WrpBase

IOTPRJ – 2019/10/06

History

Revision	Author	Date	Comments
1.0	nguyenhtm	2019/10/06	Initial version

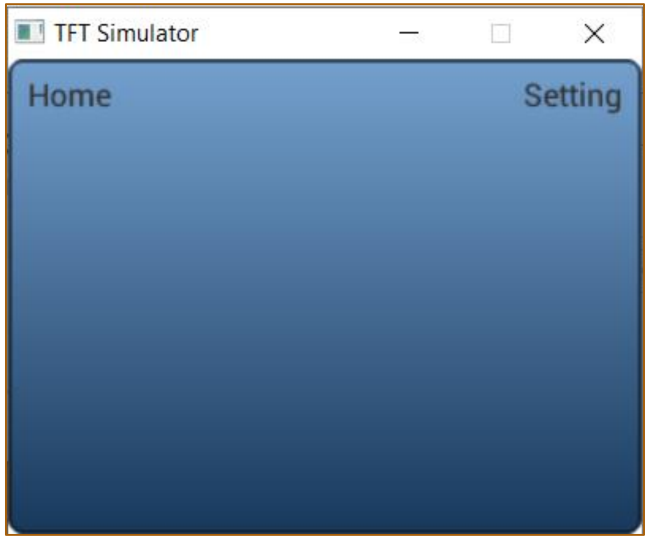
Overview

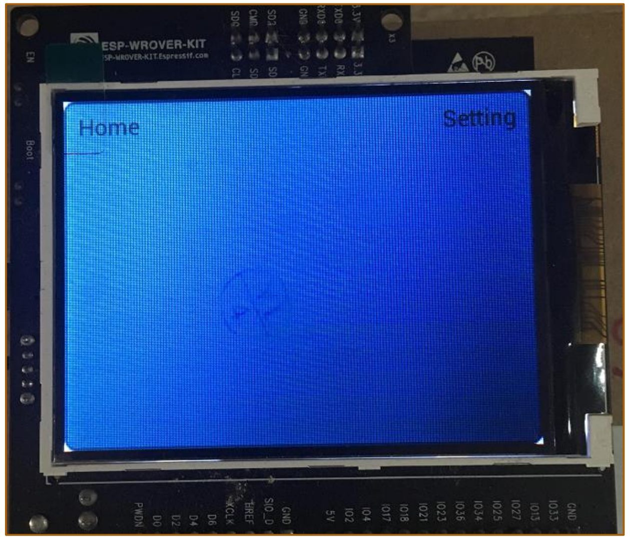
Provide a framework for developers to easily create GUI applications in IOT area with ESP32 chip

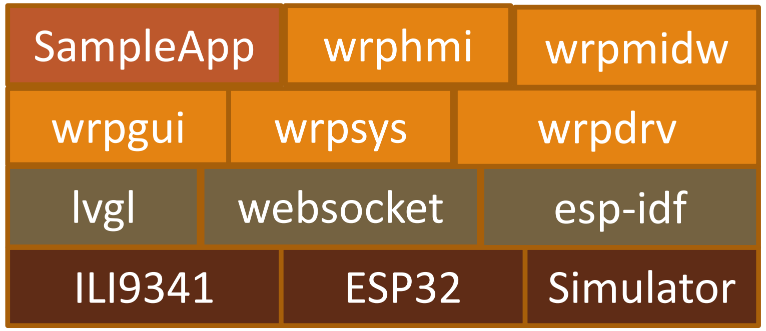
Sample App

The Sample App can run on ESP32 platform using PICO Kit and on Windows platform using SDL Simulator

Video: https://www.youtube.com/watch?v=6uVoYXjuBhI






SampleApp wrphmi wrpmidw

wrpgui wrpsys wrpdrv

lvgl websocket esp-idf

ILI9341 ESP32 Simulator

Setup

D:\iotprj\wrpbase

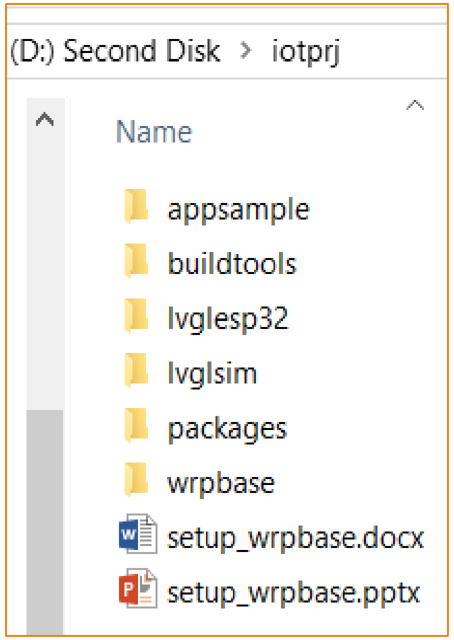
- D:\iotprj: git clone --recursive https://github.com/nguyenhtm/espt
- Folder Structures: D:\iotprj\appsample, D:\iotprj\lvglesp32, D:\iotprj\lvglsim, D:\iotprj\wrpbase

D:\iotprj\buildtools

- D:\iotprj\buildtools\mingw-w64: download mingw-w64-install.exe at http://mingw-w64.org/doku.php/download
- D:\iotprj\buildtools\msys32: download esp32_win32_msys2_environment_and_toolchain-20181001.zip at https://docs.espressif.com/projects/esp-idf/en/stable/get-started/windows-setup.html
- D:\iotprj\buildtools\eclipse: download eclipse-cpp-2019-03-R-win32-x86_64.zip at https://www.eclipse.org/downloads/packages/file/55067

D:\iotprj\packages

- D:\iotprj\packages\esp-idf: git clone --recursive https://github.com/espressif/esp-idf.git
- D:\iotprj\packages\lvgl: git clone --recursive https://github.com/littlevgl/lvgl.git
- D:\iotprj\packages\pc_simulator_sdl_eclipse: git clone --recursive https://github.com/littlevgl/pc_simulator_sdl_eclipse.git
- D:\iotprj\packages\esp32_ili9341: git clone --recursive https://github.com/littlevgl/esp32_ili9341.git
- D:\iotprj\packages\SDL2-2.0.5: download the SDL2-devel-2.0.5-mingw.tar.gz file at https://www.libsdl.org/release
- D:\iotprj\packages\mongoose: git clone https://github.com/cesanta/mongoose



(D:) Second Disk > iotprj

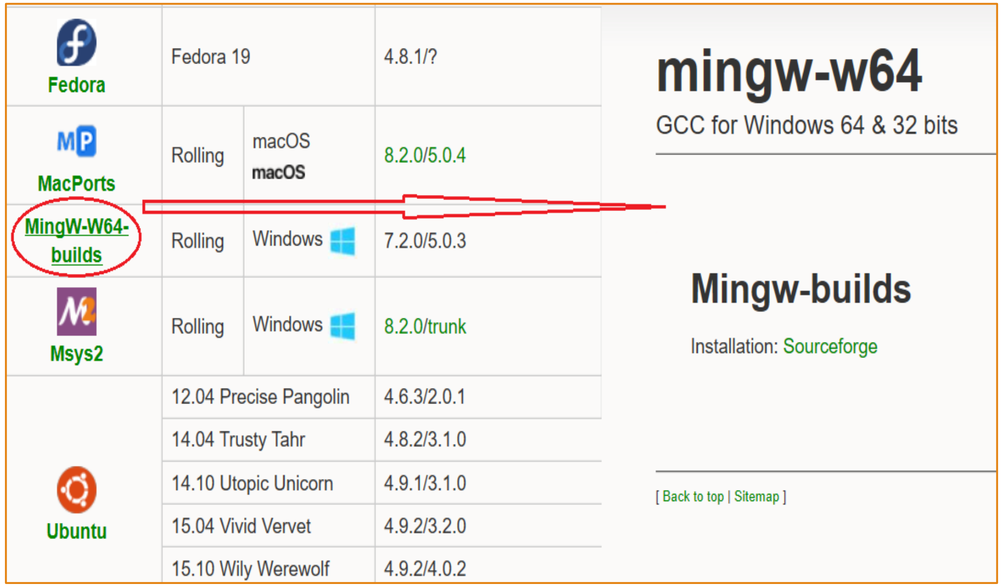
Name

appsample
buildtools
lvglesp32
lvglsim
packages
wrpbase
setup_wrpbase.docx
setup_wrpbase.pptx

BuildTools

Mingw64

- GCC for Windows 32/64 bit which is used to compile source code for simulation
- Download mingw-w64-install.exe at http://mingw-w64.org/doku.php/download and install in buildtools folder



Fedora	Fedora 19		4.8.1/?
MacPorts	Rolling	macOS macOS	8.2.0/5.0.4
MingW-W64-builds	Rolling	Windows	7.2.0/5.0.3
Msys2	Rolling	Windows	8.2.0/trunk
Ubuntu	12.04 Precise Pangolin		4.6.3/2.0.1
	14.04 Trusty Tahr		4.8.2/3.1.0
	14.10 Utopic Unicorn		4.9.1/3.1.0
	15.04 Vivid Vervet		4.9.2/3.2.0
	15.10 Wily Werewolf		4.9.2/4.0.2

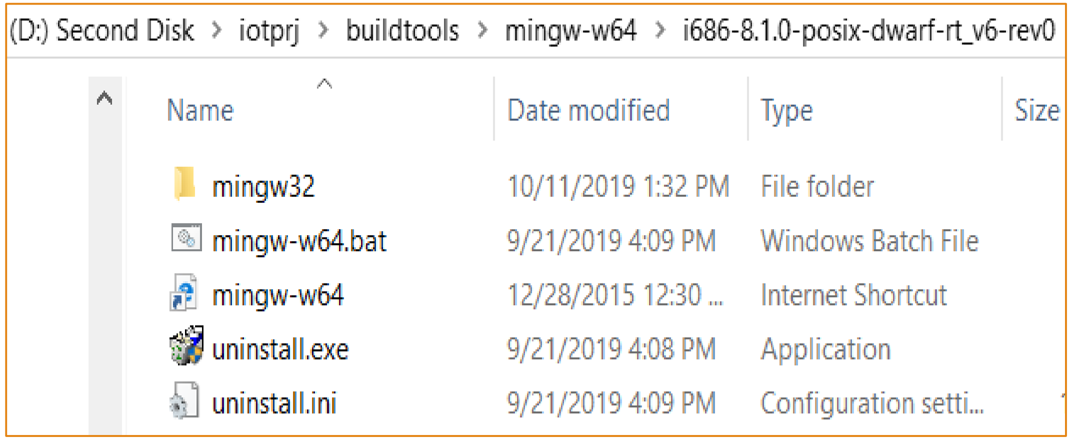
mingw-w64

GCC for Windows 64 & 32 bits

Mingw-builds

Installation: Sourceforge

[Back to top | Sitemap]



(D:) Second Disk › iotprj › buildtools › mingw-w64 › i686-8.1.0-posix-dwarf-rt_v6-rev0

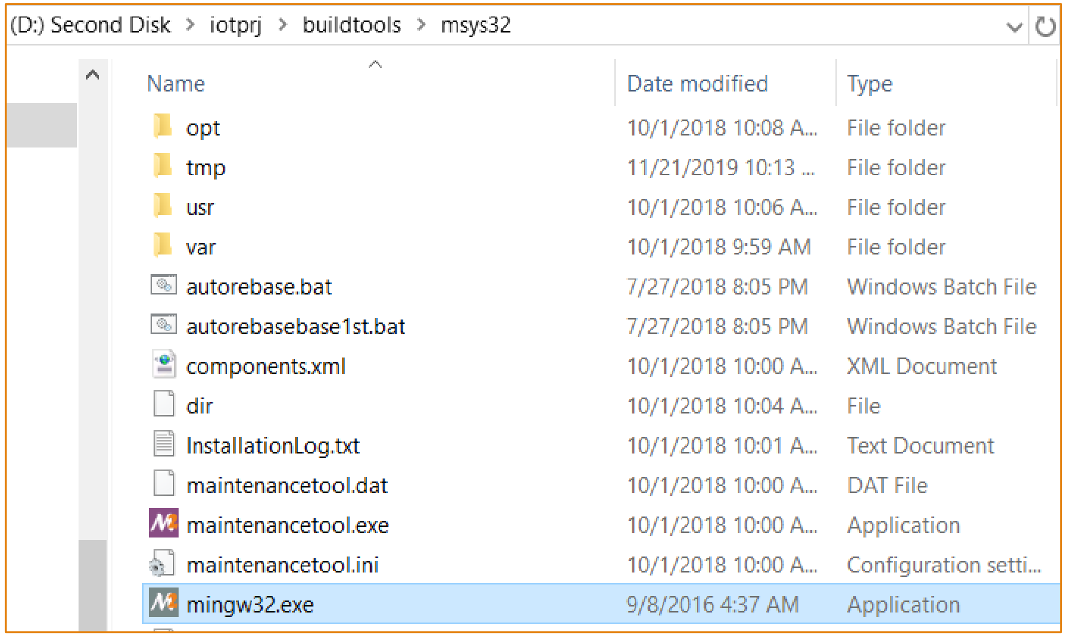
Name	Date modified	Type	Size
mingw32	10/11/2019 1:32 PM	File folder	
mingw-w64.bat	9/21/2019 4:09 PM	Windows Batch File	
mingw-w64	12/28/2015 12:30 ...	Internet Shortcut	
uninstall.exe	9/21/2019 4:08 PM	Application	
uninstall.ini	9/21/2019 4:09 PM	Configuration setti...	

GCC install path: D:\iotprj\buildtools\mingw-w64\i686-8.1.0-posix-dwarf-rt_v6-rev0\mingw32\bin

BuildTools 2

Msys32 with ESP32

- GCC for ESP32 which is used to compile source code for PICO target
- Download esp32_win32_msys2_environment_and_toolchain-20181001.zip at https://docs.espressif.com/projects/esp-idf/en/stable/get-started/windows-setup.html and extract at buildtools folder



(D:) Second Disk › iotprj › buildtools › msys32

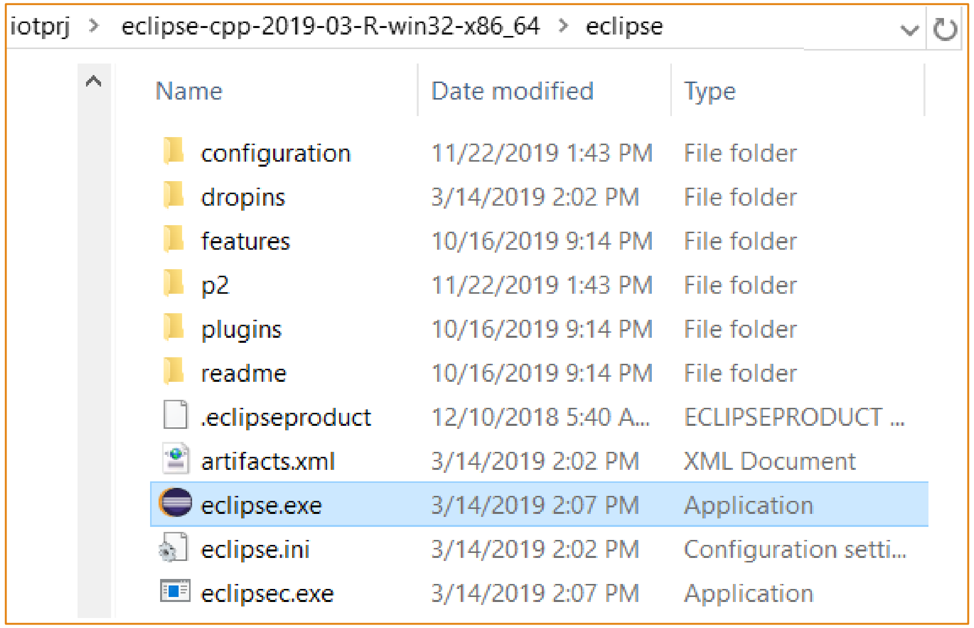
Name	Date modified	Type
opt	10/1/2018 10:08 A...	File folder
tmp	11/21/2019 10:13 ...	File folder
usr	10/1/2018 10:06 A...	File folder
var	10/1/2018 9:59 AM	File folder
autorebase.bat	7/27/2018 8:05 PM	Windows Batch File
autorebasebase1st.bat	7/27/2018 8:05 PM	Windows Batch File
components.xml	10/1/2018 10:00 A...	XML Document
dir	10/1/2018 10:04 A...	File
InstallationLog.txt	10/1/2018 10:01 A...	Text Document
maintenancetool.dat	10/1/2018 10:00 A...	DAT File
maintenancetool.exe	10/1/2018 10:00 A...	Application
maintenancetool.ini	10/1/2018 10:00 A...	Configuration setti...
mingw32.exe	9/8/2016 4:37 AM	Application

GCC install path:
D:\iotprj\buildtools\msys32\opt\xtensa-esp32-elf\bin

BuildTools 3

Eclipse

- Editor can be editor and configured to use GCC to build the sample app on PICO target and Windows
- Download eclipse-cpp-2019-03-R-win32-x86_64.zip at https://www.eclipse.org/downloads/packages/file/55067 and extract at buildtools folder



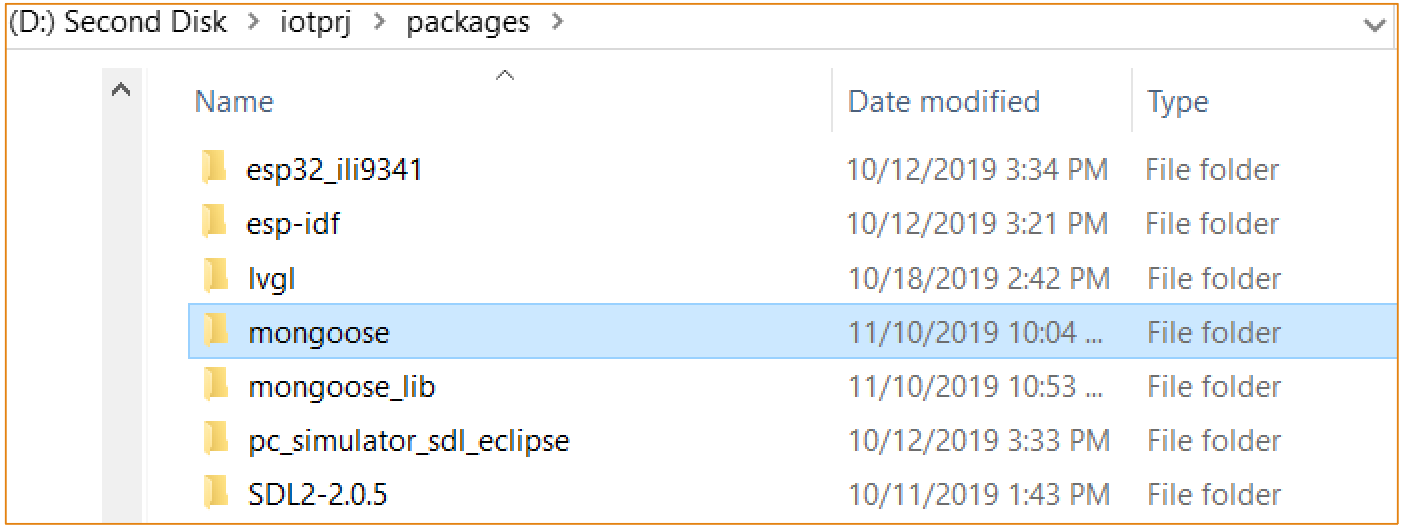
iotprj › eclipse-cpp-2019-03-R-win32-x86_64 › eclipse

Name	Date modified	Type
configuration	11/22/2019 1:43 PM	File folder
dropins	3/14/2019 2:02 PM	File folder
features	10/16/2019 9:14 PM	File folder
p2	11/22/2019 1:43 PM	File folder
plugins	10/16/2019 9:14 PM	File folder
readme	10/16/2019 9:14 PM	File folder
.eclipseproduct	12/10/2018 5:40 A...	ECLIPSEPRODUCT ...
artifacts.xml	3/14/2019 2:02 PM	XML Document
eclipse.exe	3/14/2019 2:07 PM	Application
eclipse.ini	3/14/2019 2:02 PM	Configuration setti...
eclipsec.exe	3/14/2019 2:07 PM	Application

Eclipse install path:
D:\iotprj\buildtools\eclipse-cpp-2019-03-R-win32-x86_64\eclipse

Packages

- The folder used to store open sources like lvgl, mongoose or esp-idf framework. Refer to Setup slide to download
- In case of mongoose, after downloading, create **mongoose_lib** folder and copy **mongoose.c** and **mongoose.h** files to it

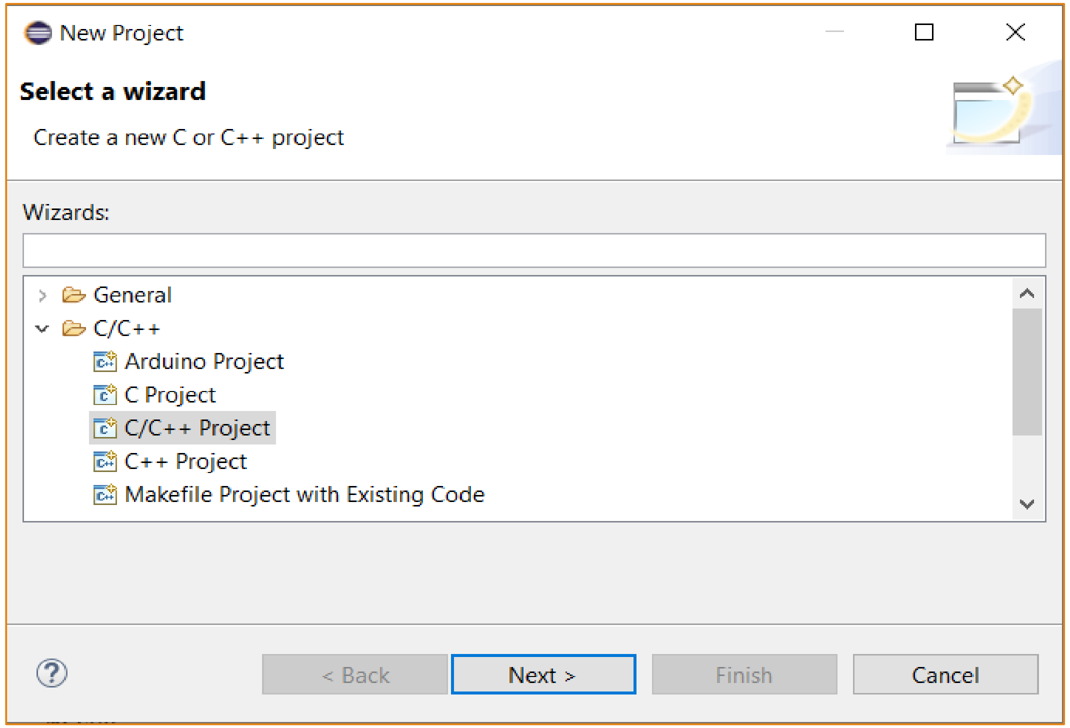


(D:) Second Disk › iotprj › packages ›

Name	Date modified	Type
esp32_ili9341	10/12/2019 3:34 PM	File folder
esp-idf	10/12/2019 3:21 PM	File folder
lvgl	10/18/2019 2:42 PM	File folder
mongoose	11/10/2019 10:04 ...	File folder
mongoose_lib	11/10/2019 10:53 ...	File folder
pc_simulator_sdl_eclipse	10/12/2019 3:33 PM	File folder
SDL2-2.0.5	10/11/2019 1:43 PM	File folder

Eclipse C++ Project

- Create 2 Eclispse C++ projects: one for simulation and one for ESP32
- Both demo how to setup working environment and how to use open sources like lvgl, mongoose,…



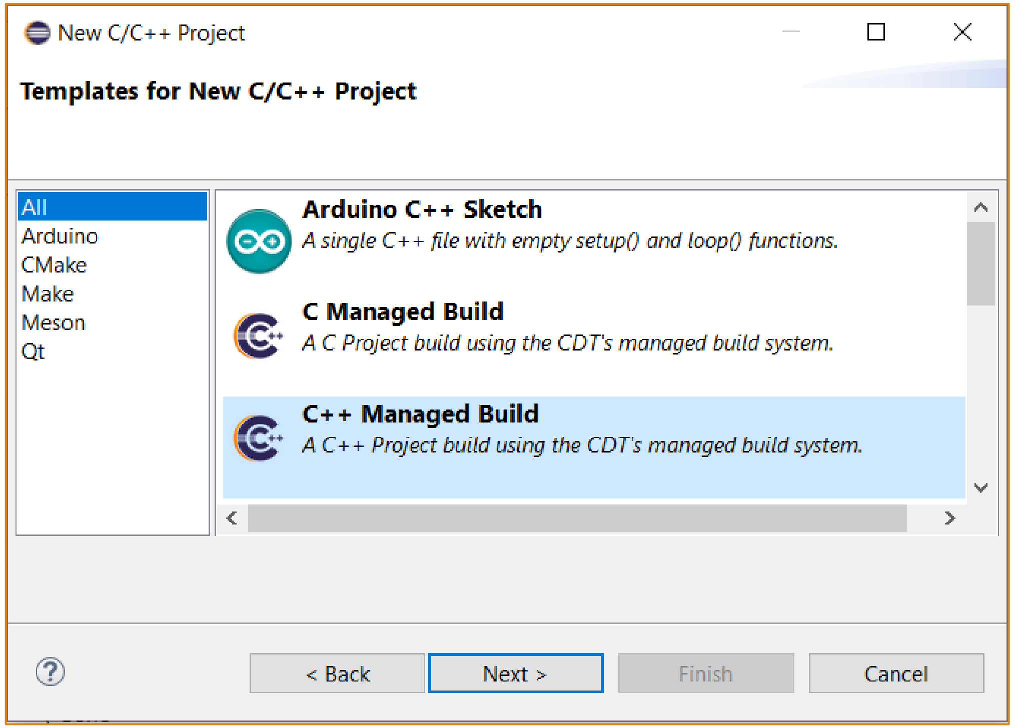
New Project

Select a wizard

Create a new C or C++ project

Wizards:

- General
- C/C++
  - Arduino Project
  - C Project
  - C/C++ Project
  - C++ Project
  - Makefile Project with Existing Code



New C/C++ Project

Templates for New C/C++ Project

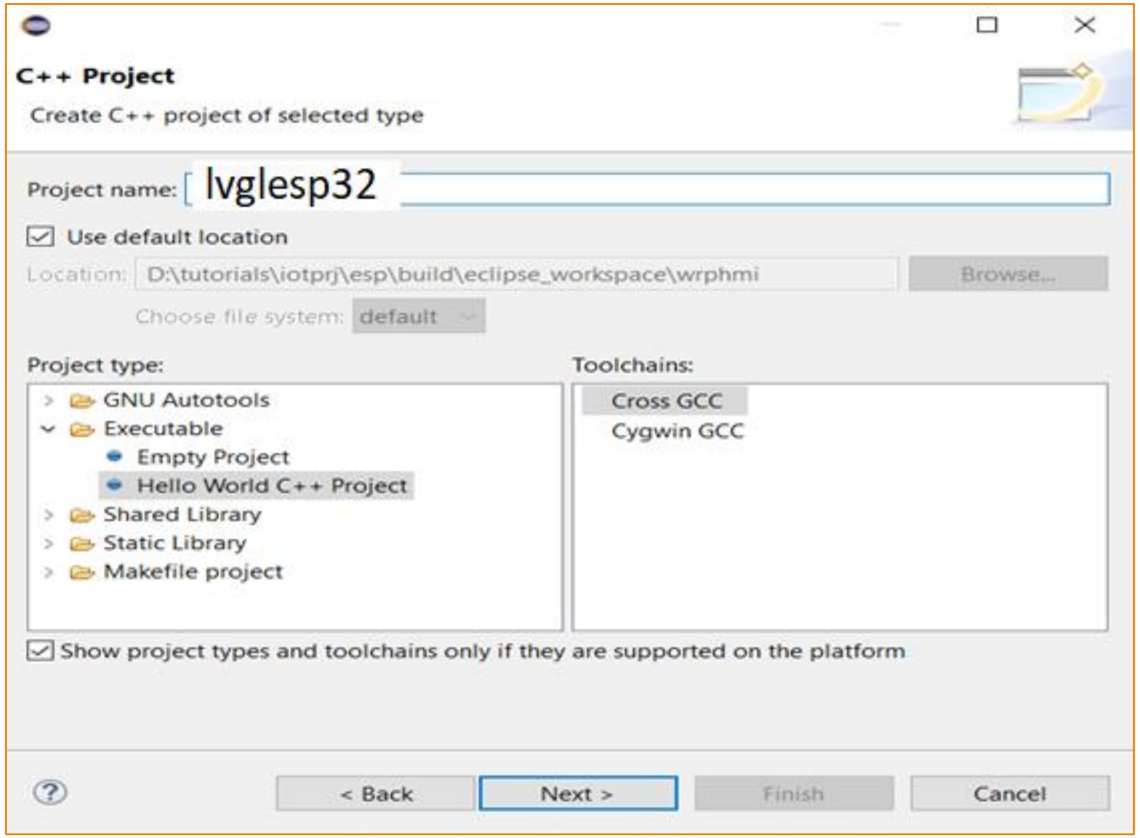
- All
- Arduino
- CMake
- Make
- Meson
- Qt

Arduino C++ Sketch
A single C++ file with empty setup() and loop() functions.

C Managed Build
A C Project build using the CDT's managed build system.

C++ Managed Build
A C++ Project build using the CDT's managed build system.

Eclipse C++ Project 2



C++ Project

Create C++ project of selected type

Project name: lvglesp32

☑ Use default location

Location: D:\tutorials\iotprj\esp\build\eclipse_workspace\wrphmi

Choose file system: default

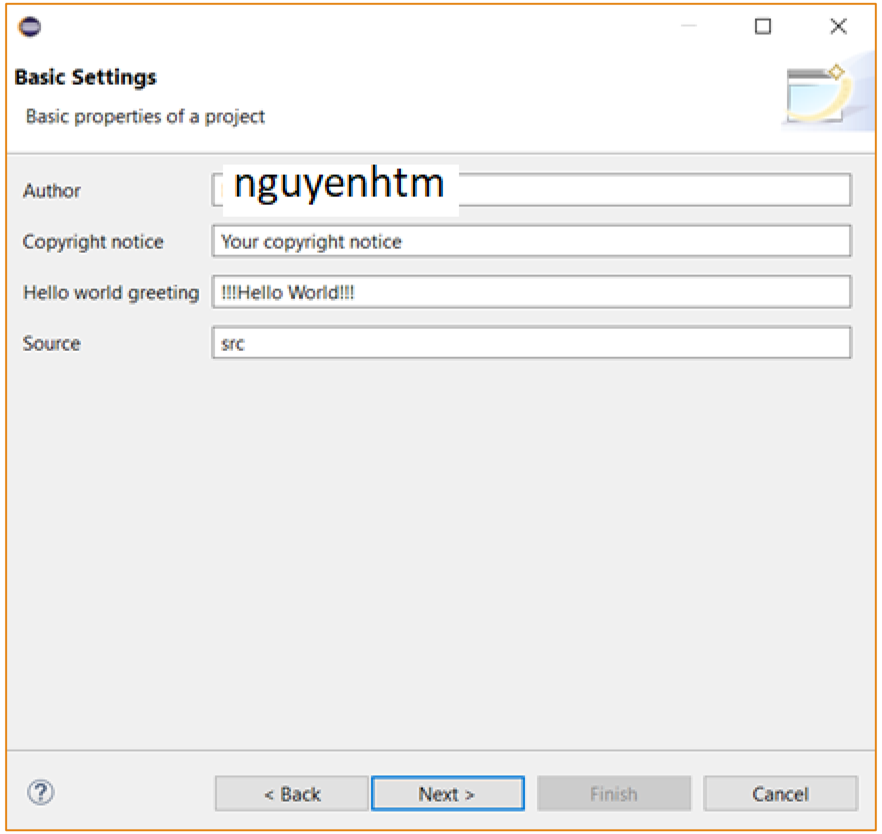
Project type:

- GNU Autotools
- Executable
  - Empty Project
  - Hello World C++ Project
- Shared Library
- Static Library
- Makefile project

Toolchains:

- Cross GCC
- Cygwin GCC

☑ Show project types and toolchains only if they are supported on the platform

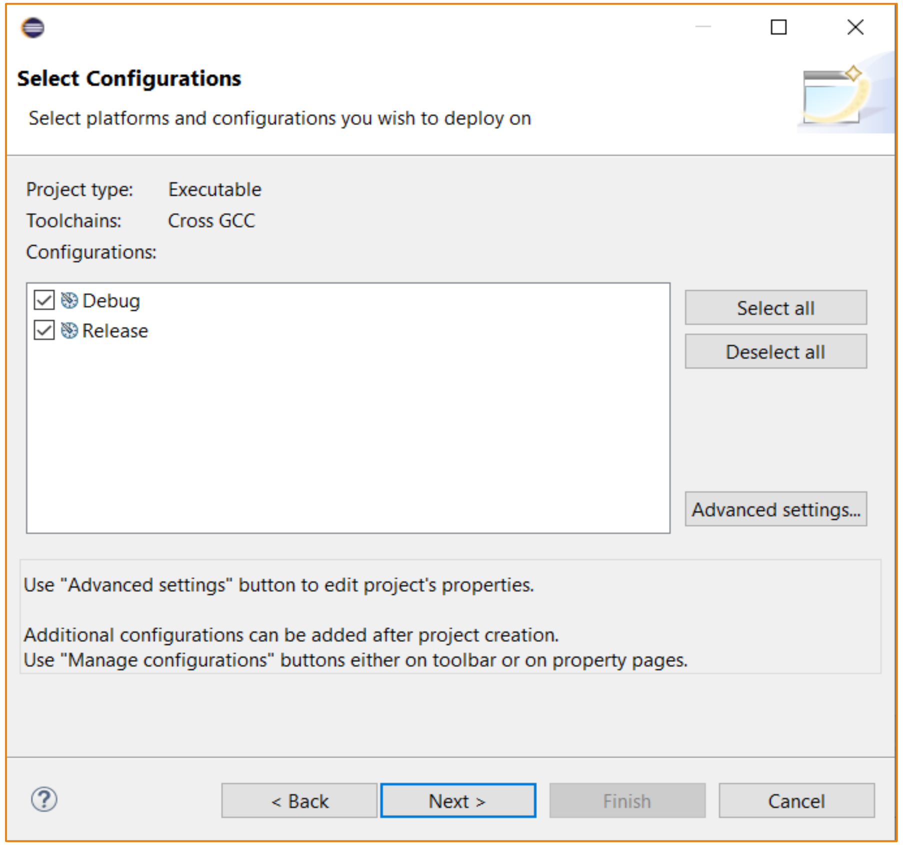


Basic Settings

Basic properties of a project

Author	nguyenhtm
Copyright notice	Your copyright notice
Hello world greeting	!!!Hello World!!!
Source	src

Eclipse C++ Project 3



Select Configurations

Select platforms and configurations you wish to deploy on

Project type: Executable

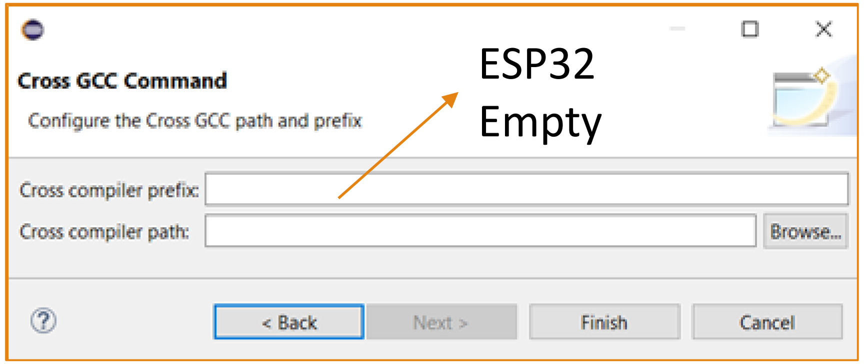
Toolchains: Cross GCC

Configurations:

- ☑ Debug
- ☑ Release

Use "Advanced settings" button to edit project's properties.

Additional configurations can be added after project creation.
Use "Manage configurations" buttons either on toolbar or on property pages.



Cross GCC Command

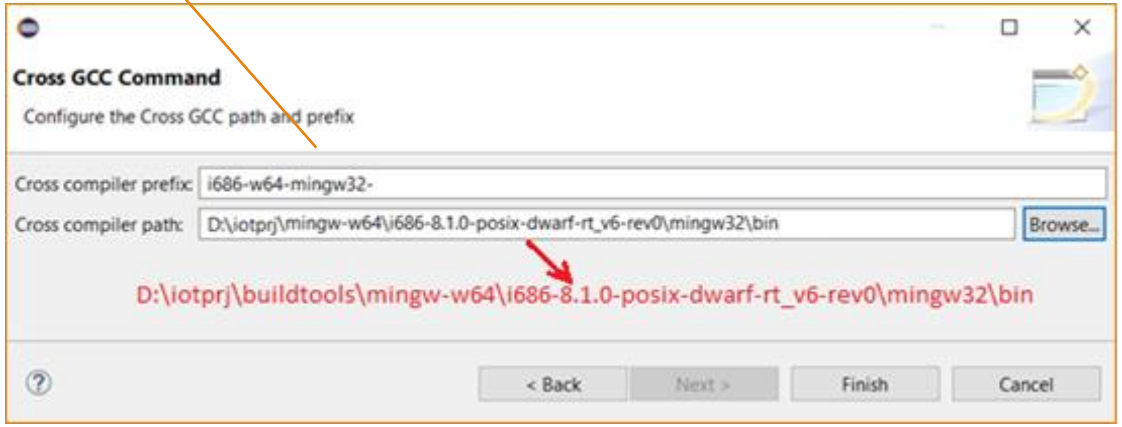
Configure the Cross GCC path and prefix

Cross compiler prefix:

Cross compiler path:

ESP32
Empty

Simulator



Cross GCC Command

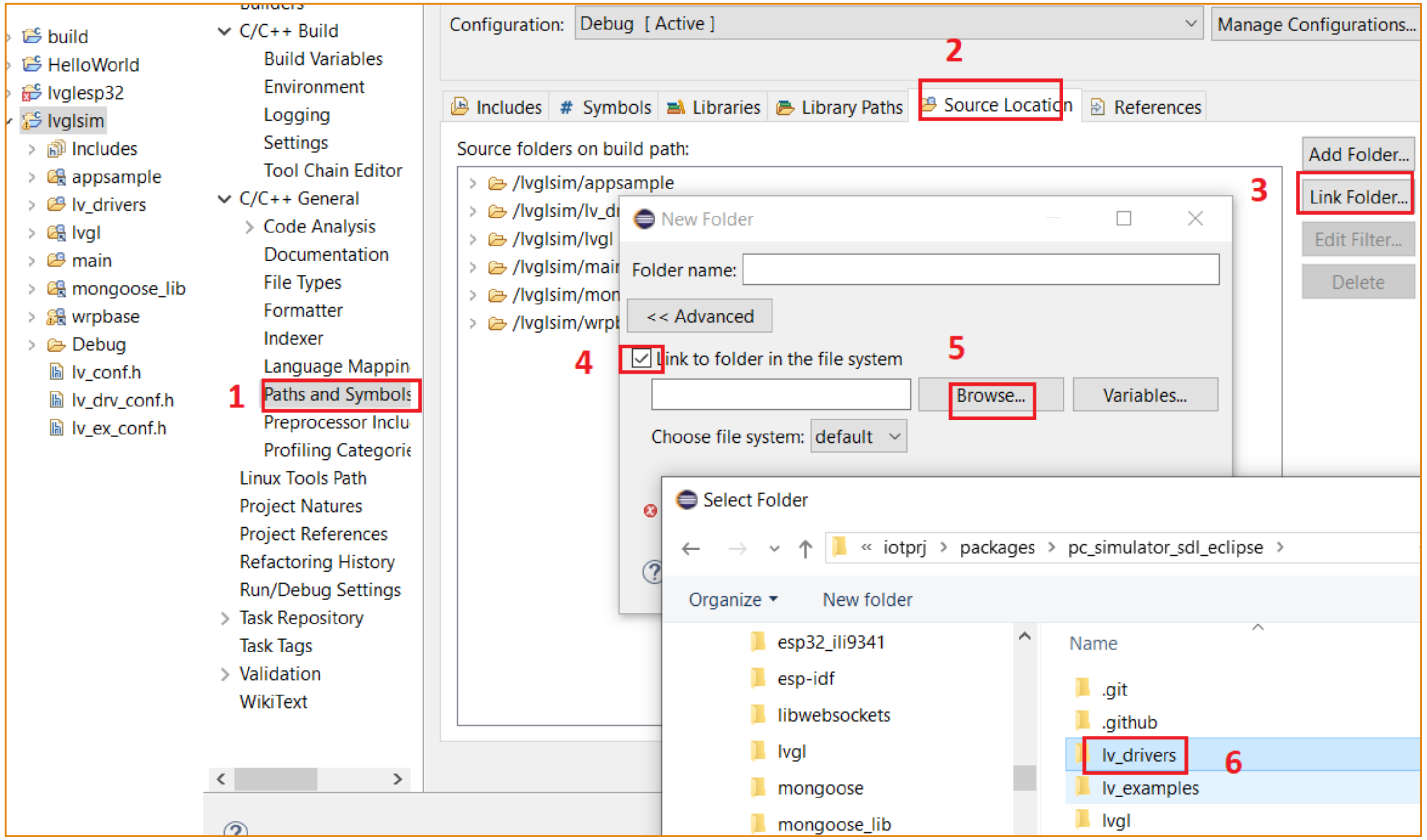
Configure the Cross GCC path and prefix

Cross compiler prefix: i686-w64-mingw32-

Cross compiler path: D:\iotprj\mingw-w64\i686-8.1.0-posix-dwarf-rt_v6-rev0\mingw32\bin

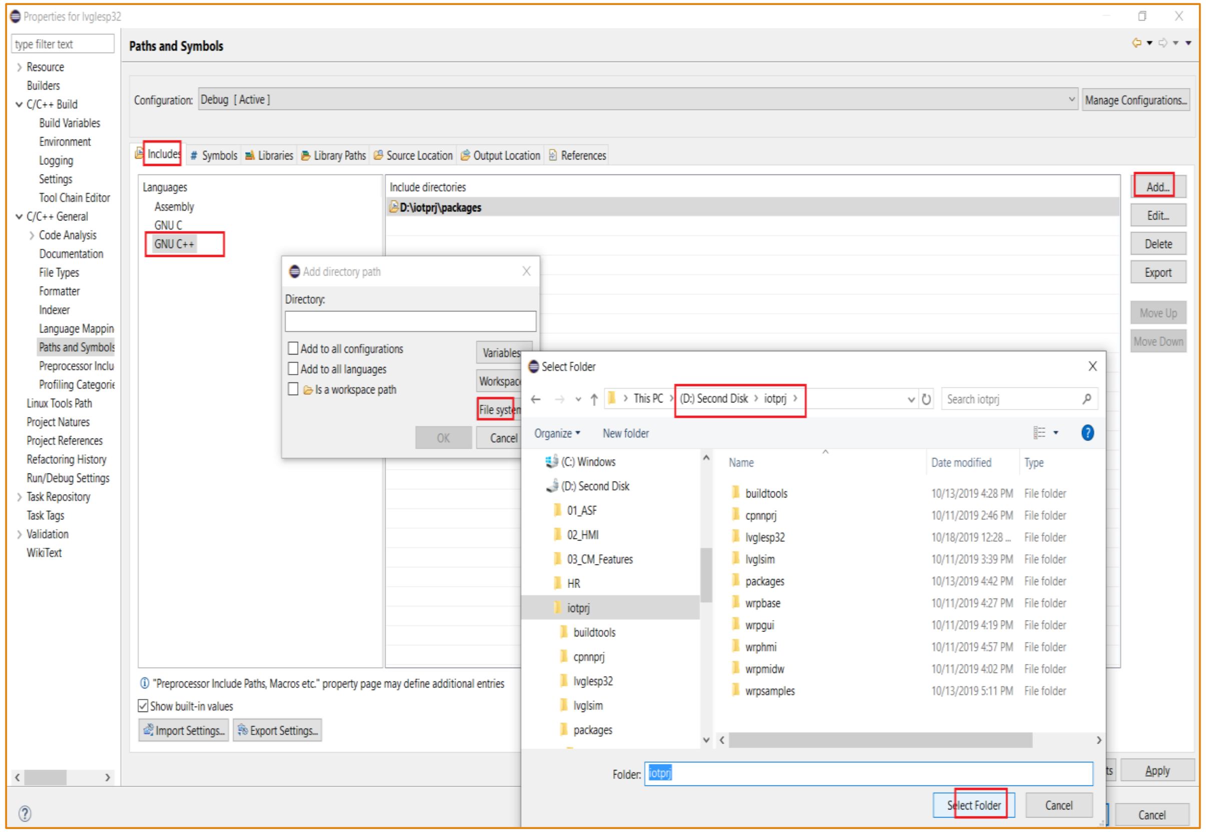
D:\iotprj\buildtools\mingw-w64\i686-8.1.0-posix-dwarf-rt_v6-rev0\mingw32\bin

LVGL SIM Eclipse 1



Link source folders such as appsample, Lvgl, mongoose_lib, and wrpbase

LVGL SIM Eclipse 2



Paths and Symbols

Configuration: Debug [Active]

Include directories

D:\iotprj\packages

Directory:

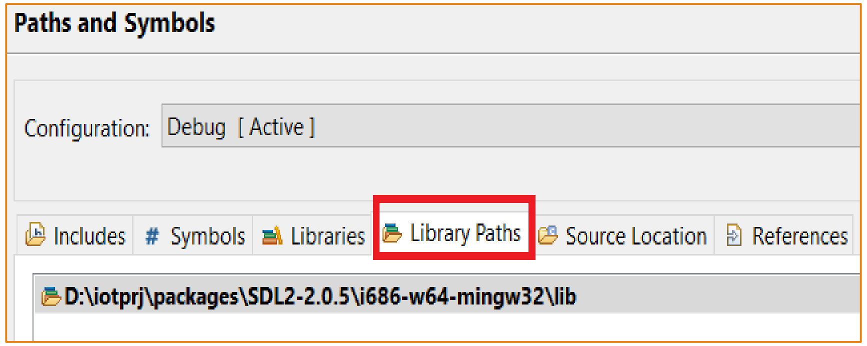
□ Add to all configurations
□ Add to all languages
□ Is a workspace path

Name	Date modified	Type
buildtools	10/13/2019 4:28 PM	File folder
cpnnprj	10/11/2019 2:46 PM	File folder
lvglesp32	10/18/2019 12:28 ...	File folder
lvglsim	10/11/2019 3:39 PM	File folder
packages	10/13/2019 4:42 PM	File folder
wrpbase	10/11/2019 4:27 PM	File folder
wrpgui	10/11/2019 4:19 PM	File folder
wrphmi	10/11/2019 4:57 PM	File folder
wrpmidw	10/11/2019 4:02 PM	File folder
wrpsamples	10/13/2019 5:11 PM	File folder

Folder: iotprj

"Preprocessor Include Paths, Macros etc." property page may define additional entries

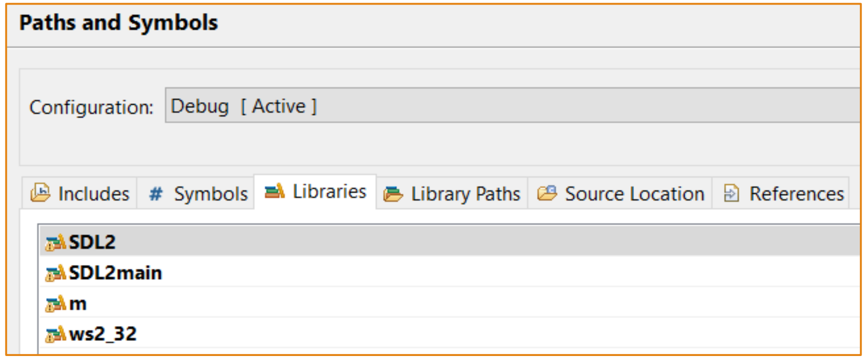
☑ Show built-in values



Paths and Symbols

Configuration: Debug [Active]

D:\iotprj\packages\SDL2-2.0.5\i686-w64-mingw32\lib

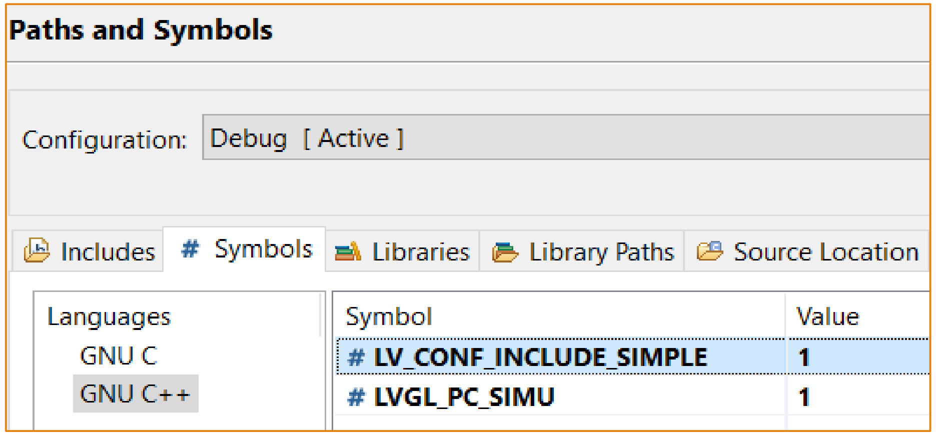


Paths and Symbols

Configuration: Debug [Active]

SDL2
SDL2main
m
ws2_32

LVGL SIM Eclipse 3



Paths and Symbols

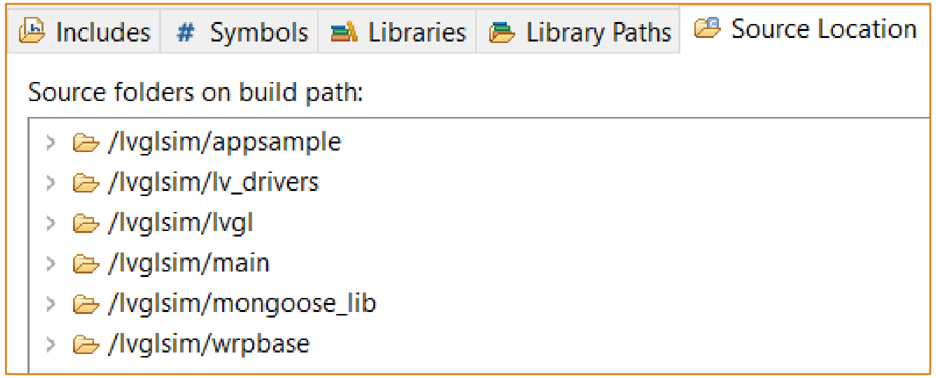
Configuration: Debug [Active]

Includes | # Symbols | Libraries | Library Paths | Source Location

Languages

- GNU C
- GNU C++

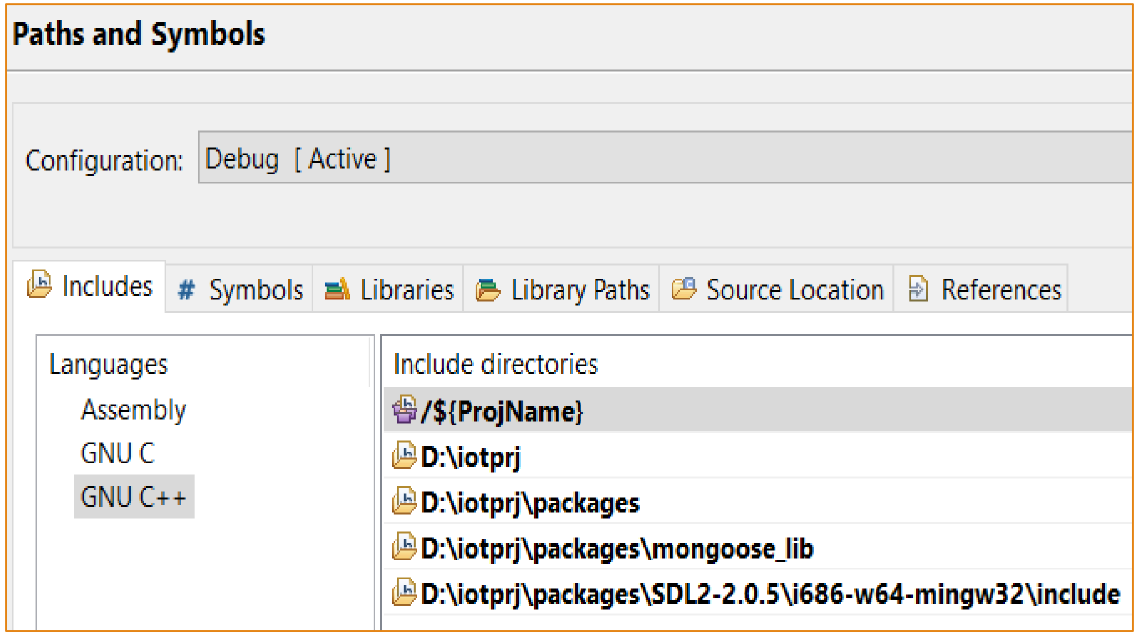
Symbol	Value
# LV_CONF_INCLUDE_SIMPLE	1
# LVGL_PC_SIMU	1



Includes | # Symbols | Libraries | Library Paths | Source Location

Source folders on build path:

- /lvglsim/appsample
- /lvglsim/lv_drivers
- /lvglsim/lvgl
- /lvglsim/main
- /lvglsim/mongoose_lib
- /lvglsim/wrpbase



Paths and Symbols

Configuration: Debug [Active]

Includes | # Symbols | Libraries | Library Paths | Source Location | References

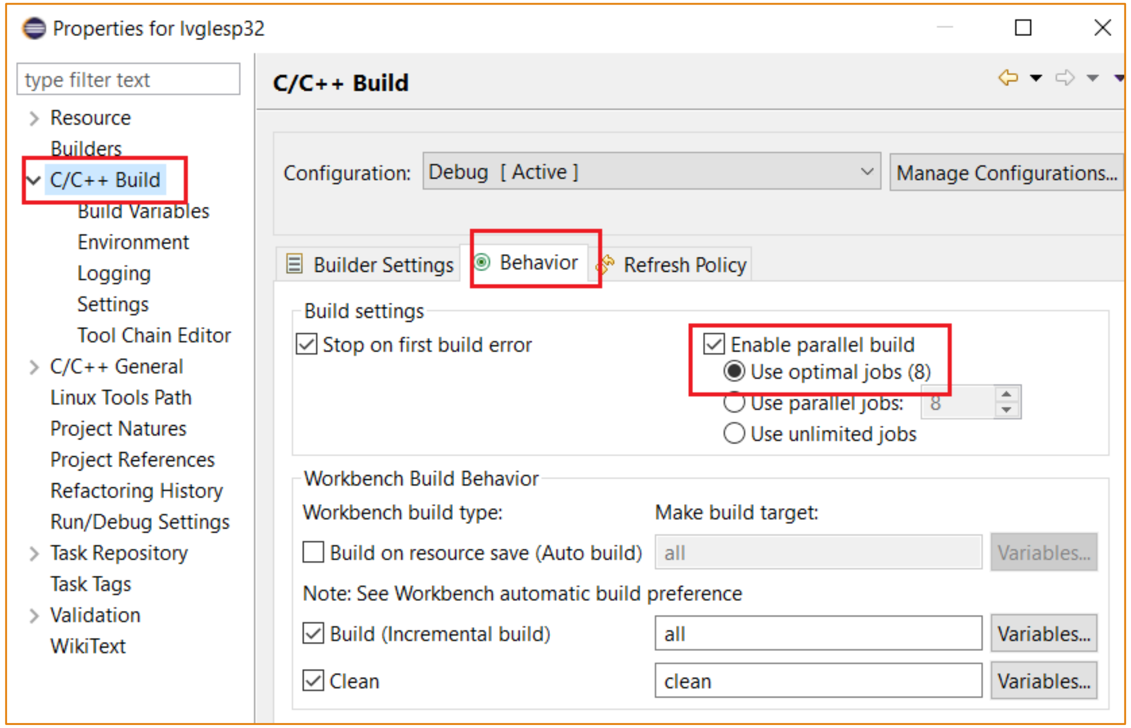
Languages

- Assembly
- GNU C
- GNU C++

Include directories

- /${ProjName}
- D:\iotprj
- D:\iotprj\packages
- D:\iotprj\packages\mongoose_lib
- D:\iotprj\packages\SDL2-2.0.5\i686-w64-mingw32\include

LVGL ESP32 Eclipse



Properties for lvglesp32

C/C++ Build

Configuration: Debug [Active]

Build settings

☑ Stop on first build error

☑ Enable parallel build

● Use optimal jobs (8)

○ Use parallel jobs: 8

○ Use unlimited jobs

Workbench Build Behavior

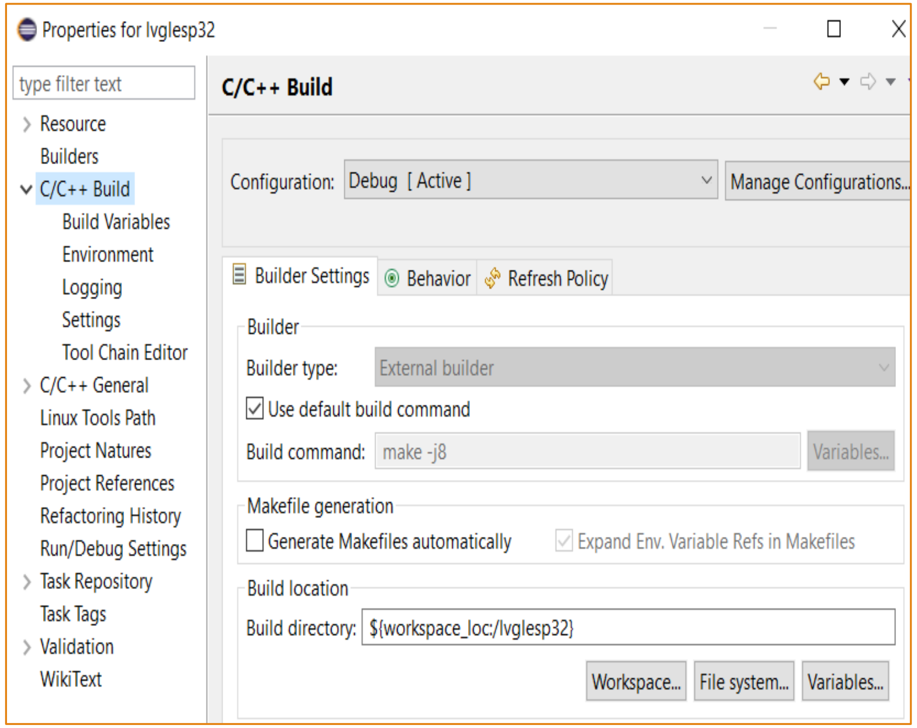
Workbench build type: Make build target:

□ Build on resource save (Auto build) all

Note: See Workbench automatic build preference

☑ Build (Incremental build) all

☑ Clean clean



Properties for lvglesp32

C/C++ Build

Configuration: Debug [Active]

Builder

Builder type: External builder

☑ Use default build command

Build command: make -j8

Makefile generation

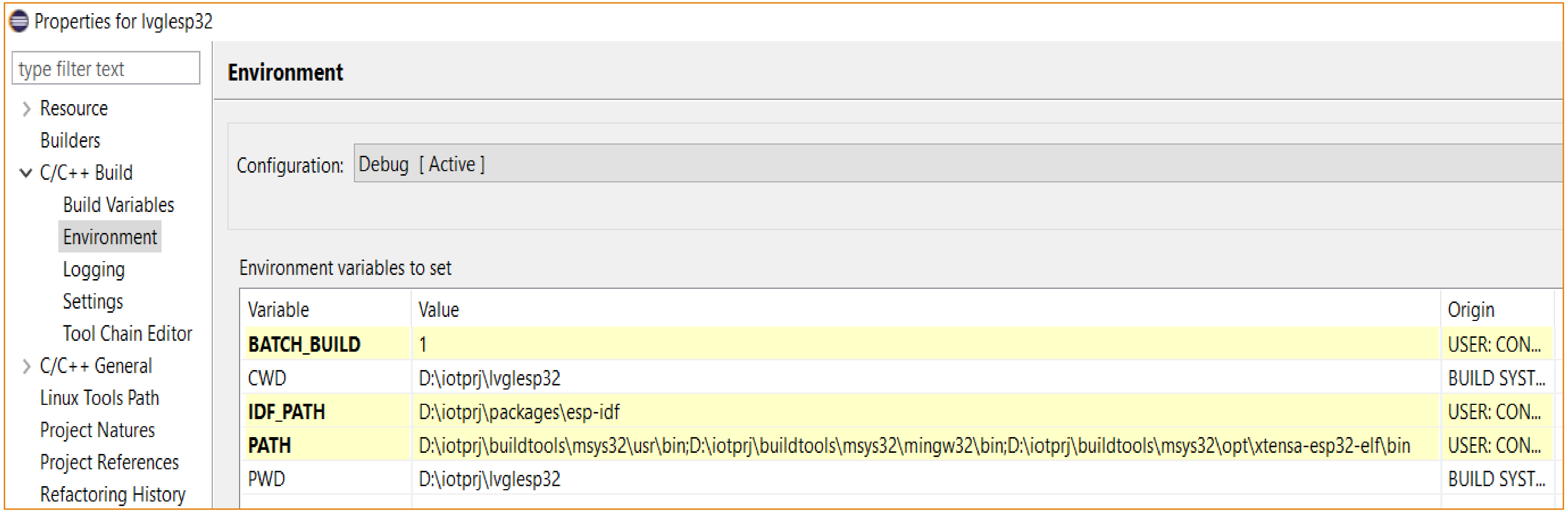
□ Generate Makefiles automatically ☑ Expand Env. Variable Refs in Makefiles

Build location

Build directory: ${workspace_loc:/lvglesp32}

LVGL ESP32 Eclipse 1

Configure ESP-IDF framework and GCC for ESP32 compiler path as below



Environment

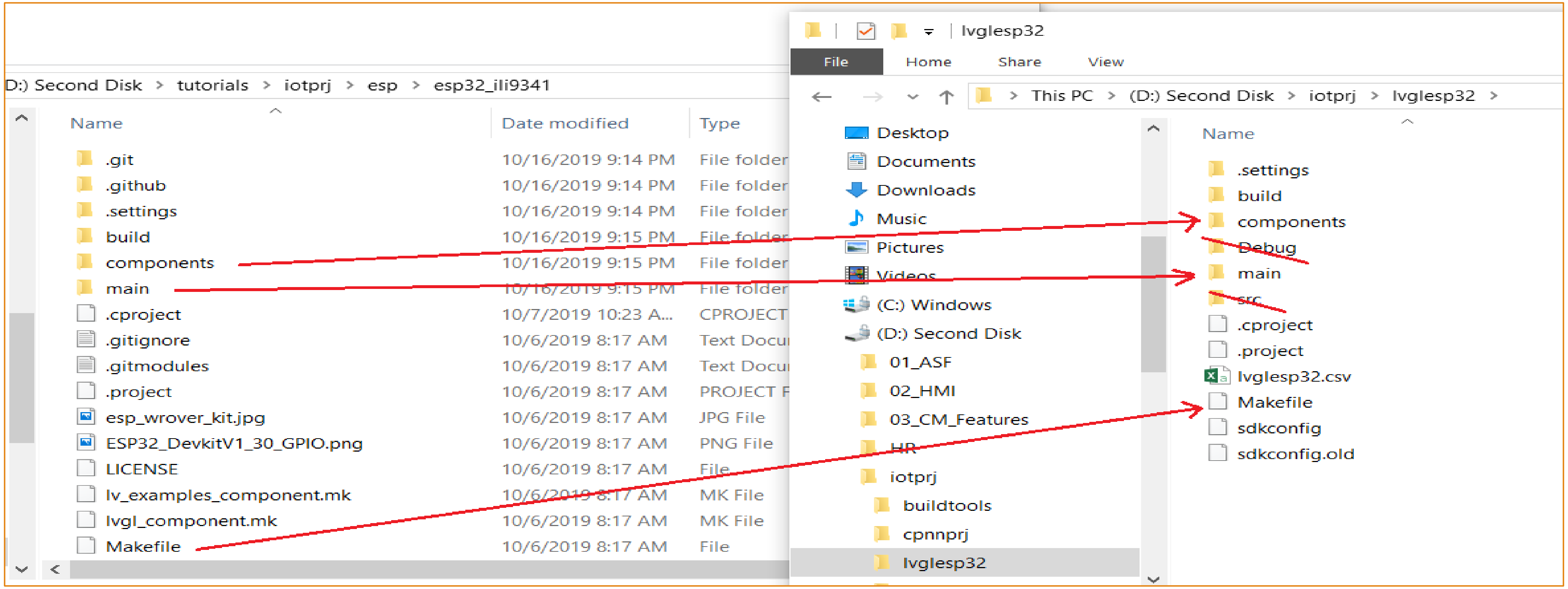
Configuration: Debug [Active]

Environment variables to set

Variable	Value	Origin
BATCH_BUILD	1	USER: CON...
CWD	D:\iotprj\lvglesp32	BUILD SYST...
IDF_PATH	D:\iotprj\packages\esp-idf	USER: CON...
PATH	D:\iotprj\buildtools\msys32\usr\bin;D:\iotprj\buildtools\msys32\mingw32\bin;D:\iotprj\buildtools\msys32\opt\xtensa-esp32-elf\bin	USER: CON...
PWD	D:\iotprj\lvglesp32	BUILD SYST...

LVGL ESP32 Eclipse 2

Copy esp32_ili9341/**components**, **main** folder and **Makefile** to lvglesp32



D:) Second Disk > tutorials > iotprj > esp > esp32_ili9341

Name	Date modified	Type
.git	10/16/2019 9:14 PM	File folder
.github	10/16/2019 9:14 PM	File folder
.settings	10/16/2019 9:14 PM	File folder
build	10/16/2019 9:15 PM	File folder
components	10/16/2019 9:15 PM	File folder
main	10/16/2019 9:15 PM	File folder
.cproject	10/7/2019 10:23 A...	CPROJECT
.gitignore	10/6/2019 8:17 AM	Text Docu
.gitmodules	10/6/2019 8:17 AM	Text Docu
.project	10/6/2019 8:17 AM	PROJECT F
esp_wrover_kit.jpg	10/6/2019 8:17 AM	JPG File
ESP32_DevkitV1_30_GPIO.png	10/6/2019 8:17 AM	PNG File
LICENSE	10/6/2019 8:17 AM	File
lv_examples_component.mk	10/6/2019 8:17 AM	MK File
lvgl_component.mk	10/6/2019 8:17 AM	MK File
Makefile	10/6/2019 8:17 AM	File

This PC > (D:) Second Disk > iotprj > lvglesp32 >

Name

.settings
build
components
~~Debug~~
main
~~src~~
.cproject
.project
lvglesp32.csv
Makefile
sdkconfig
sdkconfig.old

LVGL ESP32 Eclipse 3

```
PROJECT_NAME := lvglesp32

# Build lvgl component in iotprj/packages/lvgl, drv in its own, and wrpbase component in iotprj/wrpbase

EXTRA_CFLAGS := -DLV_CONF_INCLUDE_SIMPLE

EXTRA_COMPONENT_DIRS := D:/iotprj/packages/lvgl D:/iotprj/lvglesp32/components/drv D:/iotprj/wrpbase D:/iotprj/appsample

# Include lv_conf.h if using main.cpp

EXTRA_CPPFLAGS := -DLV_CONF_INCLUDE_SIMPLE

COMPONENT_EXTRA_INCLUDES := D:/iotprj/packages D:/iotprj/packages/esp32_ili9341/components

CPPFLAGS += -DLVGL_PC_SIMU=0 -DLVGL_ESP32_ILI9341=1 -DUSE_ESP_IDF=1

include $(IDF_PATH)/make/project.mk
```

Notes

- Set IDF_PATH: echo 'export IDF_PATH="D:/iotprj/packages/esp-idf"' >> $HOME/.bash_profile

msys32 open will use this path

- Generate partition table:
  - Partition table should not same name as project name otherwise same .bin is generated
  - Generate: python $IDF_PATH/components/partition_table/gen_esp32part.py projectname_partition_table.bin
  - Flash: python $IDF_PATH/tools/idf.py partition_table-flash => enter to lvglesp32\build\partition_table

D:/iotprj/buildtools/msys32/mingw32/bin/python.exe -m pip install --user -r D:/iotprj/packages/esp-idf/requirements.txt

Create components/main folders in lvglsim and copy lv_drivers, .h file into these folder => same as esp-idf app

References

LVGL: https://github.com/littlevgl/lvgl

ESP-IDF: https://docs.espressif.com/projects/esp-idf/en/latest/index.html