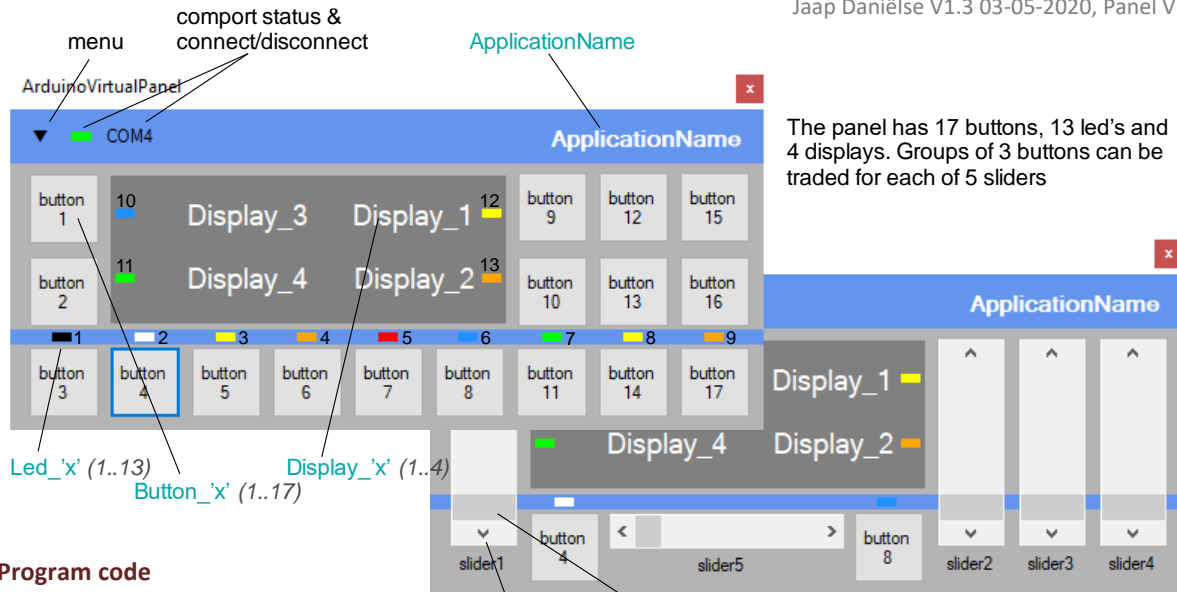


Arduino Experiment Control Panel

Jaap Daniëls V1.3 03-05-2020, Panel V1.1.x



Program code

Minimal code

```
#include "VirtualPanel.h"

void setup ()
{ Panel.begin(); }

void loop ()
{ Panel.receive(); }

// callbackroutine
void PanelCallback (vp_channel event)
{ switch (event)
{ case channel:
...
break;
} } }
```

Panel.send (channel, variable*);
Panel.sendf (channel, formatted string, format variables ...);**
 * types depending on channel.
 ** see printf formatting

Main Panel channels/events

send() or sendf() functions.

Receive via **PanelCallback() event**

ApplicationName send

char*	appl. name text
color ¹	text color

PanelConnected receive

void	on connect
------	------------

Reset send

void	reset panel
------	-------------

DynamicDisplay send

bool	activate/ deactivate
int16	delay ms (100-2000)*

Receive

void	on delay freq.
------	----------------

*Default 250ms

UnixTime send

void	request
------	---------

receive

uint32	(local) unix time code
--------	------------------------

Beep send

void	def: (500 Hz 400 ms)
Int16	Freq. Hz 400 ms
uint32	Frequency, Duration
*	

* use _Sound helper function:
long _Sound (int freq, int dur)

Button_x' (1..17) send

any	button text
color ¹	button text color
size ¹	text size

receive

void	on button click
------	-----------------

Slider_x' (1..5) send

bool	visible/invisible
char*	slider label text
int16	set (initial) value

receive

int16	value on slider action
-------	------------------------

MaxSlider_x' (1..5) send

int16	maximum value*
-------	----------------

* positive only, max 1024

PanelColor send

color ¹	panel color
--------------------	-------------

Led_x' (1..13) send

bool	visible/invisible
color ¹	led color

Display_x' (1..4) send

any	display as text
color ¹	display text color
size ¹	text size

Receive

void	double click
------	--------------

Panel Input

PanelInputLabel_x' (1..2)

PanelInput_x' (1..2)

Frequency (Hz)	1000
----------------	------

MinPanelInput_x' (1..2)

MaxPanelInput_x' (1..2)

PanelInput_x' (1..2) send

bool	true:static/false:volatile
any	set value

receive

any*	value
void	discard

*Type same as sent type

MinPanelInput_x' (1..2) send

num*	min value**
------	-------------

MaxPanelInput_x' (1..2) send

num*	max value**
------	-------------

*Int16 int32, float32

** When string: min/max length.

PanelInputLabel_x' (1..2) send

any	Input label text
-----	------------------

¹ See: Special strings

OpenFile_ 'x' (1..4) send

char*	file path string*
-------	-------------------

Receive

int23_t	line count if open
void	if file not open

- *- dir. path only, sets dialog path.
- filename or wildcard + ext. opens or creates file via dialog.
- ext. sets dialog file filter.
- /f forces open/create w/o dialog if specified dir. / dialog dir. valid.

FileDialogTitle_ 'x' (1..4) send

char*	set dialog title
-------	------------------

ReadLineFile_ 'x' (1..4) send

void	read next line
int32	set next read line nr.

Receive

char*	line read *
void	end of file

* Truncates to 60 chars.

WriteLineFile_ 'x' (1..4) send

char*	write next line
int32	set next write line nr.

ClearFile_ 'x' (1..4) send

void	clear open file
------	-----------------

DeleteFile_ 'x' (1..4) send

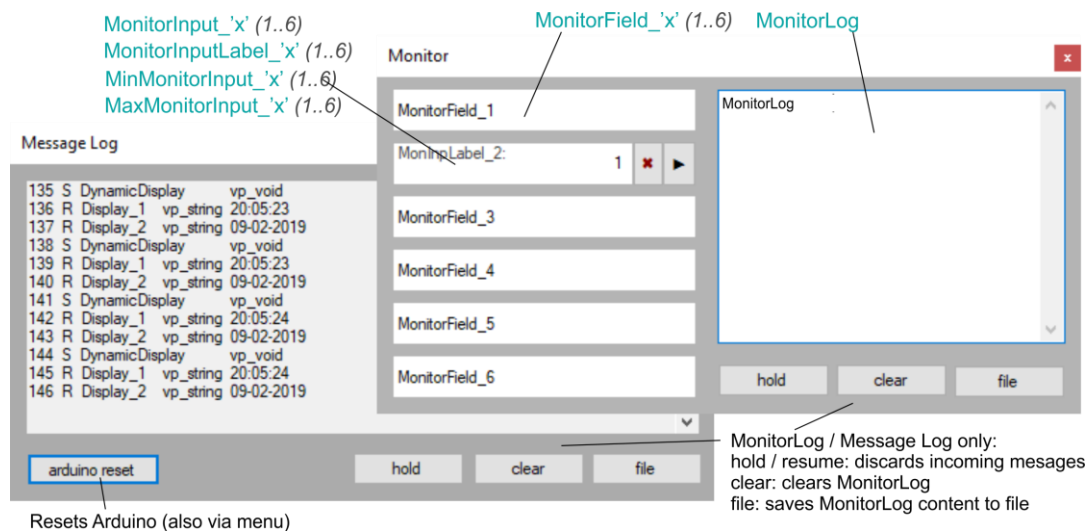
void	delete open file
------	------------------

Message Log Panel

Records panel incoming (R) and panel outgoing (S) messages.

Monitor Panel

Provides a log panel and additional displays and inputs



Message Log

Format:

146 R Display_2 vp_string Test
{MessageNumber} {Send/Receive}
{channel} {VarType} {Value}

Monitor channels / events

Monitor send

bool	win. visible/invisible
------	------------------------

MonitorField_ 'x' (1..6) send

any	display as text
-----	-----------------

MonitorInput_ 'x' (1..6) send

bool	static/volatile
any*	value

receive

any*	value
void	discard

*Type same as sent type

MonitorInputLabel_ 'x' (1..2) send

any	Input label text
-----	------------------

MinMonitorInput_ 'x' (1..6) send

num*	value
------	-------

*Int16 int32, float32

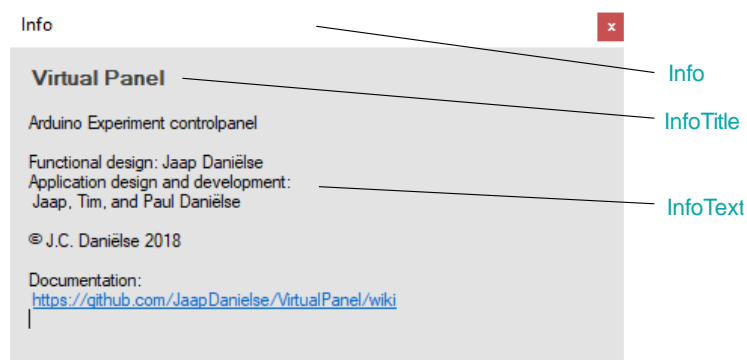
When string: min/max length.

MonitorLog send

any	display as text
\$CLEAR	clear Log

Info Panel

Application dependent help panel.



Info channels/ events

Info send

bool	win. visible/invisible
char*	\$CLEAR

InfoTitle send

any*	title text
------	------------

*Also clears InfoText

InfoText send

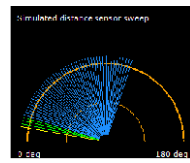
char*	Info text*
\$CLEAR	Clears info text

* max 60 char per send.

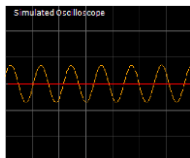
Can be repeated for larger text

Graph Panel

Graphic display functions (rolling/static graph, draw) panel, including additional labels and buttons.



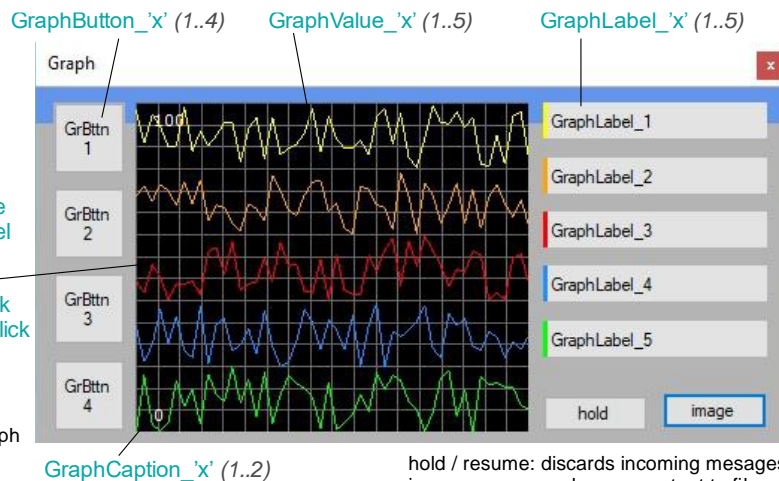
Graph Draw



Static Graph

GraphGrid
GraphDrawLine
GraphDrawPixel
GraphText
GraphClick
GraphRightClick
GraphDoubleClick

RollingGraph



hold / resume: discards incoming messages
image: saves graph pane content to file

Graph channels/events

Graph send

bool	win. visible/invisible
char*	\$CLEAR

GraphGrid send

int16	vert. grid count
-------	------------------

GraphDrawLine send

void	line start
uint16 ²	line point (x,y)
uint32 ²	line segment (x,y,x',y')
color ¹	line color
width ¹	line width

GraphDrawPixel send

uint16 ²	point (x,y)
color ¹	pixel color
width ¹	pixel width

GraphDrawCircle send

params ²	circle parameters
color ¹	circle color
width ¹	circle width

GraphCaption_'x' (1..2) send

any	Caption text
-----	--------------

Graph Panel 255(x) X 220(y)
Actual 263(x) for GraphValue

GraphText send

color ¹	text color
uint16 ²	point 2 x byte (x,y)
char*	text

GraphValue_'x' (1..5) send

byte	graph value (0-255)
color ¹	graph color
width ¹	line width string
type ¹	rolling/static
\$CLEAR	clear sent values

GraphValueCount_'x' (1..5) send

int16	hor. value count
-------	------------------

¹See: Special strings

²See: Helper functions Draw
_Point, _Line, _Circle

GraphButton_'x' (1..4) send

any	button text
color ¹	button color
size ¹	text size

receive

void	on button click
------	-----------------

GraphClick receive

GraphRightClick receive

GraphDoubleClick* receive

uint16**	click position
----------	----------------

* occurs together with GraphClick

**uint 2 x byte (X,Y)

(same as -DrawPixel and -DrawLine)

GraphLabel_'x' (1..5) send

bool	visible/invisible
any	label text
color ¹	color bar color*

* \$OFF (color bar invisible)

GraphInput_'x' (1..5) send

bool	static/volatile
any*	set value

receive

any*	value
void	discard

*Type same as sent type

GraphInputLabel_'x' (1..5) send

any	Input label text
-----	------------------

MinGraphInput_'x' (1..5) send

MaxGraphInput_'x' (1..5) send

num*	min/max value
------	---------------

*Int16 int32, float32

When string min/max length.

Data types and Panel Variables

Data types

vp_type::vp_void	void
vp_type::vp_boolean	bool
vp_type::vp_string	char*
vp_type::vp_byte	byte
vp_type::vp_int	int16
vp_type::vp_uint	uint16
vp_type::vp_long	int32
vp_type::vp_ulong	uint32
vp_type::vp_float	float

Event data type received in:

Panel.vpr_type	vpr_type
----------------	----------

Panel variables

(Event data received)

Panel.vpr_void	void
Panel.vpr_bool	bool
Panel.vpr_string	char*
Panel.vpr_byte	byte
Panel.vpr_int	int16_t
Panel.vpr_uint	uint16_t
Panel.vpr_long	int32_t
Panel.vpr_ulong	uint32_t
Panel.vpr_float	float32_t

vpr_void DynamicDisplay (timer),
Button, GraphButton (click),
ReadLineFile (eof),
Display (double click), PanelInput,
MonitorInput, GraphInput (discard)
vpr_bool OpenFile, WriteLineFile
vpr_string ReadLineFile (line read)
vpr_int Slider (slider value)
vpr_long UnixTime (timecode)
any type PanelInput, MonitorInput,
GraphInput (send)

Code example:

```
if (Panel.vpr_type==vp_type::vp_int)
    MyInt = Panel.vpr_int;
```

Special strings

Color strings

For: `ApplicationName`, `Display`, `Led`, `Button`, `GraphButton`, `GraphValue`, `GraphLine`, `GraphPixel`, `GraphCircle`.

\$DELETE*	
\$OFF**	■
\$BLACK	■
\$GRAY	■
\$PURPLE	■
\$PINK	■
\$BLUE	■
\$GREEN	■
\$YELLOW	■
\$ORANGE	■
\$RED	■
\$BROWN	■
\$WHITE	■

* draw only ** Led only

Graph Type strings

Set graph type for: `GraphValue`.

Rolling values are added right and move to left. Static waits until all values have been sent then displays.

\$ROLLING*	Set rolling graph
\$STATIC	Set static graph

* default

Pen size strings Draw

Size for: `GraphPixel`, `GraphLine`, `GraphCircle`, `GraphValue`.

\$1PX*	1 pixel
\$2PX	2 pixels
\$3PX	3 pixels
\$4PX	4 pixels

* default

Text attributes/size strings

For: `Display`, `Button`, `GraphButton`.

\$SMALL	font size small
\$NORMAL*	font size normal
\$BIG	font size big
\$BOLD	bold text

*Default. Resets bold and big

(Helper) Functions

Panel Delay function

`bool Panel.Delay(int16_t milliseconds, bool receive)`

Allows to check for incoming messages during delay. If receive is true. Panel receive is called. If an incoming message was detected `true` is returned.

Helper function Sound

`uint32_t _Sound(int freq, int dur)`
Combines two `int16_t` (frequency Hz, duration mS) into one `uint32_t`.

Helper functions Draw

`_Point()`

`uint16_t _Point(byte x, byte y)`
combines 2 bytes into `uint16_t` (x,y) for a point.

When sent to `GraphDrawLine` consecutive points are connected in a line.

`_Line()`

`uint32_t _Line(byte Fx, Fy, Tx, Ty)`
Combines four bytes into `uint32_t` (x from, y from, x to, y to)

`_Circle()`

`char * _Circle(byte x, byte y, byte rad, int angle, int arc)`
Center (x,y) radius, start angle, radius angle.

`_VPoint()/_VLine()/_VCircle()`

`uint16_t _VPoint(byte x, byte y)`

`uint32_t _VLine(byte Fx, Fy, Tx, Ty)`

`char * _VCircle(byte x, byte y, byte rad, int angle, int arc)`

Same as `_Point`, `_Line` and `_Circle` but transforms y values from value (0-255) to coordinate (0-220).

Sendf() / Printf formatting

`%[flags][width][length]specifier`

specifiers (limited list)

%d	signed decimal
%ld	unsigned int32
%u	unsigned decimal
%o	unsigned octal
%x	unsigned hex
%c	character
%s	string

flags

-	left justify
+	force sign
0	pad zero's

Examples:

`Panel.sendf(Display_1, "Test`

`%d", 10) // output: Test 10`

`Panel.sendf(Display_1, "Test`

`%03d", 10) // output: Test 010`

`Panel.sendf(Display_1, "Test`

`%+d", 10) // output: Test +10`

Helper function Float string

`char * _FString(floatNumber, length, decimals);`

sendf() float

Float not supported on

AVR (Uno, Nano, Mega ...)

Use `_FString()` helper function.

`char* _FString(floatNumber, length, decimals);` again with `Panel.sendf` using `"%s"`

Example:

`Panel.sendf(Display_1, "Value %s", _FString(FloatValue, 5, 2));`

Prints `FloatValue` using 5 chars, 3 of which are a '.' and 2 decimals.

Unicode characters

Using `send()` or `sendf()` to send a string, Unicode characters can be used. Simply copy and paste into the string.

F() Macro

In both `send()` and `sendf()` the `F()` macro for strings

is allowed. This will force the

string to be placed in

program memory. (*not Due*)

Example:

`Panel.sendf(Display_1, F("Value %d"), 10);`