Lua for RePhone
(Xadow GSM+BLE)

LCD Module Reference

LoBo 07/2016

Content

LCD Module

Function List

lcd.init	Initialize the display
lcd.clear	Clear the screen
lcd.write	Write strings and|or numbers to display
lcd.on	Turn display on
lcd.off	Turn display off
lcd.setfont	Set the font used for write function
lcd.getscreensize	Get current screen size
lcd.getfontsize	Get current font size in pixels
lcd.getfontheight	Get current font height in pixels
lcd.fixedwidth	Set fixed width or proportional character printing
lcd.setrot	Set text rotation (angle)
lcd.setorient	Set display orientation, default PORTRAIT
lcd.setwrap	Set line wrap for lcd.write() function
lcd.setcolor	Set foreground and background colors
lcd.settransp	Set transparency for character printing
lcd.setfixed	Force fixed width printing of proportional fonts
lcd.setclipwin	Set the coordinates of the clipping window
lcd.resetclipwin	Reset clipping window to full screen
lcd.invert	Set inverted/normal colors
lcd.putpixel	Puts pixel on screen
lcd.line	Draw line
lcd.rect	Draw rectangle
lcd.triangle	Draw triangle
lcd.circle	Draw circle
lcd.image	Show image from file
lcd.hsb2rgb	Converts HSB color values to 16-bit RGB value

Constants

lcd.PORTRAIT	Default orientation
lcd.PORTRAIT_FLIP	Orientation flipped portrait
lcd.LANDSCAPE	Orientation landscape
lcd.LANDSCAPE_FLIP	Orientation flipped landscape
lcd.CENTER	Center text (write function)
lcd.RIGHT	Right allign text (write function)
lcd.LASTX	Continue writing at last X position (write function)
lcd.LASTY	Continue writing at last Y position (write function)
lcd.FONT_SMALL	Small fixed width font (8x8)
lcd.FONT_BIG	Big fixed width font (16x16)
lcd.FONT_DEJAVU12	Proportional font DejaVue 12
lcd.FONT_DEJAVU18	Proportional font DejaVue 18
lcd.FONT_DEJAVU24	Proportional font DejaVue 24
lcd.FONT_7SEG	7 segment vector font (digits,'-','.',':','deg' only
lcd.ST7735	ST7735 based display, type #0
lcd.ST7735B	ST7735 based display, type #1
lcd.ST7735G	ST7735 based display, type #2
lcd.ILI9341	ILI9341 based display
lcd.BLACK	Colors
lcd.NAVY	
lcd.DARKGREEN	
lcd.DARKCYAN	
lcd.MAROON	
lcd.PURPLE	
lcd.OLIVE	
lcd.LIGHTGREY	
lcd.DARKGREY	
lcd.BLUE	
lcd.GREEN	
lcd.CYNAN	
lcd.RED	
lcd.MAGENTA	
lcd.YELLOW	
lcd.WHITE	
lcd.ORANGE	
lcd.GREENYELLOW	
lcd.PINK	

The module supports operations with TFT SPI display modules.
Displays based on ST7735 and ILI9341 controllers, using 4-wire SPI interface are supported.

SPI interface must be setup before using the module.

CS and DC pins must be declared.

SPI speed can be set to up to 10 MHz.

SPI pins operate at 2.8V and can drive the display board (if powered with 2.8V) directly. Display can be powered from RePhone's 2.8V output, **bypass** any voltage regulator if present on display module in that configuration.

Use **level shifters** if display module is powered with 3.3V / 5V.

Back light can be powered directly from battery output or with PWM pin (via MOSFET).

Connecting RePhone to display module:

RePhone	Pin		Display
MOSI	GPIO28	->	SDI (MOSI)
MISO	GPIO29	->	SDO (MISO), **not used**
CLK	GPIO27	->	SCK
CS	any	->	CS
DC	any	->	DC
			RESET, not used, pullup (4.7K) to power supply

Functions

lcd.init()

Description

Initialize the tft display and clear the screen.
You must initialize the SPI interface first.

Syntax

res = lcd.init(type [,orient])

Parameters

type: display type, **0**,**1**,**2** (probably 1 will work best) for ST7735
             or **3** for ILI9341
             You can use defined constants ST7735, ST7735B, ST7735G, ILI9341
orient: optional, display orientation (default: PORTRAIT)

Returns

res: 0 on success, error code on error

Examples

```
-- setup SPI 10 MHz clock
>spi.setup({mode=0, cs=2, dc=1, speed=10000})
>res = lcd.init(lcd.ILI9341,lcd.LANDSCAPE)
```

lcd.clear()

Description

Clear screen to default or specified color.

Syntax

lcd.clear([color])

Parameters

color   optional; fill the screen with color (default: BLACK)

Returns

nil

Examples

```
> lcd.clear(lcd.BLUE)
> lcd.clear()
```

lcd.off()

Description

Turns the display of, preserve power. Back light has to be turned off separately.

Syntax

lcd.off()

Parameters

nil

Returns

nil

Examples

> `lcd.off()`

lcd.on()

Description

Turns the display on.

Syntax

lcd.on()

Parameters

nil

Returns

nil

Examples

> `lcd.on()`

lcd.invert()

Description

Set inverted/normal colors.

Syntax

lcd.invert(inv)

Parameters

inv   0: inverted colors off; 1: inverted colors on

Returns

nil

Examples

> `lcd.invert(0)`

lcd.setorient()

Description

Set display orientation.

Syntax

lcd.setorient(orient)

Parameters

orient   one of display orientation constants
PORTRAIT, PORTRAIT_FLIP, LANSCAPE, LANDSCAPE_FLIP

Returns

nil

Examples

```
> lcd.orient(lcd.LANDCSAPE)
> lcd.orient(PORTRAIT_FLIP)
```

lcd.setclipwin()

Description

Sets the clipping area coordinates. All writing to screen is clipped to that area.
Starting x & y in all functions will be adjusted to the clipping area.
This setting has no effect on lcd.image function.

Syntax

lcd.setclipwin(x1, y1, x2, y2)

Parameters

x1,y1   upper left point of the clipping area
x1,y1   bottom right point of the clipping area

Returns

nil

Examples

```
> lcd.setclipwin(20,20,220,200)
```

lcd.resetclipwin()

Description

Resets the clipping are coordinates to default full screen.

Syntax

lcd.resetclipwin()

Parameters

nil

Returns

nil

Examples

```
> lcd.resetclipwin()
```

lcd.setrot()

Description

Set text rotation (angle) for lcd.write() function. Has no effect on FONT_7SEG.

Syntax

lcd.setrot(rot)

Parameters

rot   rotation angle (0~360)

Returns

nil

Examples

```
> lcd.rot(90)
> lcd.write("Ratated text")
```

lcd.settransp()

Description

Set transparency when writing the text. If transparency is on, only text foreground color is shown.

Syntax

lcd.settransp(transp)

Parameters

transp   0: transparency off; 1: transparency on

Returns

nil

Examples

```
> lcd.settransp(1)
```

lcd.setwrap()

Description

Set line wrapping writing the text. If wrapping is on, text will wrap to new line, otherwise it will be clipped.

Syntax

lcd.setwrap(wrap)

Parameters

wrap   0: line wrap off; 1: line wrap on

Returns
>nil

Examples
>`> lcd.setwrap(1)`

lcd.setfixed()

Description
>Forces fixed width print of the proportional font.

Syntax
>lcd.setwrap(force)

Parameters
>force   0: force fixed width off; 1: force fixed width on

Returns
>nil

Examples
>`> lcd.setfixed(1)`

lcd.setcolor()

Description
>Set the color used when writing characters or drawing on display.

Syntax
>lcd.setcolor(color[,bgcolor])

Parameters
>color   foreground color for text and drawing
>bgcolor   optional; background color for writing text

Returns
>nil

Examples
>`> lcd.setcolor(lcd.YELLOW)`
>`> lcd.setcolor(lcd.ORANGE, lcd.DARKGREEN)`

lcd.setfont()

Description

Set the font used when writing the text to display.
Six fonts are available:
FONT_SMALL (default, fixed width 8x8),
FONT_BIG (fixed width 16x16)
FONT_DEJAVU12,FONT_DEJAVU18,FONT_DEJAVU24 (proportional fonts)
FONT_7SEG (vector font, imitates 7 segment displays).

7-segment font is the vector font for which any size can be set (distance between bars and the bar width). Only characters 0,1,2,3,4,5,6,7,8,.,-,:,/ are available. Character '/' draws the degree sign.

Syntax

lcd.setfont(font [,size, width])

Parameters

font	one of the available fonts
size	optional; only for FONT_7SEG, distance between bars (default: 12; min=6; max=40)
width	optional; only for FONT_7SEG, bar width (default: 2; min=1; max=12 or size/2)

Returns

nil

Examples

```
> lcd.setfont(lcd.FONT_BIG)
> lcd.setfont(lcd.FONT_7SEG, 20, 4)
```

lcd.getfontsize()

Description

Get current font size in pixels. Useful if FONT_7SEG is used to get actual character width and height.

Syntax

lcd.getfontsize()

Parameters

nil

Returns

xsize	width of the font character in pixels. For the proportional fonts, maximal char width will be returned
ysize	height of the font character in pixels

Examples

```
> lcd.getfontsize()
    8   12
```

lcd.getfontheight()

Description

Get current font height in pixels.

Syntax

lcd.getfontheight()

Parameters

nil

Returns

ysize   height of the font character in pixels

Examples

```
> lcd.setfont(lcd.FONT_BIG)
> lcd.getfontsize()
   16
```

lcd.getscreensize()

Description

Get current screen size (width & height) in pixels.

Syntax

lcd.getscreensize()

Parameters

nil

Returns

xsize   width of the screen in pixels

ysize   height of the screen in pixels

Examples

```
> lcd.getscreensize()
  240    320
```

lcd.putpixel()

Description

Draws pixel on display at coordinates (x,y) using foreground or given color

Syntax

lcd.putpixel(x, y [, color])

Parameters

x, y   coordinates of pixel

color   optional: pixel color (default: current foreground color)

Returns

nil

Examples

```
> lcd.putpixel(10,10)
> lcd.putpixel(20,40,lcd.GREEN)
```

lcd.line()

Description

Draws line from (x1,y1) to (x2,y2) using foreground or given color

Syntax

lcd.line(x1, y1, x2, y2 [,color])

Parameters

x1,y1   coordinates of line start point
x1,y1   coordinates of line end point
color   optional: line color (default: current foreground color)

Returns

nil

Examples

```
> lcd.line(0,0,127,159)
> lcd.line(20,40,80,10,lcd.ORANGE)
```

lcd.rect()

Description

Draws rectangle at (x,y) w pixels wide, h pixels high, with given color. If the fill color is given, fills the rectangle.

Syntax

lcd.rect(x, y, w, h, color [,fillcolor])

Parameters

x, y   coordinates of the upper left corner of the rectangle
w   width of the rectangle
h   height of the rectangle
color   rectangle outline color
fillcolor   optional: rectangle fill color

Returns

nil

Examples

```
> lcd.rect(10,10,100,110,lcd.RED)
> lcd.rect(0,0,128,160,lcd.ORANGE,lcd.YELLOW)
```

lcd.circle()

Description

Draws circle with center at (x,y) and radius r, with given color. If the fill color is given, fills the circle.

Syntax

lcd.circle(x, y, r, color [,fillcolor])

Parameters

x, y	coordinates circle center
r	radius of the circle
color	circle outline color
fillcolor	optional: circle fill color

Returns

nil

Examples

```
> lcd.circle(64,80,20,lcd.RED)
> lcd.circle(50,60,30,lcd.ORANGE,lcd.YELLOW)
```

lcd.triangle()

Description

Draws triangle between three given points, with given color. If the fill color is given, fills the triangle.

Syntax

lcd.triangle(x1, y1, x2, y2, x3, y3, color [,fillcolor])

Parameters

x1, y1, x2, y2, x3, y3	coordinates of the 3 triangle points
color	triangle outline color
fillcolor	optional: triangle fill color

Returns

nil

Examples

```
> lcd.triangle(50,20,80,100,20,100,lcd.RED)
> lcd.triangle(50,20,80,100,20,100,lcd.RED, lcd.WHITE)
```

lcd.write()

Description

Write strings and|or numbers to display. Rotation of the displayed text can be set with lcd.setrot() function.

Two special characters are allowed in strings:
'\r'   CR (0x0D), clears the display to EOL
'\n'   LF (ox0A), continues to the new line, x=0

Syntax

lcd.write(x, y, data1, [data2, ... datan])

Parameters

x: x position (column; 0~screen width-1)
         Special values can be entered:
         lcd.CENTER, centers the text; lcd.RIGHT, right justifies the text
         lcd.LASTX, continues from last X position
y: y positoin (row; 0~screen height-1)
         Special values can be entered:
         lcd.LASTY, continues from last Y position
data1: number or string to write to the display
         If simple number is given, integer is printed. The number can be given as
         a table containing number (float) and number of decimal places.
data2: optional
datan: optional

Returns

nil

Examples

```
>lcd.setcolor(lcd.YELLOW)
>lcd.write(0,0,"RePhone")
>t=2.3456
>lcd.write(8,16,"Temp=", {t,2})
```

lcd.image()

Description

Shows the image from file. The image file must be in raw 16bit format.
Any image can be converted with *ImageConverter565.exe* which can be found in on GitHub repository.
Be careful to give the right image width and height.

Syntax

lcd.image(x, y, xsize, ysize, filename)

Parameters

x: x position of the image upper left corner
y: y position of the image upper left corner
xsize: image xsize (width)
ysize;   image ysize (height)
filename: name of the row image file

Returns

nil

Examples

```
>lcd.rot(lcd.PORTRAIT)
>lcd.clear()
>lcd.image(0,0,128,96,"rephone_128x96.img")
>lcd.rot(lcd.LANDSCAPE)
>lcd.image(0,0,160,128,"rephone_160x128.img")
```

lcd.hsb2rgb()

Description

Converts HSB (hue, saturation, brightness) color values to 16-bit RGB value.

Syntax

Color = lcd.hsb2rgb(hue, sat, bri)

Parameters

hue   float, hue value (0.0 ~ 359.9999)
sat   float, saturation value (0.0 ~ 1.0)
bri   brightness value (0.0 ~ 1.0)

Returns

color   16-bit RGB color value

Examples

```
> lcd.circle(50,60,30,lcd.ORANGE,lcd.hsb2rgb(90.0,1.0,0.5))
```