init(void){ volatile unsigned long delay;
24   SYSCTL_RCGC2_R |= 0x00000020;     // 1) activate clock for Port F
25   delay = SYSCTL_RCGC2_R;           // allow time for clock to start
26   GPIO_PORTF_LOCK_R = 0x4C4F434B;   // 2) unlock GPIO Port F
27   GPIO_PORTF_CR_R = 0x1F;           // allow changes to PF4-0
28   // only PF0 needs to be unlocked, other bits can't be locked
29   GPIO_PORTF_AMSEL_R = 0x00;        // 3) disable analog on PF
30   GPIO_PORTF_PCTL_R = 0x00000000;   // 4) PCTL GPIO on PF4-0
31   GPIO_PORTF_DIR_R = 0x0E;          // 5) PF4,PF0 in, PF3-1 out
```

Go To Line... Ctrl+G
Select Text between Matching Braces Ctrl+Shift+E
Go To Matching Brace Ctrl+E
Tabify Selection
Untabify Selection
Make Uppercase Ctrl+Shift+U
Make Lowercase Ctrl+U
Comment Selection
Uncomment Selection
Indent Selection
Unindent Selection
Indent Selection with Text...
Unindent Selection with Text...
Delete Trailing White Space
Delete Horizontal White Space
Cut Current Line Ctrl+L
Go to Definition of current Word
Go to Reference of current Word

Split Window horizontally
Insert '#include <TM4C123.h>'
Go to Headerfile
Insert/Remove Breakpoint F9
Enable/Disable Breakpoint Ctrl+F9
Insert/Remove Bookmark Ctrl+F2
Undo Ctrl+Z
Redo Ctrl+Y
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Select All Ctrl+A
Outlining
Advanced

Build Output

```
linking...
Program Size: Code=1176 RO-data=32 RW-data=4 ZI-data=1124
".\blink.axf" - 0 Error(s), 0 Warning(s).
```

Converts each selected line to comment text | Simulation | L:21 C:74 | CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Target 1

Project

- Target 1
  - Source Group 1
    - ex1.c
    - startup.s
    - tm4c123gh6pm.h
    - driverlib.lib

ex1.c*

```
10 //#define GPIO_PORTF_AMSEL_R      (*((volatile unsigned long *)0x40025528))
11 //#define GPIO_PORTF_PCTL_R       (*((volatile unsigned long *)0x4002552C))
12 //#define PF4                     (*((volatile unsigned long *)0x40025040))
13 //#define PF3                     (*((volatile unsigned long *)0x40025020))
14 //#define PF2                     (*((volatile unsigned long *)0x40025010))
15 //#define PF1                     (*((volatile unsigned long *)0x40025008))
16 //#define PF0                     (*((volatile unsigned long *)0x40025004))
17 //#define GPIO_PORTF_DR2R_R       (*((volatile unsigned long *)0x40025500))
18 //#define GPIO_PORTF_DR4R_R       (*((volatile unsigned long *)0x40025504))
19 //#define GPIO_PORTF_DR8R_R       (*((volatile unsigned long *)0x40025508))
20 //#define GPIO_LOCK_KEY           0x4C4F434B  // Unlocks the GPIO_CR register
21 //#define SYSCTL_RCGC2_R          (*((volatile unsigned long *)0x400FE108))
22
23
24 #include "tm4c123gh6pm.h"
25
26 void PortF_Init(void){ volatile unsigned long delay;
27   SYSCTL_RCGC2_R |= 0x00000020;     // 1) activate clock for Port F
28   delay = SYSCTL_RCGC2_R;           // allow time for clock to start
29   GPIO_PORTF_LOCK_R = 0x4C4F434B;   // 2) unlock GPIO Port F
30   GPIO_PORTF_CR_R = 0x1F;           // allow changes to PF4-0
31   // only PF0 needs to be unlocked, other bits can't be locked
32   GPIO_PORTF_AMSEL_R = 0x00;        // 3) disable analog on PF
33   GPIO_PORTF_PCTL_R = 0x00000000;   // 4) PCTL GPIO on PF4-0
34   GPIO_PORTF_DIR_R = 0x0E;          // 5) PF4,PF0 in, PF3-1 out
35   GPIO_PORTF_AFSEL_R = 0x00;        // 6) disable alt funct on PF7-0
36   GPIO_PORTF_PUR_R = 0x11;          // enable pull-up on PF0 and PF4
37   GPIO_PORTF_DEN_R = 0x1F;          // 7) enable digital I/O on PF4-0
38 }
39 unsigned long Led;
40 void Delay(void){unsigned long volatile time;
```

Build Output

```
linking...
Program Size: Code=1176 RO-data=32 RW-data=4 ZI-data=1124
".\blink.axf" - 0 Error(s), 0 Warning(s).
```

Simulation | L:24 C:1 | CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Target 1

Options for Target...
Configure target options

Project

- Target 1
  - Source Group 1
    - ex1.c
    - startup.s
    - tm4c123gh6pm.h
    - driverlib.lib

ex1.c

```
10  //#define GPIO_PORTF_AMSEL_R      (*((volatile unsigned long *)0x40025528))
11  //#define GPIO_PORTF_PCTL_R       (*((volatile unsigned long *)0x4002552C))
12  //#define PF4                     (*((volatile unsigned long *)0x40025040))
13  //#define PF3                     (*((volatile unsigned long *)0x40025020))
14  //#define PF2                     (*((volatile unsigned long *)0x40025010))
15  //#define PF1                     (*((volatile unsigned long *)0x40025008))
16  //#define PF0                     (*((volatile unsigned long *)0x40025004))
17  //#define GPIO_PORTF_DR2R_R       (*((volatile unsigned long *)0x40025500))
18  //#define GPIO_PORTF_DR4R_R       (*((volatile unsigned long *)0x40025504))
19  //#define GPIO_PORTF_DR8R_R       (*((volatile unsigned long *)0x40025508))
20  //#define GPIO_LOCK_KEY           0x4C4F434B  // Unlocks the GPIO_CR register
21  //#define SYSCTL_RCGC2_R          (*((volatile unsigned long *)0x400FE108))
22
23
24  #include "tm4c123gh6pm.h"
25
26  void PortF_Init(void){ volatile unsigned long delay;
27    SYSCTL_RCGC2_R |= 0x00000020;     // 1) activate clock for Port F
28    delay = SYSCTL_RCGC2_R;           // allow time for clock to start
29    GPIO_PORTF_LOCK_R = 0x4C4F434B;   // 2) unlock GPIO Port F
30    GPIO_PORTF_CR_R = 0x1F;           // allow changes to PF4-0
31    // only PF0 needs to be unlocked, other bits can't be locked
32    GPIO_PORTF_AMSEL_R = 0x00;        // 3) disable analog on PF
33    GPIO_PORTF_PCTL_R = 0x00000000;   // 4) PCTL GPIO on PF4-0
34    GPIO_PORTF_DIR_R = 0x0E;          // 5) PF4,PF0 in, PF3-1 out
35    GPIO_PORTF_AFSEL_R = 0x00;        // 6) disable alt funct on PF7-0
36    GPIO_PORTF_PUR_R = 0x11;          // enable pull-up on PF0 and PF4
37    GPIO_PORTF_DEN_R = 0x1F;          // 7) enable digital I/O on PF4-0
38  }
39  unsigned long Led;
40  void Delay(void){unsigned long volatile time;
```

Build Output

```
linking...
Program Size: Code=1176 RO-data=32 RW-data=4 ZI-data=1124
".\blink.axf" - 0 Error(s), 0 Warning(s).
```

Simulation L:24 C:26 CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Target 1

Project

- Target 1
  - Source Group 1
    - ex1.c
    - startup.s
    - tm4c123gh6pm.h
    - driverlib.lib

ex1.c

```
10  //#define GPIO_PORTF_AMSEL_R      (*((volatile unsigned long *)0x40025528))
```


Options for Target 'Target 1'

Device | Target | Output | Listing | User | C/C++ | Asm | Linker | Debug | Utilities

Texas Instruments TM4C123GH6PM

Xtal (MHz): 16.0

Operating system: None

System-Viewer File (.Sfr):

TM4C123GH6PM.SFR

Use Custom SVD File

Code Generation

Use Cross-Module Optimization

Use MicroLIB Big Endian

Floating Point Hardware: Use FPU

Not Used
Use FPU

Read/Only Memory Areas

default	off-chip	Start	Size	Startup
	ROM1:			
	ROM2:			
	ROM3:			
	on-chip			
☑	IROM1:	0x0	0x40000	◉
	IROM2:			

Read/Write Memory Areas

default	off-chip	Start	Size	NoInit
	RAM1:			
	RAM2:			
	RAM3:			
	on-chip			
☑	IRAM1:	0x20000000	0x8000	
	IRAM2:			

OK Cancel Defaults Help

Build Output

```
linking...
Program Size: Code=1176 RO-data=32 RW-data=4 ZI-data=1124
".\blink.axf" - 0 Error(s), 0 Warning(s).
```

Simulation L:24 C:26 CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Project

- Target 1
  - Source Group 1
    - ex1.c
    - startup.s
    - tm4c123gh6pm.h
    - driverlib.lib

ex1.c

```
10  //#define GPIO_PORTF_AMSEL_R      (*((volatile unsigned long *)0x40025528))
11  //#define GPIO_PORTF_PCTL_R       (*((volatile unsigned long *)0x4002552C))
12  //#define
13  //#define
14  //#define
15  //#define
16  //#define
17  //#define
18  //#define
19  //#define
20  //#define
21  //#define
22
23
24  #include "
25
26  void PortF
27    SYSCTL_R
28    delay =
29    GPIO_POR
30    GPIO_POR
31    // only
32    GPIO_POR
33    GPIO_POR
34    GPIO_POR
35    GPIO_POR
36    GPIO_POR
37    GPIO_POR
38  }
39  unsigned l
40  void Delay(void)unsigned long volatile time;
```

Options for Target 'Target 1'

Device | Target | Output | Listing | User | C/C++ | Asm | Linker | Debug | Utilities

- (•) Use Simulator — Settings
- [ ] Limit Speed to Real-Time
- ( ) Use: Stellaris ICDI — Settings
- [x] Load Application at Startup — [x] Run to main()
- Initialization File: — ... — Edit...
- Restore Debug Session Settings
  - [x] Breakpoints — [x] Toolbox
  - [x] Watch Windows & Performance Analyzer
  - [x] Memory Display — [x] System Viewer
- CPU DLL: SARMCM3.DLL — Parameter: -MPU
- Dialog DLL: DCM.DLL — Parameter: -pCM4 -dLaunchPadDLL
- Driver DLL: SARMCM3.DLL — Parameter: -MPU
- Dialog DLL: TCM.DLL — Parameter: -pCM4

OK | Cancel | Defaults | Help

Build Output

```
linking...
Program Size: Code=1176 RO-data=32 RW-data=4 ZI-data=1124
".\blink.axf" - 0 Error(s), 0 Warning(s).
```

Simulation | L:24 C:26 | CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Project

- Target 1
  - Source Group 1
    - ex1.c
    - startup.s
    - tm4c123gh6pm.h
    - driverlib.lib

ex1.c

```
10  //#define GPIO_PORTF_AMSEL_R      (*((volatile unsigned long *)0x40025528))
11  //#define GPIO_PORTF_PCTL_R       (*((volatile unsigned long *)0x4002552C))
12  //#define
13  //#define
14  //#define
15  //#define
16  //#define
17  //#define
18  //#define
19  //#define
20  //#define
21  //#define
22
23
24  #include "
25
26  void PortF
27    SYSCTL_R
28    delay =
29    GPIO_POR
30    GPIO_POR
31    // only
32    GPIO_POR
33    GPIO_POR
34    GPIO_POR
35    GPIO_POR
36    GPIO_POR
37    GPIO_POR
38  }
39  unsigned l
40  void Delay(void)unsigned long volatile time;
```

Options for Target 'Target 1'

Device | Target | Output | Listing | User | C/C++ | Asm | Linker | Debug | Utilities

- Configure Flash Menu Command
- (•) Use Target Driver for Flash Programming — [ ] Use Debug Driver
- Stellaris ICDI — Settings — [x] Update Target before Debugging
- Init File: — ... — Edit...
- ( ) Use External Tool for Flash Programming
- Command: — ...
- Arguments:
- [ ] Run Independent
- Configure Image File Processing (FCARM):
- Output File: — Add Output File to Group: Source Group 1
- Image Files Root Folder: — [ ] Generate Listing

OK | Cancel | Defaults | Help

Build Output

```
linking...
Program Size: Code=1176 RO-data=32 RW-data=4 ZI-data=1124
".\blink.axf" - 0 Error(s), 0 Warning(s).
```

Simulation | L:24 C:26 | CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Start/Stop Debug Session (Ctrl+F5)
Enter or leave a debug session

Project

- Target 1
  - Source Group 1
    - ex1.c
    - startup.s
    - tm4c123gh6pm.h
    - driverlib.lib

ex1.c

```
10  //#define GPIO_PORTF_AMSEL_R      (*((volatile unsigned long *)0x40025528))
11  //#define GPIO_PORTF_PCTL_R       (*((volatile unsigned long *)0x4002552C))
12  //#define PF4                     (*((volatile unsigned long *)0x40025040))
13  //#define PF3                     (*((volatile unsigned long *)0x40025020))
14  //#define PF2                     (*((volatile unsigned long *)0x40025010))
15  //#define PF1                     (*((volatile unsigned long *)0x40025008))
16  //#define PF0                     (*((volatile unsigned long *)0x40025004))
17  //#define GPIO_PORTF_DR2R_R       (*((volatile unsigned long *)0x40025500))
18  //#define GPIO_PORTF_DR4R_R       (*((volatile unsigned long *)0x40025504))
19  //#define GPIO_PORTF_DR8R_R       (*((volatile unsigned long *)0x40025508))
20  //#define GPIO_LOCK_KEY           0x4C4F434B  // Unlocks the GPIO_CR register
21  //#define SYSCTL_RCGC2_R          (*((volatile unsigned long *)0x400FE108))
22
23
24  #include "tm4c123gh6pm.h"
25
26  void PortF_Init(void){ volatile unsigned long delay;
27    SYSCTL_RCGC2_R |= 0x00000020;     // 1) activate clock for Port F
28    delay = SYSCTL_RCGC2_R;           // allow time for clock to start
29    GPIO_PORTF_LOCK_R = 0x4C4F434B;   // 2) unlock GPIO Port F
30    GPIO_PORTF_CR_R = 0x1F;           // allow changes to PF4-0
31    // only PF0 needs to be unlocked, other bits can't be locked
32    GPIO_PORTF_AMSEL_R = 0x00;        // 3) disable analog on PF
33    GPIO_PORTF_PCTL_R = 0x00000000;   // 4) PCTL GPIO on PF4-0
34    GPIO_PORTF_DIR_R = 0x0E;          // 5) PF4,PF0 in, PF3-1 out
35    GPIO_PORTF_AFSEL_R = 0x00;        // 6) disable alt funct on PF7-0
36    GPIO_PORTF_PUR_R = 0x11;          // enable pull-up on PF0 and PF4
37    GPIO_PORTF_DEN_R = 0x1F;          // 7) enable digital I/O on PF4-0
38  }
39  unsigned long Led;
40  void Delay(void){unsigned long volatile time;
```

Build Output

```
Erase Done.
Programming Done.
Verify OK.
```

Enter or leave a debug session | Simulation | L:24 C:26 | CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Project

- Target 1
  - Source Group 1
    - ex1.c
    - startup.s
    - tm4c123gh6pm.h
    - driverlib.lib

ex1.c

```
10  //#define GPIO_PORTF_AMSEL_R      (*((volatile unsigned long *)0x40025528))
11  //#define GPIO_PORTF_PCTL_R       (*((volatile unsigned long *)0x4002552C))
12  //#define PF4                     (*((volatile unsigned long *)0x40025040))
13  //#define PF3                     (*((volatile unsigned long *)0x40025020))
14  //#define PF2                     (*((volatile unsigned long *)0x40025010))
15  //#define PF1                     (*((volatile unsigned long *)0x40025008))
16  //#define PF0                     (*((volatile unsigned long *)0x40025004))
17  //#define GPIO_PORTF_DR2R_R       (*((volatile unsigned long *)0x40025500))
18  //#define GPIO_PORTF_DR4R_R       (*((volatile unsigned long *)0x40025504))
19  //#define GPIO_PORTF_DR8R_R       (*((volatile unsigned long *)0x40025508))
20  //#define GPIO_LOCK_KEY           0x4C4F434B  // Unlocks the GPIO_CR register
21  //#define SYSCTL_RCGC2_R                                    0FE108))
22
23
24  #include "tm4c123gh6pm.h"
25
26  void PortF_Init(void){ volatile
27    SYSCTL_RCGC2_R |= 0x00000020;
28    delay = SYSCTL_RCGC2_R;
29    GPIO_PORTF_LOCK_R = 0x4C4F434E
30    GPIO_PORTF_CR_R = 0x1F;
31    // only PF0 needs to be unlocked, other bits can't be locked
32    GPIO_PORTF_AMSEL_R = 0x00;        // 3) disable analog on PF
33    GPIO_PORTF_PCTL_R = 0x00000000;   // 4) PCTL GPIO on PF4-0
34    GPIO_PORTF_DIR_R = 0x0E;          // 5) PF4,PF0 in, PF3-1 out
35    GPIO_PORTF_AFSEL_R = 0x00;        // 6) disable alt funct on PF7-0
36    GPIO_PORTF_PUR_R = 0x11;          // enable pull-up on PF0 and PF4
37    GPIO_PORTF_DEN_R = 0x1F;          // 7) enable digital I/O on PF4-0
38  }
39  unsigned long Led;
40  void Delay(void){unsigned long volatile time;
```

µVision

EVALUATION MODE
Running with Code Size Limit: 32K

OK

Build Output

```
Erase Done.
Programming Done.
Verify OK.
```

Simulation | L:24 C:26 | CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Registers

Register	Value
Core	
R0	0x20000068
R1	0x20000068
R2	0x20000068
R3	0x20000068
R4	0x00000000
R5	0x20000004
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x000004AC
R11	0x00000000
R12	0x20000044
R13 (SP)	0x20000468
R14 (LR)	0x0000030F
R15 (PC)	0x0000038E
xPSR	0x21000000
Banked	
System	
Internal	
Mode	Thread
Privilege	Privileged
Stack	MSP
States	878
Sec	0.00005487
FPU	

Project Registers

Disassembly

```
    47:   PortF_Init();  // mai                    LED)
0x0000038E F7FFFFC7  BL.W                        320)
    48:   while(1){
0x00000392 E00F      B            0x000003B4
```

Logic Analyzer
Performance Analyzer
Code Coverage

ex1.c startup.s

```
34   GPIO_PORTF_DIR_R = 0x0E;          // 5) PF4,PF0 in, PF3-1 out
35   GPIO_PORTF_AFSEL_R = 0x00;        // 6) disable alt funct on PF7-0
36   GPIO_PORTF_PUR_R = 0x11;          // enable pull-up on PF0 and PF4
37   GPIO_PORTF_DEN_R = 0x1F;          // 7) enable digital I/O on PF4-0
38 }
39 unsigned long Led;
40 void Delay(void){unsigned long volatile time;
41   time = 145448;  // 0.1sec
42   while(time){
43     time--;
44   }
45 }
46 int main(void){
47   PortF_Init();  // make PF1 out (PF1 built-in LED)
48   while(1){
49     Led = GPIO_PORTF_DATA_R;   // read previous
50     Led = Led^0x02;            // toggle red LED, PF1
51     GPIO_PORTF_DATA_R = Led;   // output
52     Delay();
53   }
54 }
55
```

Command

```
*** Currently used: 1200 Bytes (3%)
```

ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE

Call Stack + Locals

Name	Location/Value	Type
main	0x0000038E	int f()

Call Stack + Locals Memory 1

Show or hide the Logic Analyzer Window | Simulation | t1: 0.00005487 sec | L:47 C:1 | CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Registers

Register	Value
Core	
R0	0x20000068
R1	0x20000068
R2	0x20000068
R3	0x20000068
R4	0x00000000
R5	0x20000004
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x000004AC
R11	0x00000000
R12	0x20000044
R13 (SP)	0x20000468
R14 (LR)	0x0000030F
R15 (PC)	0x0000038E
xPSR	0x21000000
Banked	
System	
Internal	
Mode	Thread
Privilege	Privileged
Stack	MSP
States	878
Sec	0.00005487
FPU	

Project Registers

Logic Analyzer

Setup... Load... Save... | Min Time 0 s | Max Time 54.875 us | Grid 1 ms | Zoom In Out All | Min/Max Auto Undo | Update Screen Stop Clear | Transition Prev Next | Jump to Code Trace | Signal Info | Show Cycles | Amplitude | Cursor

2.6875 us | 4.822687 ms | 11.00269 ms | 22.00269 ms

Disassembly Logic Analyzer

ex1.c startup.s

```
34   GPIO_PORTF_DIR_R = 0x0E;          // 5) PF4,PF0 in, PF3-1 out
35   GPIO_PORTF_AFSEL_R = 0x00;        // 6) disable alt funct on PF7-0
36   GPIO_PORTF_PUR_R = 0x11;          // enable pull-up on PF0 and PF4
37   GPIO_PORTF_DEN_R = 0x1F;          // 7) enable digital I/O on PF4-0
38 }
39 unsigned long Led;
40 void Delay(void){unsigned long volatile time;
41   time = 145448;  // 0.1sec
42   while(time){
```

Command

```
*** Currently used: 1200 Bytes (3%)
```

ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE

Call Stack + Locals

Name	Location/Value	Type
main	0x0000038E	int f()

Call Stack + Locals Memory 1

Simulation | t1: 0.00005487 sec | L:47 C:1 | CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Registers

Register	Value
Core	
R0	0x20000068
R1	0x20000068
R2	0x20000068
R3	0x20000068
R4	0x00000000
R5	0x20000004
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x000004AC
R11	0x00000000
R12	0x20000044
R13 (SP)	0x20000468
R14 (LR)	0x0000030F
R15 (PC)	0x0000038E
xPSR	0x21000000
Banked	
System	
Internal	
Mode	Thread
Privilege	Privileged
Stack	MSP
States	878
Sec	0.00005487
FPU	

Project Registers

Logic Analyzer

Setup... Load... Save... | Min Time 0 s | Max Time 54.875 us | Grid 1 ms | Zoom | Min/Max | Update Screen | Transition | Jump to | Signal Info | Amplitude | Show Cycles | Cursor

2.6875 us 0.562688 ms 22.00269 ms

Disassembly Logic Analyzer

ex1.c startup.s

```
47   PortF_Init();  // make P
48   while(1){
49     Led = GPIO_PORTF_DATA_
50     Led = Led^0x02;
51     GPIO_PORTF_DATA_R = Le
52     Delay();
53   }
54 }
55
```

Setup Logic Analyzer

Current Logic Analyzer Signals:

New (Insert)

Signal Display
Display Type: Analog
Color:
Hexadecimal Display

Display Range
Max: 0.0
Min: 0.0

Display Formula (Signal & Mask) >> Shift
And Mask: 0xFFFFFFFF
Shift Right: 0

Export / Import
Export Signal Definitions...
Import Signal Definitions...
Delete actual Signals

Kill All Close Help

Command

```
*** Currently used: 1200 Bytes (3%)
>
ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE
```

Call Stack + Locals

Name	Location/Value	Type
main	0x0000038E	int f()

Call Stack + Locals Memory 1

Simulation t1: 0.00005487 sec L:47 C:1 CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Registers

Register	Value
Core	
R0	0x20000068
R1	0x20000068
R2	0x20000068
R3	0x20000068
R4	0x00000000
R5	0x20000004
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x000004AC
R11	0x00000000
R12	0x20000044
R13 (SP)	0x20000468
R14 (LR)	0x0000030F
R15 (PC)	0x0000038E
xPSR	0x21000000
Banked	
System	
Internal	
Mode	Thread
Privilege	Privileged
Stack	MSP
States	878
Sec	0.00005487
FPU	

Project Registers

Logic Analyzer

Setup... Load... Save... | Min Time 54.875 us | Max Time 54.875 us | Grid 0 s | Zoom | Min/Max | Update Screen | Transition | Jump to | Signal Info | Amplitude | Show Cycles | Cursor

4294967295
(portf & 0x00000002) >> 1
0
54.875 54.875 us 54.875 us

Disassembly Logic Analyzer

ex1.c startup.s

```
47   PortF_Init();  // make P
48   while(1){
49     Led = GPIO_PORTF_DATA_
50     Led = Led^0x02;
51     GPIO_PORTF_DATA_R = Le
52     Delay();
53   }
54 }
55
```

Setup Logic Analyzer

Current Logic Analyzer Signals:

(portf & 0x00000002) >> 1

Signal Display
Display Type: Analog (Analog / Bit / State)
Color:
Hexadecim...

Display Range
Max: 0xFFFFFFFF
Min: 0x0

Display Formula (Signal & Mask) >> Shift
And Mask: 0x00000002
Shift Right: 1

Export / Import
Export Signal Definitions...
Import Signal Definitions...
Delete actual Signals

Kill All Close Help

Command

```
LA (portf & 0x00000002) >> 1
>
ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE
```

Call Stack + Locals

Name	Location/Value	Type
main	0x0000038E	int f()

Call Stack + Locals Memory 1

Simulation t1: 0.00005487 sec L:47 C:1 CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Registers

Run (F5)
Start code execution

Register	Value
Core	
R0	0x20000068
R1	0x20000068
R2	0x20000068
R3	0x20000068
R4	0x00000000
R5	0x20000004
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x000004AC
R11	0x00000000
R12	0x20000044
R13 (SP)	0x20000468
R14 (LR)	0x0000030F
R15 (PC)	0x0000038E
xPSR	0x21000000
Banked	
System	
Internal	
Mode	Thread
Privilege	Privileged
Stack	MSP
States	878
Sec	0.00005487
FPU	

Project Registers

Logic Analyzer

Setup... Load... Save... | Min Time 54.875 us | Max Time 54.875 us | Grid 0 s | Zoom In Out All | Min/Max Auto Undo | Update Screen Stop Clear | Transition Prev Next | Jump to Code Trace | Signal Info | Amplitude | Show Cycles | Cursor

(portf & 0x00000002) >> 1

1
0

54.875 us 54.875 us 54.875 us 54.875 us

Disassembly Logic Analyzer

ex1.c startup.s

```
47   PortF_Init();  // make PF1 out (PF1 built-in LED)
48   while(1){
49     Led = GPIO_PORTF_DATA_R;   // read previous
50     Led = Led^0x02;            // toggle red LED, PF1
51     GPIO_PORTF_DATA_R = Led;   // output
52     Delay();
53   }
54 }
55
```

Command

```
LA (portf & 0x00000002) >> 1
>
ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE
```

Call Stack + Locals

Name	Location/Value	Type
main	0x0000038E	int f()

Call Stack + Locals Memory 1

Simulation t1: 0.00005487 sec L:47 C:1 CAP NUM SCRL OVR R/W

C:\Users\vinay kumar\Desktop\embedded\coe,ced\ledblink\ledblink\blink.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Registers

Register	Value
Core	
R0	0x20000068
R1	0x20000068
R2	0x20000068
R3	0x20000068
R4	0x00000000
R5	0x20000004
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x000004AC
R11	0x00000000
R12	0x20000044
R13 (SP)	0x20000468
R14 (LR)	0x0000030F
R15 (PC)	0x0000038E
xPSR	0x21000000
Banked	
System	
Internal	
Mode	Thread
Privilege	Privileged
Stack	MSP
States	878
Sec	0.00005487
FPU	

Project Registers

Logic Analyzer

Setup... Load... Save... | Min Time 54.875 us | Max Time 10.435 s | Grid 50 ms | Zoom In Out All | Min/Max Auto Undo | Update Screen Start Clear | Transition Prev Next | Jump to Code Trace | Signal Info | Amplitude | Show Cycles | Cursor

& 0x00000002) >> 1

1
0

54.875 us 1 -> 1 0.200057 s , d: 1 0.400055 s, d: 0.199998 s 1.050055 s

(portf & 0x00000002) >> 1

	Mouse Pos	Reference Point	Delta
Time:	0.400055 s	0.200057 s	0.199998 s = 5.000059 Hz
Value:	1	1	0
PC $:	0x3ac	0x3ac	

Disassembly Logic Analyzer

ex1.c startup.s

```
42   while(time){
43     time--;
44   }
45 }
46 int main(void){
47   PortF_Init();  // make PF1 out (PF1 built-in LED)
48   while(1){
49     Led = GPIO_PORTF_DATA_R;   // read previous
50     Led = Led^0x02;            // toggle red LED, PF1
51     GPIO_PORTF_DATA_R = Led;   // output
52     Delay();
53   }
54 }
55
```

Command

```
LA (portf & 0x00000002) >> 1
>
ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE
```

Call Stack + Locals

Name	Location/Value	Type
main	0x0000038E	int f()

Call Stack + Locals Memory 1

Simulation t1: 36.76300006 sec L:47 C:1 CAP NUM SCRL OVR R/W