



life.augmented



# STM32 for graphics

# Accelerating the HMI of Things



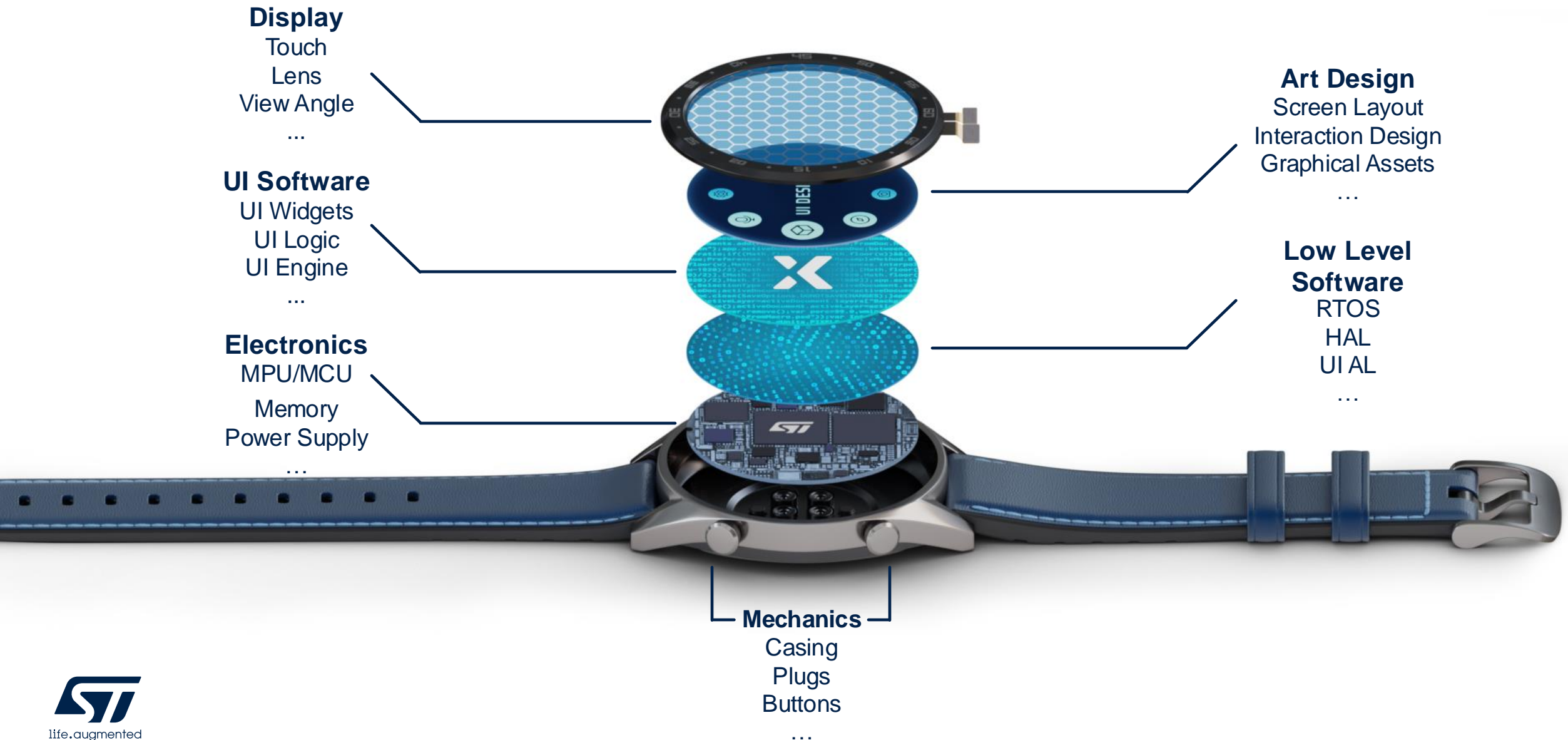
# The evolution of embedded HMIs

## Smarter user interfaces for smarter products



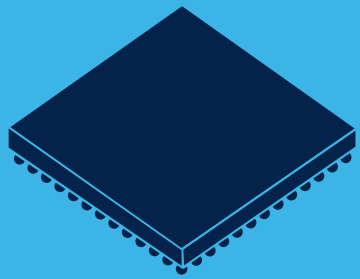
The user experience provided by smartphones sets a new standard for smart devices

# What it takes to develop GUIs





# STM32 graphics offer



**STM32 hardware**

## TouchGFX

Full support for MCU

MPU add-on available



Third-party  
libraries

**STM32 software**



**Extensive  
ecosystem**





# STM32 hardware MCUs and MPUs for any UIs







# STM32 MCU embedded graphics hardware acceleration



[Watch demo](#)

## **Chrom-ART™ Accelerator**

- Offloads the CPU from repetitive graphics tasks
- Fluid motion and transparency effects with 80% less CPU resources

## **Chrom-GRC™**

Graphic resource cutter for non-square displays, saving up to 20% of the framebuffer's RAM needs

## **JPEG hardware accelerator**

- JPEG compression and decompression
- Minimizing CPU load
- Enables play of high-quality motion JPEG videos

## **NeoChrom GPU accelerator**

- 2.5D acceleration for scaling and rotation effects
- New graphic processing unit to optimize animation: accelerates texture mapping and alpha blending



# STM32 MPU embedded graphics hardware acceleration



## **Arm NEON Technology**

Improves the multimedia user experience by accelerating audio and video encoding/decoding, user interface, 2D/3D graphics or gaming.

## **VeriSilicon GPU Vivante**

Providing the performance and efficiency needed for modern devices and systems with support for industry-standard APIs and advanced features.

## **VeriSilicon VPU Hantro**

Microprocessor IP for video codecs and video processing, with outstanding capabilities in supporting mainstream video formats and much more.



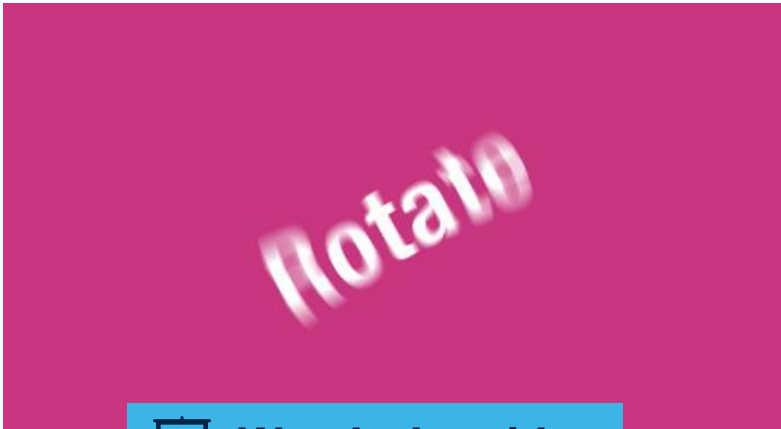
# Smother and richer graphics with NeoChrom GPU



## NeoChrom GPU

The NeoChrom GPU offloads the CPU from the graphic computations, freeing up the memory and boosting performance.

Fully supported in the [X-CUBE-TOUCHGFX](#)



## Enabling outstanding graphics on STM32, such as:

- Simple & advanced drawing
- 2D Copy
- Alpha blending
- Color format conversion
- Scaling, Rotation
- Perspective correct texture mapping
- Image format compression

Available in [STM32U5F9/5G9](#) and [STM32H7R/S](#)



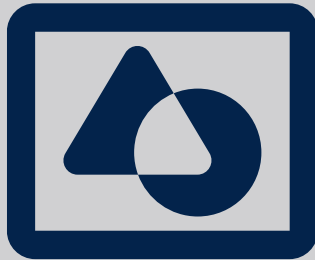


NeoChrom  
GPU

Vector graphics

# Vector graphics with NeoChromVG GPU

## Scalable vector graphics (SVG)



- To reach nice dynamic effects
- To save flash memory

## Fonts



- Drawing and manipulating characters and text-strings
- To enable dynamic graphics effects
- To save flash memory

## Map



Vector graphics are required to make map navigation possible (significant and dynamic maps, zooming)

[Read the blog](#) 



# STM32 software leveraging STM32 hardware capabilities

**TouchGFX, the free software tools for creating stunning user interfaces on STM32**



**TouchGFX**  
DESIGNER

PC GUI-builder  
and -simulator



**TouchGFX**  
GENERATOR

Configure and  
generate a  
TouchGFX  
project



**TouchGFX**  
ENGINE

Optimized and  
hardware  
accelerated  
graphics library

# Libraries running with the STM32 MPU ecosystem

## GTK - GIMP Toolkit

- Free and open-source
- C and many other languages
- Set of widgets ready to use
- OpenSTlinux support (Yocto and Buildroot)



- Free and open-source (Android open-source project)
- Variety of graphics rendering APIs for 2D and 3D
- Android support



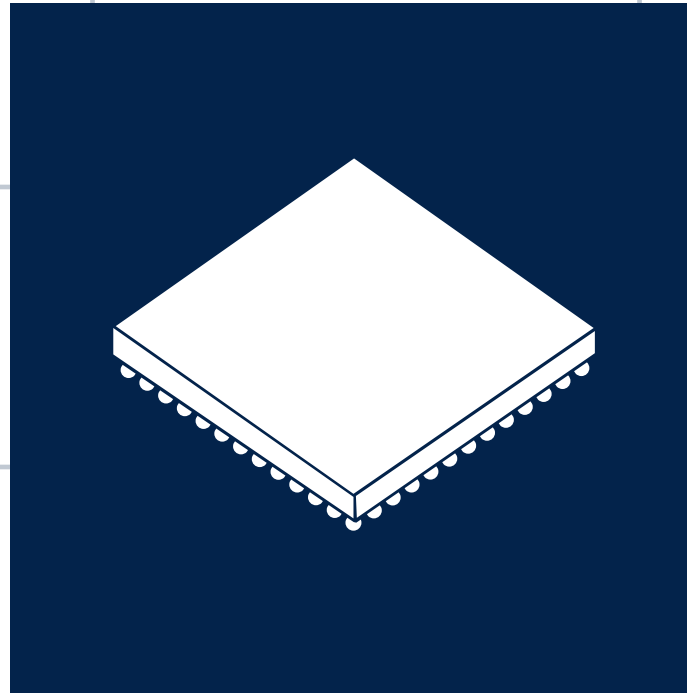
## QT

- Set of widgets ready to use
- C++ and many other languages
- Supported on many platforms
- OpenSTlinux support (Yocto and Buildroot)



## LVGL - Light and Versatile graphics Library

- Free and open source
- C language
- Set of widgets ready to use
- OpenSTlinux support (Yocto and Buildroot)
- Bare metal support



- WYSIWYG tools
- Drag and drop interface



- WYSIWYG tools
- Drag and drop interface



- WYSIWYG tools
- Drag and drop interface



- WYSIWYG GUI editor
- Can be scaled to a variety of STM32



- Works with LVGL or GTK libraries
- Programming language needed



- WYSIWYG GUI editor
- Perfect fit for all STM32





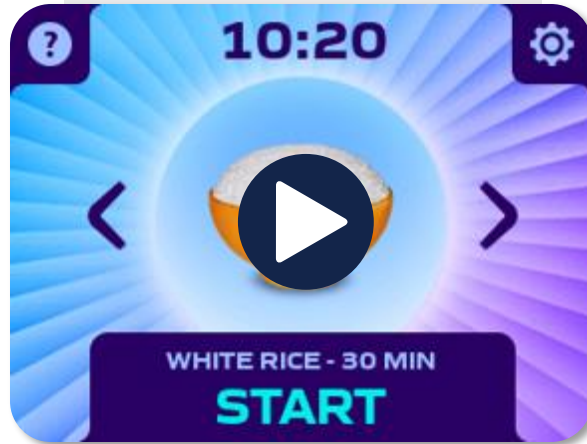
# STM32 MCU graphics examples of achievable UI performance

**STM32C0**

+  
**TouchGFX**

Display resolution  
up to 320 x 240

Entry level - internal RAM



High level - internal RAM



**STM32U5**

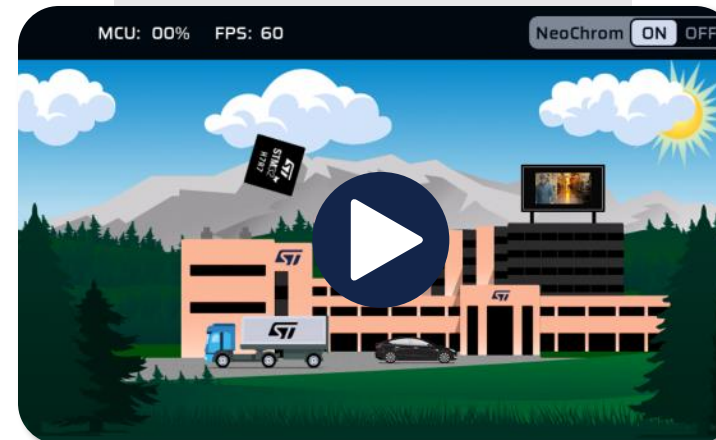
+  
**TouchGFX**

Display resolution  
up to 1024 x 768

Mid level – internal RAM



High level - external RAM



**STM32H5**

+  
**TouchGFX**

Display resolution  
up to 640 x 480

**STM32H7**

+  
**TouchGFX**

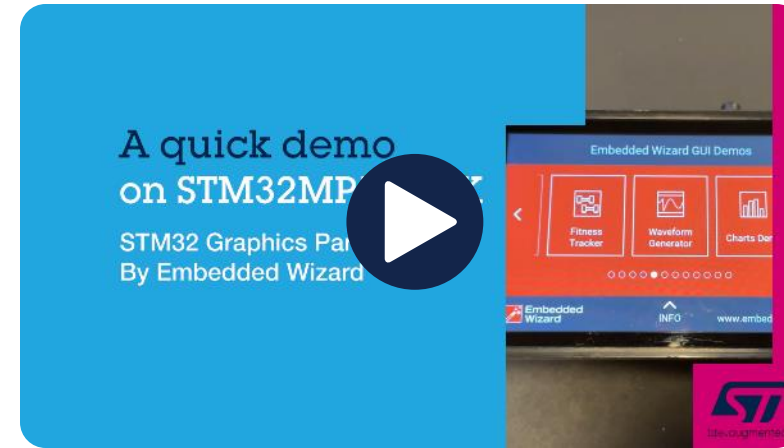
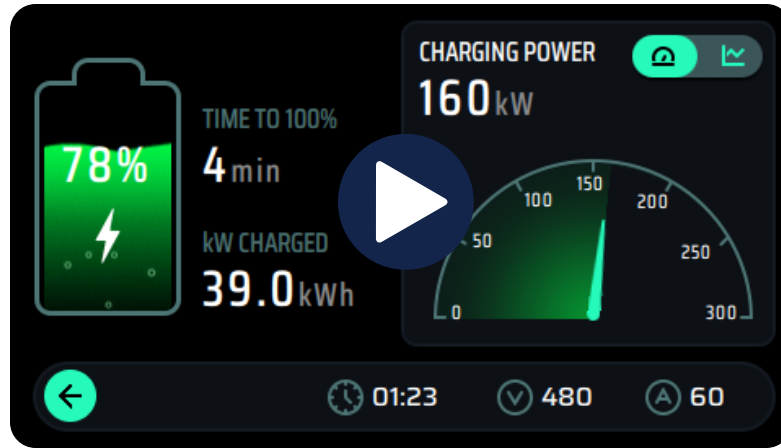
Display resolution  
up to 1280 x 800

# STM32 MPU graphics examples of achievable UI performance

## STM32MP135



Display resolution up to 480 x 272



## STM32MP157

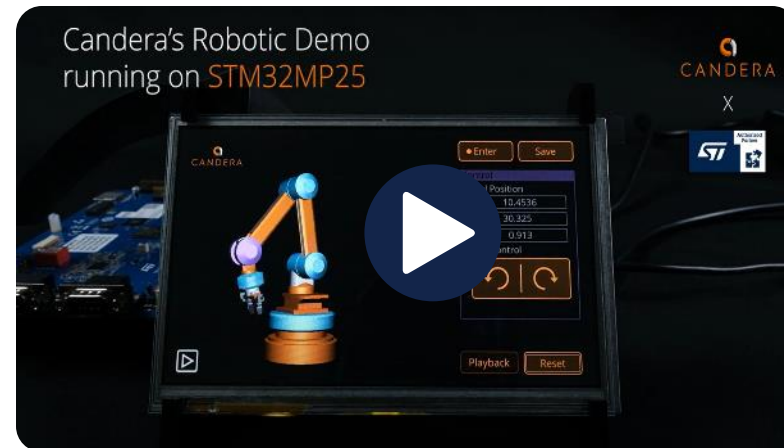


Display resolution up to 480 x 800 MIPI DSI®

## STM32MP157



Display resolution up to 480 x 800 MIPI DSI®



## STM32MP25





# Take your UI design to the next level free stock library in TouchGFXDesigner

**TouchGFX Stock, the largest library of  
graphical assets, free for STM32 MCUs**



Touch**GFX**  
stock

Find everything you need to create a consistent, professional-looking UI.

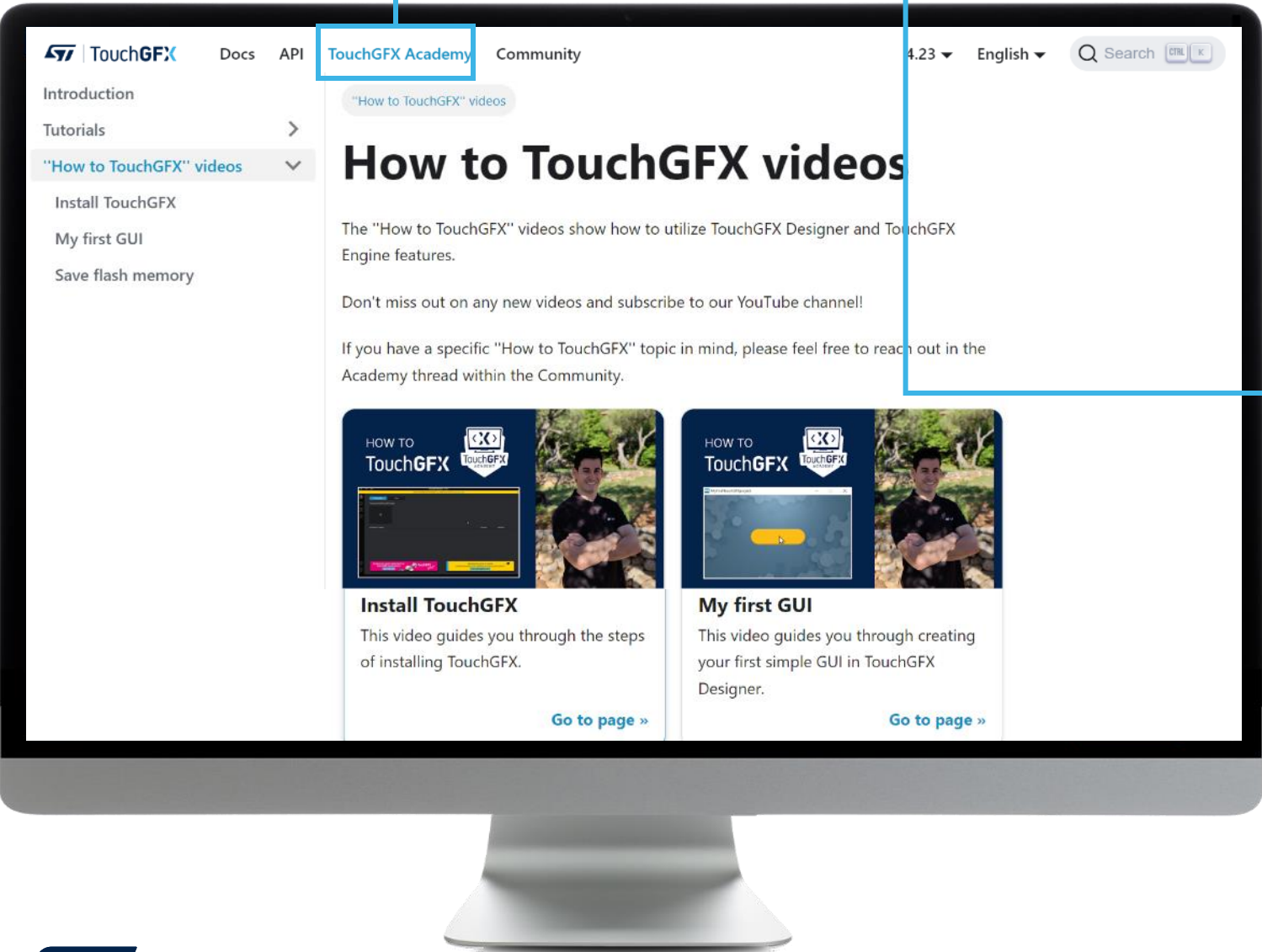
Ready-to-use themes, backgrounds, and visuals.



**Watch the video**

*All graphical designs, images, and icons provided in TouchGFX Stock, are free to use in commercial projects using microcontroller and/or microprocessor devices manufactured by or for STMicroelectronics.*

# TouchGFX Academy



**NEW**

The place to go to learn about the features and functionalities of TouchGFX. Explained by our experts and showcased through practical examples.

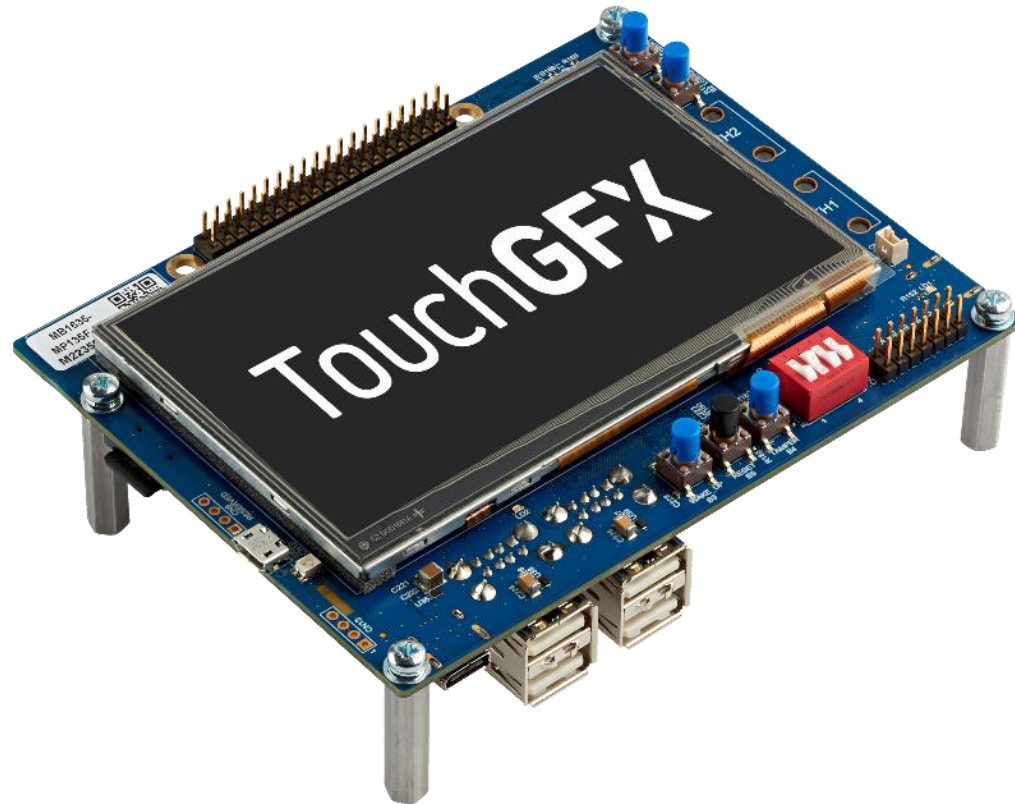
On documentation

 YouTube



NEW

# TouchGFX for STM32 MPUs



Leverage the new software add-on in TouchGFX to implement GUIs on STM32 MPUs.

[Download now](#)

[Learn more here](#)

NEW



## STM32 MPU OpenSTLinux Expansion Package for QT Framework

It contains Linux® Qt™ frameworks, as well as an ST Application Launcher based on Qt™ Framework and application examples to get started with Qt™ application development.

This expansion package is a complete ecosystem that allows developers working with OpenSTLinux to create Qt™ based application very easily.

[Download now](#)

[Learn more here](#)

# Getting started



Watch the video



1. Select the MCU and pick the associated developer kit



2. Download TouchGFXDesigner [here](#)



3. Find your display kit



4. Create/select a demo



5. Flash your display kit



# STM32 graphics accelerating the HMI of things



[www.st.com/stm32gui](http://www.st.com/stm32gui)



[community.st.com](http://community.st.com)



[TouchGFX documentation](#)



[X-CUBE-TOUCHGFX](#)

# Our technology starts with You



Find out more at [www.st.com/STM32GUI](http://www.st.com/STM32GUI)

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