HMC-20

Human Machine Controller

Configurable HMI interface

Version date 02/12/2024

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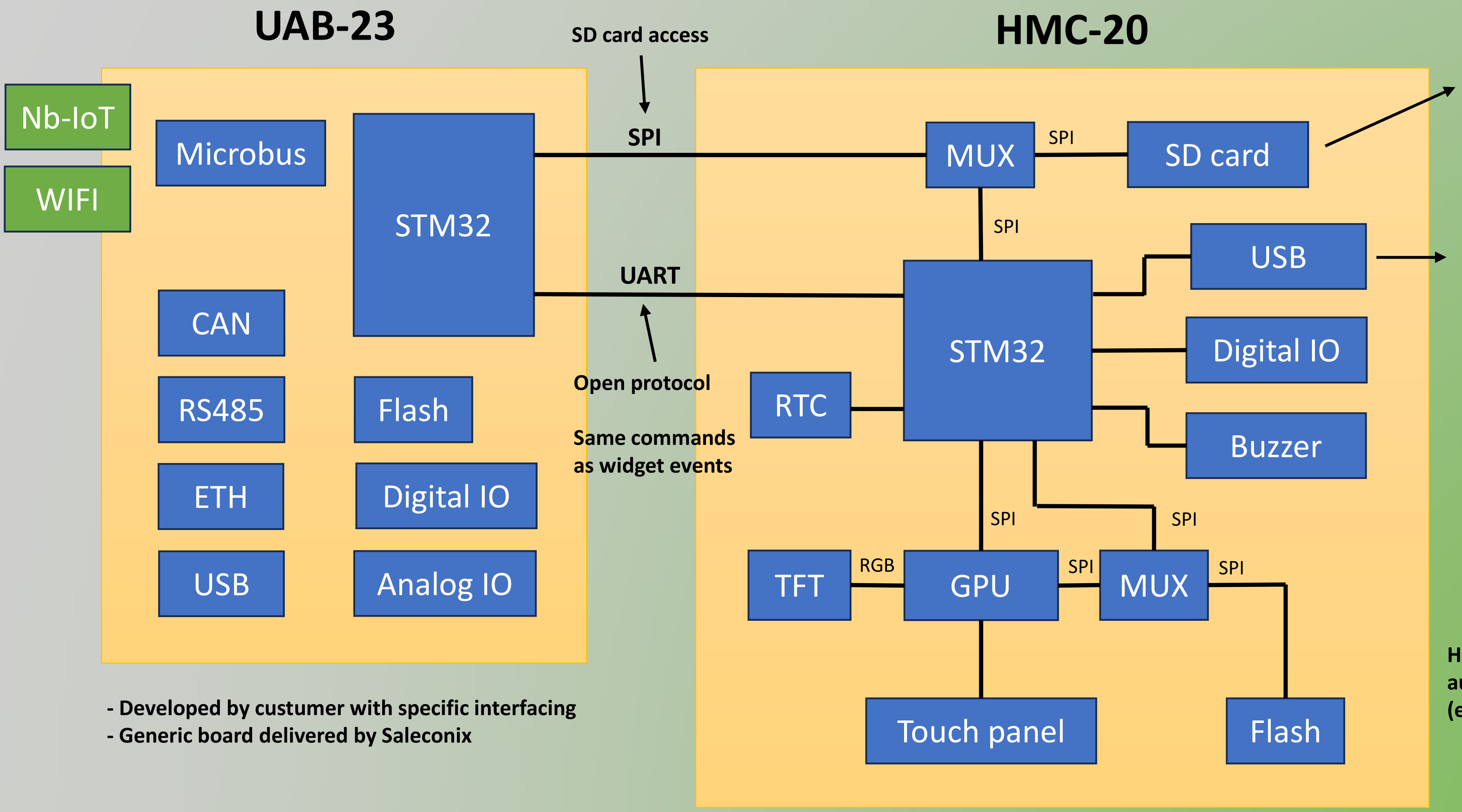

SD card access

Open protocol

Same commands as widget events

Contains
- BMP/JPG (widgets)
- GUI layout and interactions
- Extra fonts
- firmware update
- logging

After connection:
- SD card available as drive
- UART as debug interface
- Firmware updates

HMC-20 can also be used autonomously (e.g. driving LED/relay)

- Developed by custumer with specific interfacing
- Generic board delivered by Saleconix

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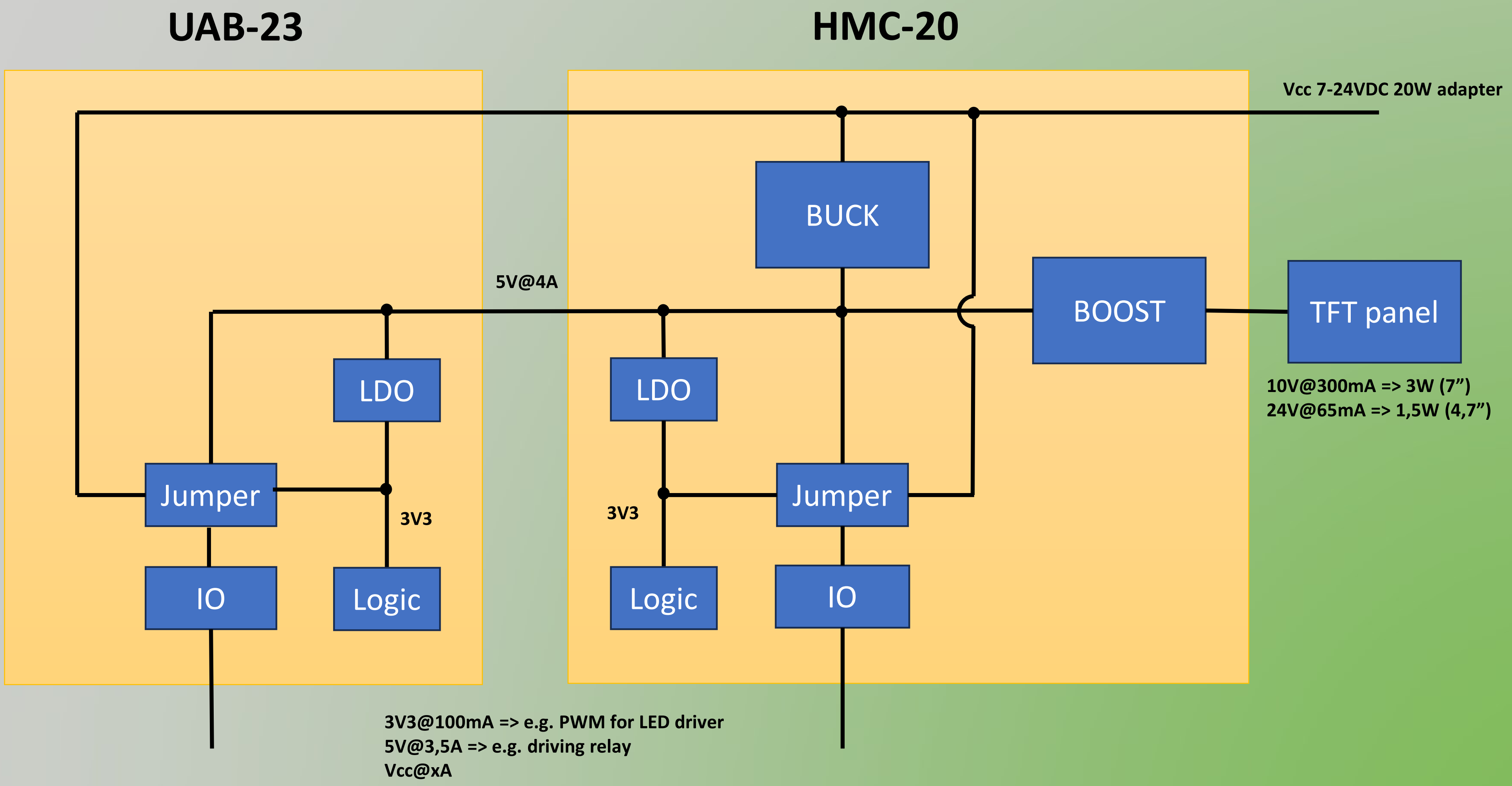

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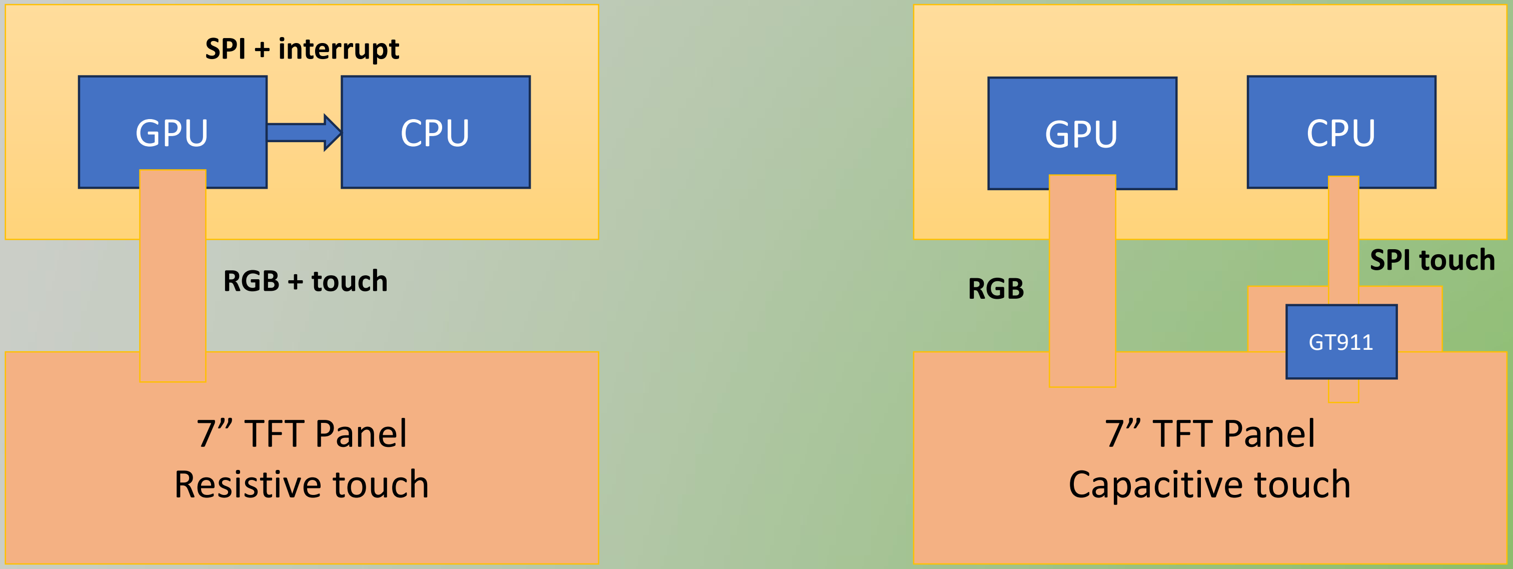
Capacitive versus resistive TFT



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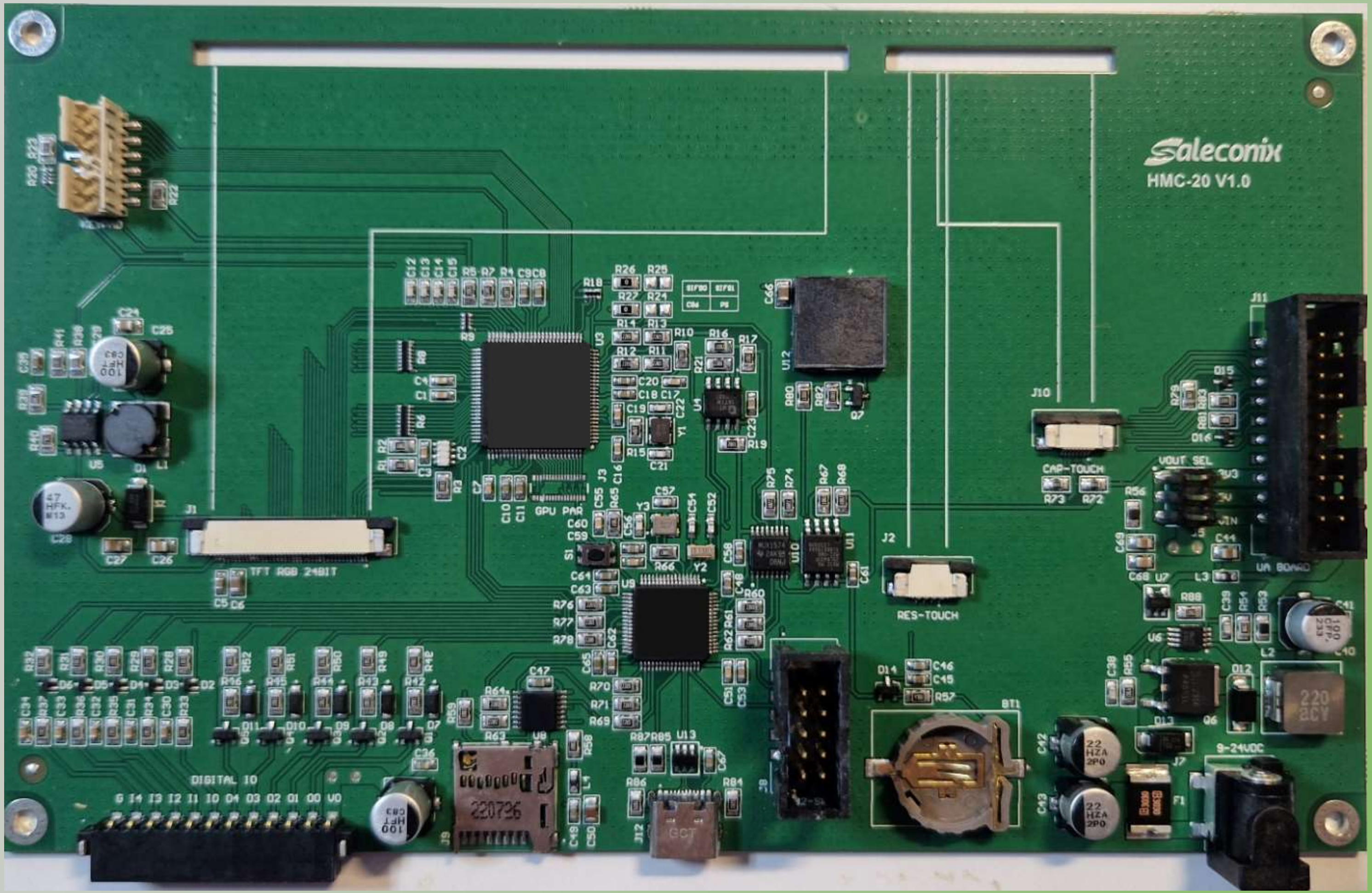

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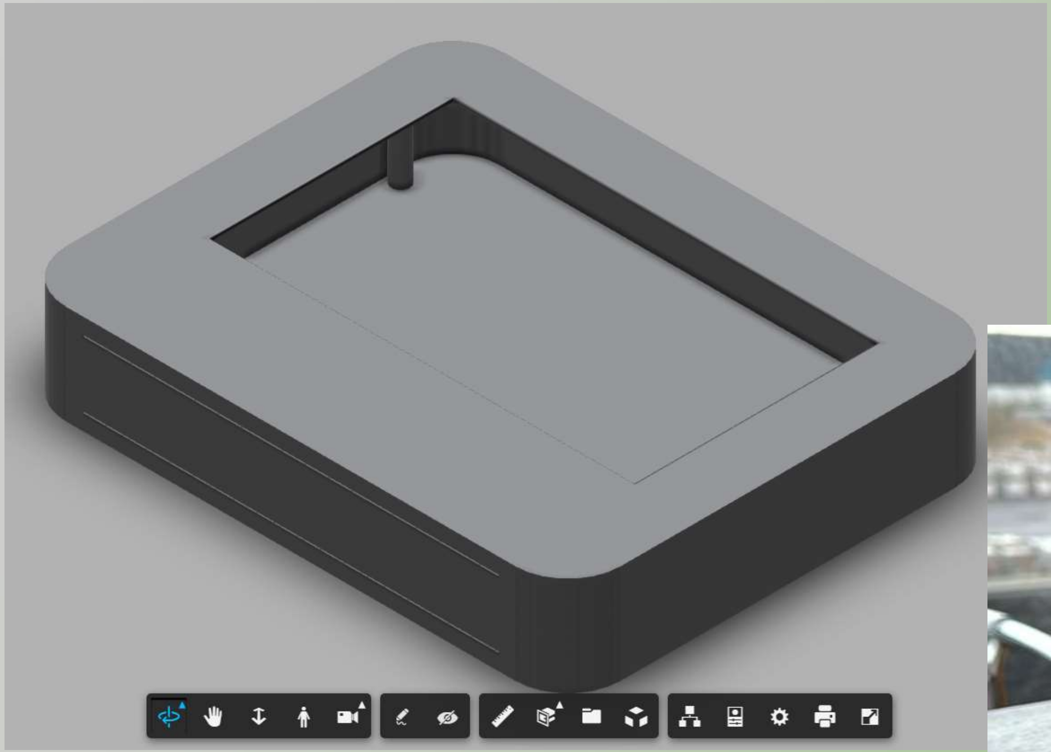
Casing



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Main features HMC-20

- 7” or 3,4” RGB TN TFT display
- 24bit 800x480px 1000 cd/m²
- 4x5 keypad interface
- PWM backlight 10V/300mA
- 10 digital I/O
- GPU 256/65K colors
- Internal font ROM 8x16dots
- RTC with external low power Xtal
- Real time command interpreter
- Rotation function 90° step
- Internal widgets
- SD-card interface
- USB2.0 port ESD protected
- Font ROM chip 150 countries
- 64Mb serial NOR flash with HMAC
- Piezo electric buzzer
- Resistive or capacitive touch interface
- 3V battery holder for RTC
- User application board connector
- High effencïency power supply
- Demo code

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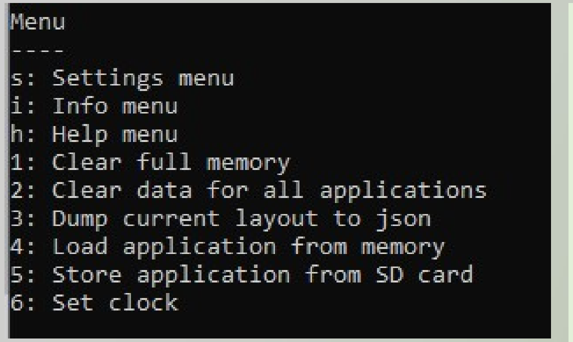

```
Menu
----
s: Settings menu
i: Info menu
h: Help menu
1: Clear full memory
2: Clear data for all applications
3: Dump current layout to json
4: Load application from memory
5: Store application from SD card
6: Set clock
```

Updating widgets and layout

1: SD card contains folders with images and "application.json" for each app
2: Selected app will be copied to internal memory together with shared images
3: Uploaded app is selected in menu and saved
4: Last selected app is loaded after power on

SD card is no longer necessary as long as no layout changes are needed

Advantages:

- Fast access with internal flash
- SD card can be ommited when updating is not necessary
- SD card can be re-used for different modules
- Different apps contain layout variations for demo and evaluation purposes

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Widgets and attributes

Category	Widget	ID	Representation	Behavior	Events
Visual	Page	Name/type	Level Background Image Color Location Size	Active Border (type/color) Sound (type/onoff) Visibility Coordinate system Clockpart	Touch: press, release, up, down, left, right
	Button				
	Led				
	Progressbar				
	Textual				
Non visual	Timer			Start, Stop	Run out
	Pincode				Pass, Fail Savedsuccesfull
	Function				Execute
	Clock				Set time/date

Level: foreground – background

Coordinate system: center - corner

Page: silent update mode → render after modifying widgets

All attributes and properties can be changed by commands

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Real time interpreter example

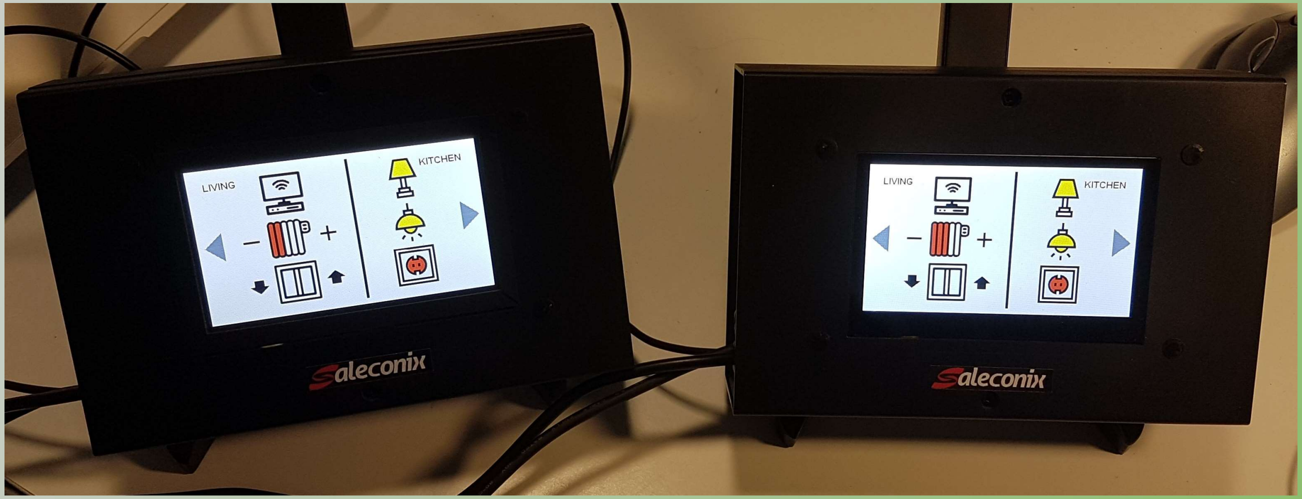
Performs predefined actions in a random order. Can be as widget events or sent by serial port. There are three predefined forms:

```
Property assign type A: [pagename].[widget].[propname]=[property]
Property assign type B: [pagename].[propname]=[property]
Command type: [command] [argument]
```

Example:

```
    okbutton.setTouchPressEvent(
        "code.unlockkeypad.cmd='exe'\n" // Unlock the keypad
        "code.enter.act=true\n"         // Unlock the enter button
        "code.crosshome.act=true\n"     // Unlock the cross home button
        "code.ok.vis=false\n"           // Make the text 'ok' invisible
        "code.pincodesaved.vis=false\n" // Make the text 'pincodesaved' invisible
        "code.popup.vis=false\n"        // Make the green popup window invisible
        "page 'code'"                   // Redraw the code page
    );
```

3,4 inch display in commercial case



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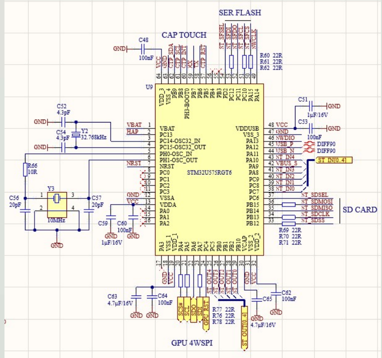
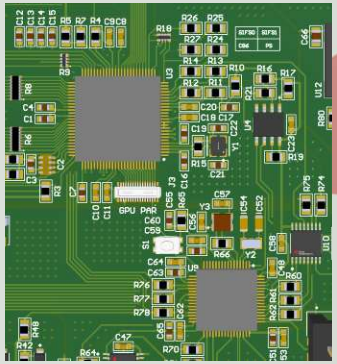
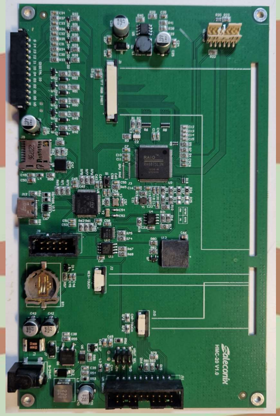
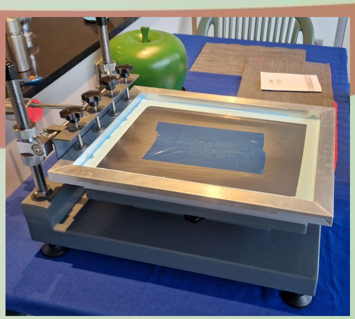
Hardware design



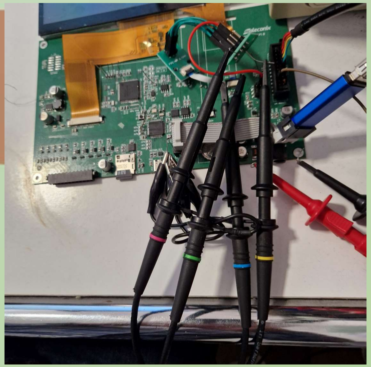


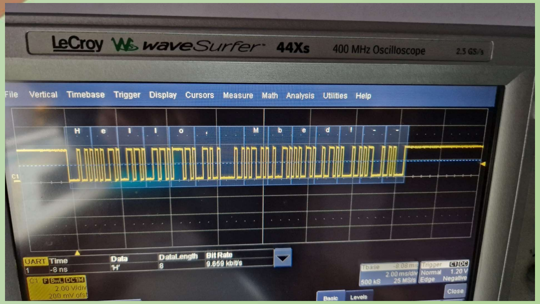
PCB prototyping





Verification and testing





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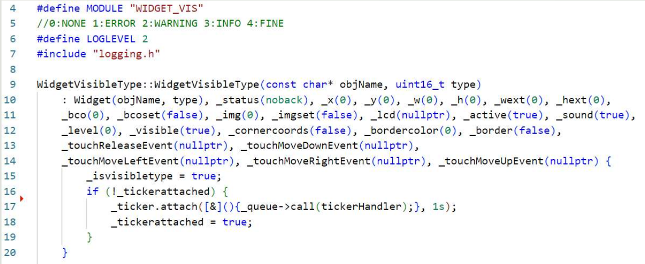
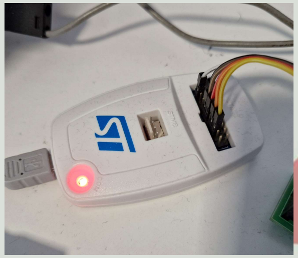
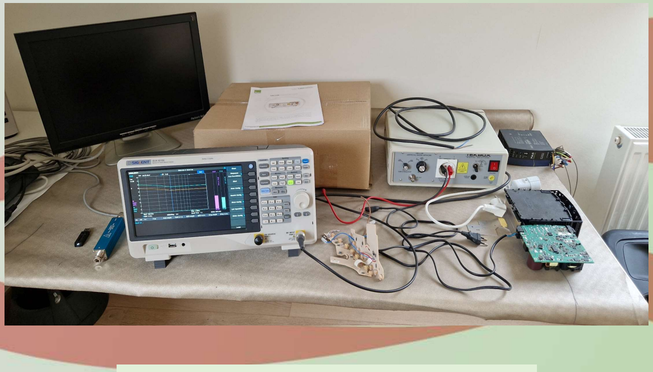
Firmware development



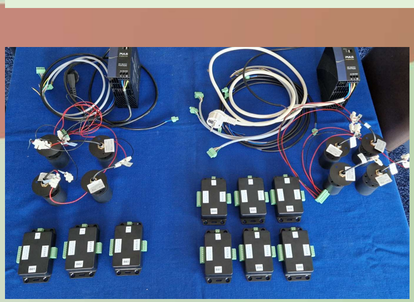
```
#define MODULE "WIDGET_VIS"
//0:NONE 1:ERROR 2:WARNING 3:INFO 4:FINE
#define LOGLEVEL 2
#include "logging.h"

WidgetVisibleType::WidgetVisibleType(const char* objName, uint16_t type)
    : Widget(objName, type), _status(noback), _x(0), _y(0), _w(0), _h(0), _wext(0), _hext(0),
    _bco(0), _bcoset(false), _img(0), _imgset(false), _lcd(nullptr), _active(true), _sound(true),
    _level(0), _visible(true), _cornercoords(false), _bordercolor(0), _border(false),
    _touchReleaseEvent(nullptr), _touchMoveDownEvent(nullptr),
    _touchMoveLeftEvent(nullptr), _touchMoveRightEvent(nullptr), _touchMoveUpEvent(nullptr) {
        _isvisibletype = true;
        if (!_tickerattached) {
            _ticker.attach([&](){_queue->call(tickerHandler);}, 1s);
            _tickerattached = true;
        }
    }
```



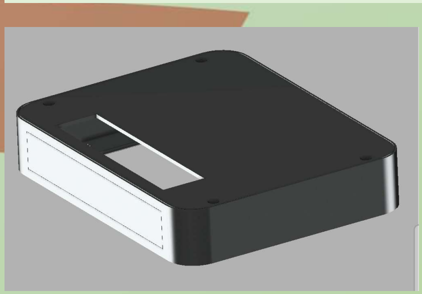
EMC analysis



Production



Mechanical design
3D printing



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Additional information?

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