

# LCD 16\*2

+ دو تا پوشه داخل پروژه هست:

۱. Proteus: فایل های پروتئوس داخلش هست. LCD و STM32F103C8 رو شبیه سازی کرده و "اسم" و "سلام" رو نشون میده.  
برای باز کردنش ، باید فایل 6.pdsprj رو باز کنی.

۲. STM32\_LCD16x2: فایل های CubeMX و CubeIDE داخلش هست.  
برای باز کردن CubeIDE باید فایل project رو باز کنی.  
برای باز کردن CubeMX باید فایل STM32\_LCD16x2.ioc رو باز کنی.

داخل این پوشه ، ۴ تا پوشه ی دیگه هم هست که:

۱. Setting. برای تنظیمات هست.

۲. Core برای فایل های اصلی برنامه است. داخلش پوشه ی Inc هست که برای فایل های

header (پسوند .h) هست. و پوشه ی Src هم برای فایل های اجرایی (پسوند .c) هست.

۳. Debug برای خروجی های برنامه ست. (فایل hex برنامه داخل این پوشه ست که داخل

پروتئوس import میکنیم).

۴. Drivers که برای HAL هست.

کار های انجام شده:

۱. نصب STM32CubeMX و STM32CubeIDE و Proteus.

۲. ساختن یک workspace در STM32CubeIDE.

۳. ساختن یک پروژه ی جدید و باز کردن آن در CubeIDE.

۴. انتخاب و عوض کردن نام pin ها (شکل زیر)

File Edit Navigate Search Project Run Window Help

Project Explorer

main.c lcd.h STM32\_LCD16x2.ioc

STM32\_LCD16x2

Binaries

Includes

Core

Drivers

Debug

STM32\_LCD16x2.ioc

STM32F103C8Tx\_FLASH

STM32\_LCD16x2.ioc - Pinout & Configuration

Pinout & Configuration

Clock Configuration

Tools

Categories A-Z

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DMA

GPIO

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Connectivity

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Group By Peripherals

GPIO

SYS

Configuration

GPIO Mode and Configuration

Search Signals

Search (Ctrl+F)

Pin... Signal... GPIO... GPIO... GPIO... Maxim... User L... Modified

PA0-W... n/a Low Output... No pull... Low RS

PA1 n/a Low Output... No pull... Low RW

PA2 n/a Low Output... No pull... Low E

PA3 n/a Low Output... No pull... Low D4

PA4 n/a Low Output... No pull... Low D5

PA5 n/a Low Output... No pull... Low D6

PA6 n/a Low Output... No pull... Low D7

☐ Show only Modified Pins

Select Pins from table to configure them. Multiple selection is Allowed

Pinout view

System view

STM32F103C8Tx LQFP48

PA14 PA15 PB3 PB4 PB5 PB6 PB7 PB8 BOOT VDD VSS PA13 PA12 PA11 PA10 PA9 PA8 PB15 PB14 PB13 PB12

VBAT PC13 PC14 PC15 PD0 PD1 NRST VSSA VDDA PA0 PA1 PA2 RS RW E

PA3 PA4 PA5 PA6 PA7 PA8 PA9 PA10 PA11 PA12 PA13 PA14 PA15

PA16 PA17 PA18 PA19 PA20 PA21 PA22 PA23 PA24 PA25 PA26 PA27 PA28 PA29 PA30 PA31

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## ۵. تنظیم قسمت های زیر:

STM32CubeIDE

Search Project Run Window Help

main.c lcd.h lcd.c STM32\_LCD16x2.ioc

### STM32\_LCD16x2.ioc - Pinout & Configuration

#### Pinout & Configuration

**Categories** A->Z

System Core

DMA

**GPIO**

IWDG

NVIC

RCC

**⚠ SYS**

WWDG

Analog >

Timers >

Connectivity >

Computing >

Middleware and Software Packs >

#### Clock Configuration

Software Packs Pinout

SYS Mode and Configuration

Mode

Debug Serial Wire

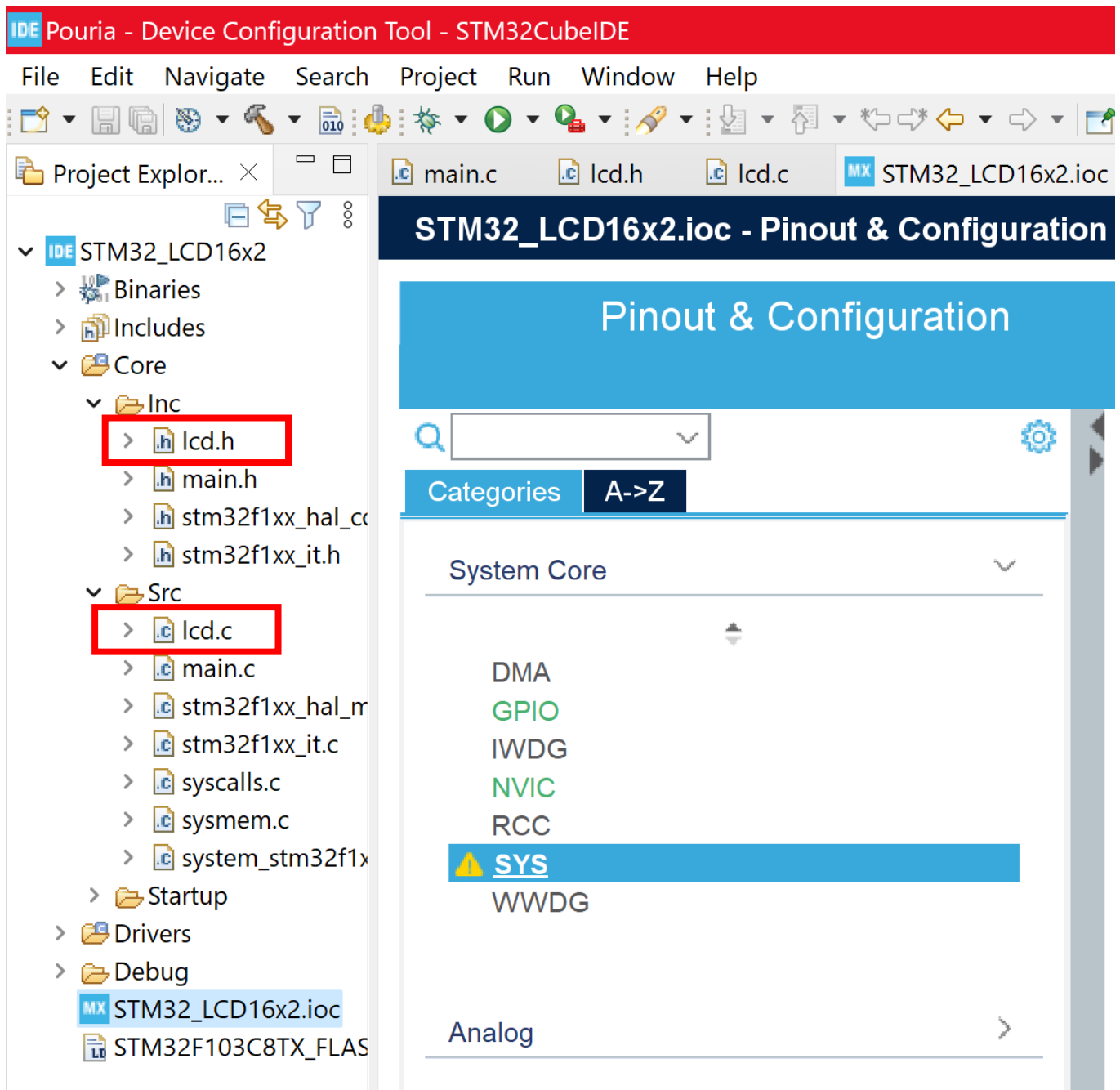
☒ System Wake-Up

Timebase Source SysTick



#### Configuration

⚠ Warning: This peripheral has no parameters to be configured.

۶. اضافه کردن فایل های lcd.h و lcd.c به فایل های برنامه:



۷. برنامه نویسی فایل main.c:

همه ی قسمت های برنامه کامنت گذاری شده ست. بعد از برنامه نویسی ، علامت  را زده تا برنامه سیو شود. سپس روی علامت  زده تا برنامه build شود. **برای درک کدهای**

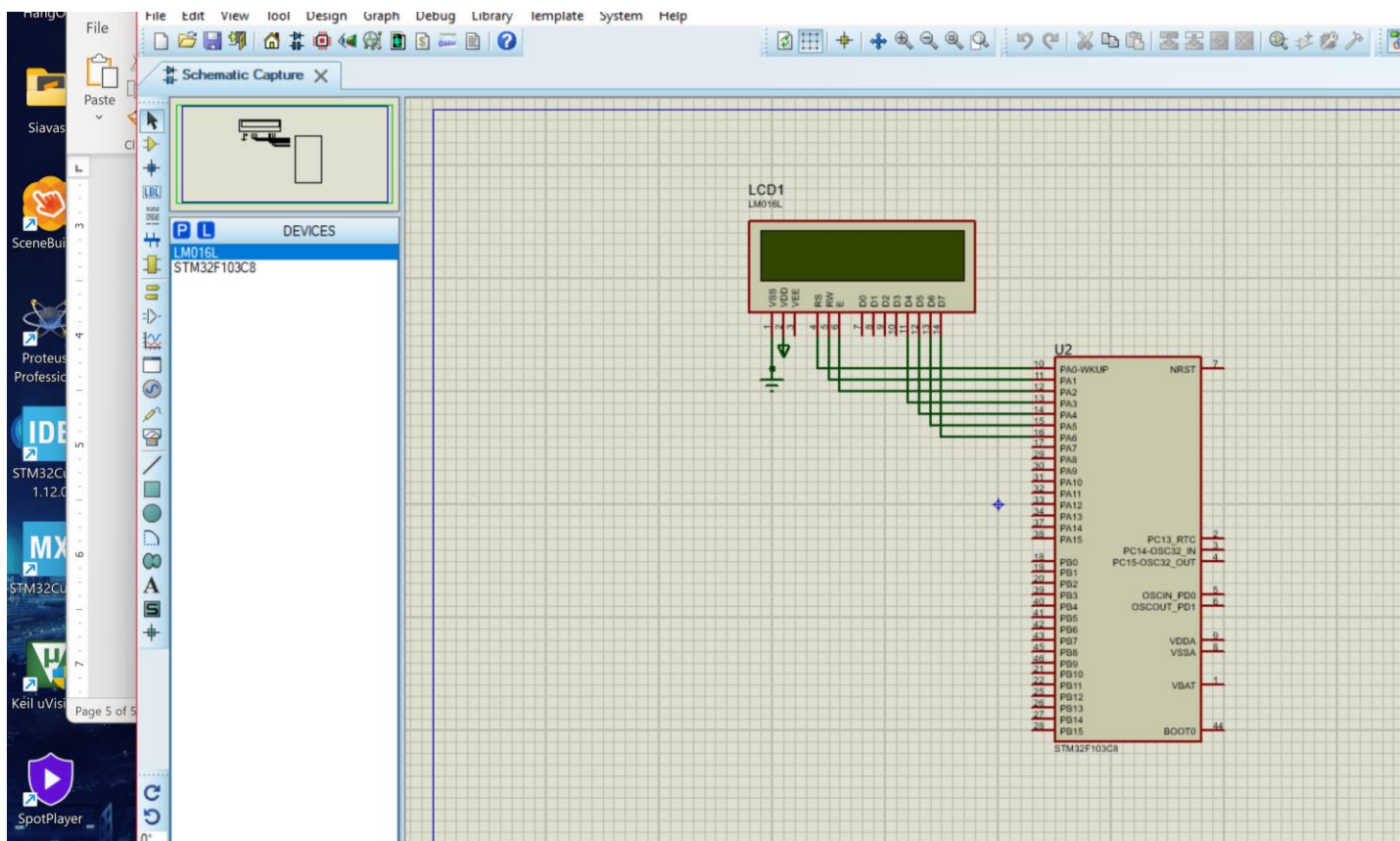
**برنامه همه ی فیلم های استاد دیده شود.**

۸. به صورت معمول نمیتوان از فونت فارسی در LCD استفاده کرد. برای همین از فونت های دستی استفاده کردم ، به این صورت که در سایت

[/https://maxpromer.github.io/LCD-Character-Creator](https://maxpromer.github.io/LCD-Character-Creator)

فونت ها را ساخته و در برنامه اضافه میکردم.

۹. نرم افزار پروتئوس را باز کرده و STM32F103C8 را طبق شکل سیم کشی میکنیم.



۱۰. بعد از آن با دو بار کلیک کردن روی STM32 ، پنجره ی زیر باز میشود ، در قسمت program file آدرس فایل hex ساخته شده را میدهیم.