

# Introduction

## Introduction

pico-Céu is a tiny programming environment for visual and interactive applications such as video games. It is composed of the programming language Céu and minimalist libraries for input, graphics, network, and sound.

## Resources

### Resources

Resource is any external file used by a pico-Céu application, such as images, fonts, and audio files. Every resource should be located in a `res` folder, in the root of the application, and can be used in `GRAPHICS_DRAW_BMP`, `GRAPHICS_SET_FONT`, or `SOUND_PLAY`.

## Graphics

### Graphics

Provides graphics operations, such as for drawing pixels and images on the screen.

TODO: `axis`

### Configuration

#### `GRAPHICS_SET_ANCHOR`

Changes the drawing anchor of all subsequent drawing operations `GRAPHICS_DRAW_BMP`, `GRAPHICS_DRAW_RECT`, and `GRAPHICS_DRAW_TEXT`.

```
output (HAnchor,VAnchor) GRAPHICS_SET_ANCHOR;
```

- Parameters:
  - `HAnchor`: new horizontal anchor
  - `VAnchor`: new vertical anchor

The anchor specifies the part of the shape to appear at the pixel position of the drawing operation.

The possible values for `HAnchor` are `HANCHOR_LEFT`, `HANCHOR_CENTER`, and `HANCHOR_RIGHT`. The initial value is `HANCHOR_CENTER`.

The possible values for `HVnchor` are `VANCHOR_TOP`, `VANCHOR_CENTER`, and `VANCHOR_BOTTOM`. The initial value is `VANCHOR_CENTER`.

### **GRAPHICS\_SET\_BMP\_FRAME**

Changes the drawing frame of all subsequent `GRAPHICS_DRAW_BMP` operations.

output (int?,int?) `GRAPHICS_SET_BMP_FRAME`;

- Parameters:
  - `int?`: new frame index to show (default: 0)
  - `int?`: new number of frames in the image (default: 1)

The initial frame index is 0 and number of frames is 1.

### **GRAPHICS\_SET\_BMP\_SIZE**

Changes the drawing size of all subsequent `GRAPHICS_DRAW_BMP` operations.

output (int?,int?) `GRAPHICS_SET_BMP_SIZE`;

- Parameters:
  - `int?`: new width (default: proportional to new height)
  - `int?`: new height (default: proportional to new width)

If both width and height are set to default, the new size is the original image size.

The initial size is the original image size.

### **GRAPHICS\_SET\_COLOR\_NAME**

Changes the color of all subsequent drawing operations.

output (Color) `GRAPHICS_SET_COLOR_NAME`

- Parameters:
  - `Color`: new color name

The color names are based on the *HTML Web Colors*:

[https://en.wikipedia.org/wiki/Web\\_colors#HTML\\_color\\_names](https://en.wikipedia.org/wiki/Web_colors#HTML_color_names)

The possible values are `COLOR_WHITE`, `COLOR_SILVER`, `COLOR_GRAY`, `COLOR_BLACK`, `COLOR_RED`, `COLOR_MAROON`, `COLOR_YELLOW`, `COLOR_OLIVE`, `COLOR_LIME`, `COLOR_GREEN`, `COLOR_AQUA`, `COLOR_TEAL`, `COLOR_BLUE`, `COLOR_NAVY`, `COLOR_FUCHSIA`, `COLOR_PURPLE`.

The initial color is white.

## **GRAPHICS\_\_SET\_\_COLOR\_\_RGB**

Changes the color in RGB of all subsequent drawing operations.

output (integer, integer, integer) GRAPHICS\_SET\_COLOR\_RGB

- Parameters:
  - **integer**: new red component
  - **integer**: new green component
  - **integer**: new blue component

The initial color is white.

## **GRAPHICS\_\_SET\_\_FONT**

Changes the font for drawing and writing text.

output (text, integer) GRAPHICS\_SET\_FONT

- Parameters:
  - **text**: path for the **.ttf** font filename
  - **integer**: height of the new font in pixels

## **GRAPHICS\_\_SET\_\_SCALE**

Changes the drawing scale of all subsequent drawing operations **GRAPHICS\_DRAW\_BMP**, **GRAPHICS\_DRAW\_RECT**, and **GRAPHICS\_DRAW\_TEXT**.

output (real, real) GRAPHICS\_SET\_SCALE;

- Parameters:
  - **real**: new horizontal scale
  - **real**: new vertical scale

The initial scale is 1.0 x 1.0.

## **GRAPHICS\_\_SET\_\_WRITE\_\_CURSOR**

Changes the cursor starting position for writing text with **GRAPHICS\_WRITE** and **GRAPHICS\_WRITELN**.

output (integer, integer) GRAPHICS\_SET\_WRITE\_CURSOR

- Parameters:
  - **integer**: new position in the x-axis
  - **integer**: new position in the y-axis

The initial starting position is the top-left of the screen.

The current position is reset on every **WINDOW\_CLEAR** operation.

## Drawing

### GRAPHICS\_DRAW\_BMP

Draws a bitmap image on the screen.

output (integer, integer, text) GRAPHICS\_DRAW\_BMP

- Parameters:
  - integer: position in the x-axis
  - integer: position in the y-axis
  - text: path for the .bmp image filename

### GRAPHICS\_DRAW\_PIXEL

Draws a pixel on the screen.

output (integer, integer) GRAPHICS\_DRAW\_PIXEL

- Parameters:
  - integer: position in the x-axis
  - integer: position in the y-axis

The drawing color is specified with GRAPHICS\_SET\_COLOR\_NAME or GRAPHICS\_SET\_COLOR\_RGB.

### GRAPHICS\_DRAW\_LINE

Draws a line on the screen.

output (integer, integer, integer, integer) GRAPHICS\_DRAW\_LINE;

- Parameters:
  - integer: start position in the x-axis
  - integer: start position in the y-axis
  - integer: end position in the x-axis
  - integer: end position in the y-axis

The drawing color is specified with GRAPHICS\_SET\_COLOR\_NAME or GRAPHICS\_SET\_COLOR\_RGB.

### GRAPHICS\_DRAW\_RECT

Draws a rectangle on the screen.

output (integer, integer, integer, integer) GRAPHICS\_DRAW\_RECT

- Parameters:
  - integer: position in the x-axis
  - integer: position in the y-axis
  - integer: rectangle width
  - integer: rectangle height

The drawing color is specified with `GRAPHICS_SET_COLOR_NAME` or `GRAPHICS_SET_COLOR_RGB`.

## **GRAPHICS\_DRAW\_TEXT**

Draws a text on the screen.

output (int,int,text) `GRAPHICS_DRAW_TEXT`;

- Parameters:
  - **integer**: position in the x-axis
  - **integer**: position in the y-axis
  - **text**: text to draw

The drawing font is specified with `GRAPHICS_SET_FONT`. The drawing color is specified with `GRAPHICS_SET_COLOR_NAME` or `GRAPHICS_SET_COLOR_RGB`.

## **Writing**

### **GRAPHICS\_WRITE**

Writes a text on the screen.

output (text) `GRAPHICS_WRITE`;

- Parameters:
  - **text**: text to draw

The drawing position is first specified with `GRAPHICS_SET_WRITE_CURSOR`. The cursor advances automatically for the position after the text. The drawing font is specified with `GRAPHICS_SET_FONT`. The drawing color is specified with `GRAPHICS_SET_COLOR_NAME` or `GRAPHICS_SET_COLOR_RGB`.

### **GRAPHICS\_WRITELN**

Writes a line of text on the screen.

output (text) `GRAPHICS_WRITELN`;

The drawing position is first specified with `GRAPHICS_SET_WRITE_CURSOR`. The cursor advances automatically for the next line after the text, at the same initial position. The drawing font is specified with `GRAPHICS_SET_FONT`. The drawing color is specified with `GRAPHICS_SET_COLOR_NAME` or `GRAPHICS_SET_COLOR_RGB`.

## **Other**

### **GRAPHICS\_SCREENSHOT**

Takes a screen shot.

output (text) GRAPHICS\_SCREENSHOT

- Parameters:
  - **text**: path for the **.bmp** image filename to generate

## Input Devices

### Input Devices

Provides input handling, such as for keyboard and mouse.

#### Keyboard

##### KEY\_PRESS

input (integer) KEY\_PRESS

- Occurrences:
  - whenever a keyboard key is pressed
- Payload:
  - **integer**: numeric key code

TODO: key codes

##### KEY\_UNPRESS

input (integer) KEY\_UNPRESS

- Occurrences:
  - whenever a keyboard key is released
- Payload:
  - **integer**: numeric key code

TODO: key codes

#### Mouse

##### MOUSE\_CLICK

input (integer,integer,integer) MOUSE\_CLICK

- Occurrences:
  - whenever a mouse button is pressed
- Payload:
  - **integer**: numeric button code (TODO: left, middle, right?)
  - **integer**: current mouse position in the x-axis

- **integer**: current mouse position in the y-axis

## **MOUSE\_UNCLICK**

input (integer,integer,integer) MOUSE\_UNCLICK

- Occurrences:
  - whenever a mouse button is released
- Payload:
  - **integer**: numeric button code (TODO: left, middle, right?)
  - **integer**: current mouse position in the x-axis
  - **integer**: current mouse position in the y-axis

## **MOUSE\_MOVE**

input (integer,integer) MOUSE\_MOVE

- Occurrences:
  - whenever the mouse moves
- Payload:
  - **integer**: current mouse position in the x-axis
  - **integer**: current mouse position in the y-axis

# **Sound**

## **Sound**

Provides sound playback.

## **Configuration**

### **SOUND\_SET\_VOLUME**

Changes the volume of all subsequent sound playbacks.

output (integer) SOUND\_SET\_VOUME

- Parameters:
  - **integer**: new sound volume in percentage (from 0 to 100)

## **Playback**

### **SOUND\_PLAY**

Plays a sound file.

output (text) SOUND\_PLAY

- Parameters:
  - **text**: path for the sound filename

The playback volume is specified with SOUND\_SET\_VOLUME.

## Network

### Network

Provides unreliable broadcast communication between peers.

#### Send

##### NET\_\_SEND

Broadcasts a message to all peers.

output (integer,byte&&) NET\_SEND;

- Parameters:
  - **integer**: number of bytes to transmit
  - **byte&&**: stream of bytes

#### Receive

##### NET\_\_RECEIVE

Receives all messages from all peers, including itself.

input (integer,byte&&) NET\_RECEIVE;

- Occurrences:
  - on every received message
- Payload:
  - **integer**: number of received bytes
  - **byte&&**: stream of bytes

## Usart

### Usart

A pico-Céu library to send and receive data using USART (Universal Synchronous and Asynchronous Receiver-Transmitter). Windows-only for now.



## Includes

```
#include "usart.ceu"
```

## Initiate

```
code/await Usart (var int portNumber) -> NEVER
```

- Parameters:
  - `var int`: Serial port number to use.
- Example:

```
spawn Usart(3);
```

Specify that we'll use the COM3 port.

## Send

### Usart\_TX

Send a byte vector via serial.

```
code/await Usart_TX (var&[] byte str) -> none
```

- Parameters:
  - `var&[] byte`: the byte vector to send.
- Example:

```
spawn Usart(3);
```

```
var[5] byte str;  
call String_Append_STR(&str, "send");
```

```
await Usart_TX(&str);
```

Create a string and send it via serial using `Usart_TX`. Check `String_Append_STR` to learn more string manipulation in C  u.

## Receive

### Usart\_RX

```
code/await Usart_RX (var&[] byte str, var int nbChar) -> none
```

- Payload:
  - `var&[] byte`: byte vector to store the received data
  - `var int`: number of bytes to read
- Example:

```
spawn Usart(3);
```

```
var[5] byte buffer;  
await Usart_RX(&buffer, 5);  
String_Print(&buffer);
```

Receive a string of size 5 from serial port, counting the \0.

## Frame Management

### Frame Management

Manages the game frames, such as for updating animations and redrawing the screen.

#### Configuration

##### **FRAMES\_SET**

Enables or disables the generation of periodic **FRAMES\_UPDATE** and **FRAMES\_REDRAW** inputs to the application.

output (yes/no) **FRAMES\_SET**

- Parameters:
  - **yes/no**: new state
    - \* **yes**: enables the generation of frames
    - \* **no**: disables the generation of frames

#### Inputs

##### **FRAMES\_UPDATE**

input (integer) **FRAMES\_UPDATE**

- Occurrences:
  - on every frame, before **FRAMES\_REDRAW**
- Payload:
  - **integer**: the number of milliseconds elapsed since the previous frame

##### **FRAMES\_REDRAW**

input (none) **FRAMES\_REDRAW**

- Occurrences:
  - on every frame, after **FRAMES\_UPDATE**

- Payload:
  - **none**: no payload

Before the input occurs, the screen is automatically cleared with `WINDOW_CLEAR`.

## Window Management

### Window Management

Manages the application window.

#### Configuration

##### `WINDOW_SET_CLEAR_COLOR_NAME`

Changes the background color of `WINDOW_CLEAR`.

output (Color) `WINDOW_SET_CLEAR_COLOR_NAME`

- Parameters:
  - **Color**: new color name

The color names are based on the *HTML Web Colors*:

[https://en.wikipedia.org/wiki/Web\\_colors#HTML\\_color\\_names](https://en.wikipedia.org/wiki/Web_colors#HTML_color_names)

The possible values are `COLOR_WHITE`, `COLOR_SILVER`, `COLOR_GRAY`, `COLOR_BLACK`, `COLOR_RED`, `COLOR_MAROON`, `COLOR_YELLOW`, `COLOR_OLIVE`, `COLOR_LIME`, `COLOR_GREEN`, `COLOR_AQUA`, `COLOR_TEAL`, `COLOR_BLUE`, `COLOR_NAVY`, `COLOR_FUCHSIA`, `COLOR_PURPLE`.

The default color is black.

##### `WINDOW_SET_CLEAR_COLOR_RGB`

Changes the background color of `WINDOW_CLEAR` in RGB.

output (integer, integer, integer) `WINDOW_SET_CLEAR_COLOR_RGB`

- Parameters:
  - **integer**: new red component
  - **integer**: new green component
  - **integer**: new blue component

The default color is black.

## **WINDOW\_SET\_GRID**

Enables or disables a visual grid delimiting the screen pixels.

output (yes/no) WINDOW\_SET\_GRID

- Parameters:
  - **yes/no**: new state
    - \* **yes**: enables the grid
    - \* **no**: disables the grid

The ratio between the real and logical dimensions set with WINDOW\_SET\_SIZE must be greater then one.

The window is automatically cleared with WINDOW\_CLEAR.

## **WINDOW\_SET\_SIZE**

Changes the real and logical sizes of the window.

output (integer,integer,integer,integer) WINDOW\_SET\_SIZE

- Parameters:
  - **integer**: new real width
  - **integer**: new real height
  - **integer**: new logical width
  - **integer**: new logical height

The window is automatically cleared with WINDOW\_CLEAR.

The arithmetic division between the real and logical dimensions must be exact.

## **WINDOW\_SET\_TITLE**

Changes the title of the window.

output (text) WINDOW\_SET\_TITLE

- Parameters:
  - **text**: new window title

## **Clear**

## **WINDOW\_CLEAR**

Clears the window screen.

output (none) WINDOW\_CLEAR

- Parameters:
  - **none**: no parameters

The clear color is specified with `WINDOW_SET_CLEAR_COLOR_NAME` or `WINDOW_SET_CLEAR_COLOR_RGB`.

The default color is black.

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