CodyNick Python Reference

Python Library References used for CodyNick Advanced and CodyNick Advanced Pro

- Library Components
- Internal Functions
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Library Components

Internal Functions

Gadget Functions

RGB LED Matrix

Purpose Of This Page

This page explains how to control the 4 by 4 RGB LED Matrix on the CodyJoy Pro using Python.

By the end of this page, students will be able to:

- Turn on one RGB LED by LED number.
- Turn on one RGB LED by `(x, y)` coordinate.
- Use built-in color codes.
- Use RGB hex colors.
- Use RGB percentage colors.
- Clear all RGB LEDs.

CodyJoy Pro RGB LED Matrix

Figure 1 - CodyJoy Pro with the 4 by 4 RGB LED Matrix.

Start Code

Every CodyNick Python script should import the CodyNick library and connect to the CodyNick device.

```
import CodyNick


cn = CodyNick.CN()
```

The variable `cn` represents the connected CodyNick device. It is passed to the CodyNick functions so Python knows which device to control.

RGB LED Number Layout

The CodyJoy Pro RGB LEDs are numbered as shown below:

```
15  14  13  12
 8   9  10  11
 7   6   5   4
 0   1   2   3
```

Important positions:

- LED `0` is the bottom-left LED.

- LED `3` is the bottom-right LED.
- LED `15` is the top-left LED.
- LED `12` is the top-right LED.

Turn On One LED By Number

Use `RGB_Matrix.set()` to turn on one LED.

Function format:

```
CodyNick.RGB_Matrix.set(cn, led_number, color)
```

Example:

```
import CodyNick

cn = CodyNick.CN()

CodyNick.RGB_Matrix.set(cn, 15, "#FF0000")
```

This turns LED `15` red.

Another example:

```
CodyNick.RGB_Matrix.set(cn, 0, "#00FF00")
```

This turns LED `0` green.

Clear The RGB Matrix

Use `RGB_Matrix.clear()` to turn off all RGB LEDs.

```
CodyNick.RGB_Matrix.clear(cn)
```

Example:

```
import CodyNick
import time

cn = CodyNick.CN()

CodyNick.RGB_Matrix.set(cn, 15, "#FF0000")
time.sleep(1)
CodyNick.RGB_Matrix.clear(cn)
```

This turns LED `15` red for one second, then turns all LEDs off.

Built-In Color Codes

The easiest way to choose a color is to use one of the built-in color codes from `0` to `7`.

Code	Name	Hex
0	Red	`#FF0000`
1	Cyan	`#00FFFF`
2	Blue	`#0000FF`
3	Yellow	`#FFFF00`
4	Magenta	`#FF00FF`
5	Green	`#00FF00`
6	Orange	`#FF8000`
7	White	`#FFFFFF`

Example:

```
import CodyNick

cn = CodyNick.CN()

CodyNick.RGB_Matrix.set(cn, 15, 0)
```

This turns LED `15` red, because color code `0` means red.

RGB Hex Colors

Students can also use RGB hex colors.

An RGB hex color starts with `#` and has six hexadecimal characters:

```
"#RRGGBB"
```

`RR` controls red, `GG` controls green, and `BB` controls blue.

Common examples:

Color	Hex
Red	`#FF0000`
Green	`#00FF00`
Blue	`#0000FF`

Color	Hex
Cyan	`#00FFFF`
Yellow	`#FFFF00`
Magenta	`#FF00FF`
White	`#FFFFFF`

Example:

```
import CodyNick

cn = CodyNick.CN()

CodyNick.RGB_Matrix.set(cn, 12, "#00FFFF")
```

This turns LED `12` cyan.

RGB Percentage Colors

Students can also describe a color with red, green, and blue percentages.

Format:

```
[red_percent, green_percent, blue_percent]
```

Each number must be between `0` and `100`.

Examples:

Color Input	Meaning
`[100, 0, 0]`	100% red
`[0, 100, 0]`	100% green
`[0, 0, 100]`	100% blue
`[0, 100, 100]`	cyan
`[100, 100, 0]`	yellow
`[50, 0, 0]`	dim red

Example:

```
import CodyNick

cn = CodyNick.CN()
```

```
CodyNick.RGB_Matrix.set(cn, 10, [0, 100, 100])
```

This turns LED `10` cyan.

Coordinate Layout

Students can also control LEDs by `(x, y)` coordinate.

The bottom-left LED is `(0, 0)`.

The top-right LED is `(3, 3)`.

```
(0,3)  (1,3)  (2,3)  (3,3)
(0,2)  (1,2)  (2,2)  (3,2)
(0,1)  (1,1)  (2,1)  (3,1)
(0,0)  (1,0)  (2,0)  (3,0)
```

Use `RGB_Matrix.set_xy()` to control one LED by coordinate.

Function format:

```
CodyNick.RGB_Matrix.set_xy(cn, x, y, color)
```

Example:

```
import CodyNick

cn = CodyNick.CN()

CodyNick.RGB_Matrix.set_xy(cn, 0, 0, "#FF0000")
```

This turns the bottom-left LED red.

Another example:

```
CodyNick.RGB_Matrix.set_xy(cn, 3, 3, 2)
```

This turns the top-right LED blue, because color code `2` means blue.

Example: Four Corners

This example lights the four corner LEDs with different colors.

```
import CodyNick

cn = CodyNick.CN()

CodyNick.RGB_Matrix.clear(cn)

CodyNick.RGB_Matrix.set_xy(cn, 0, 0, 0)          # bottom-left red
CodyNick.RGB_Matrix.set_xy(cn, 3, 0, 5)          # bottom-right green
CodyNick.RGB_Matrix.set_xy(cn, 0, 3, 2)          # top-left blue
CodyNick.RGB_Matrix.set_xy(cn, 3, 3, "#FFFF00")  # top-right yellow
```

Example: Show All Built-In Colors

This example shows all eight built-in colors one by one.

```
import CodyNick
import time

cn = CodyNick.CN()

for color_code in range(8):
    CodyNick.RGB_Matrix.clear(cn)
    CodyNick.RGB_Matrix.set(cn, color_code, color_code)
    time.sleep(0.5)
```

In this loop, the LED number and the color code are both using `color_code`.

Example: Center LEDs

The center four LEDs are:

```
(1,2)  (2,2)
(1,1)  (2,1)
```

Example:

```
import CodyNick

cn = CodyNick.CN()

CodyNick.RGB_Matrix.clear(cn)
```

```
CodyNick.RGB_Matrix.set_xy(cn, 1, 1, "#FF0000")
CodyNick.RGB_Matrix.set_xy(cn, 2, 1, "#00FF00")
CodyNick.RGB_Matrix.set_xy(cn, 1, 2, "#0000FF")
CodyNick.RGB_Matrix.set_xy(cn, 2, 2, "#FFFFFF")
```

Practice Tasks

Try these exercises:

1. Turn on LED `0` in red.
2. Turn on LED `12` in blue.
3. Clear the matrix after two seconds.
4. Turn on all four corners with different colors.
5. Use `set_xy()` to light the center four LEDs.
6. Create a loop that moves one light from LED `0` to LED `15`.
7. Use percentage colors to make dim red, dim green, and dim blue.

Common Mistakes

Hex colors must be written as strings:

```
CodyNick.RGB_Matrix.set(cn, 0, "#FF0000")
```

This is not correct:

```
CodyNick.RGB_Matrix.set(cn, 0, #FF0000)
```

Color percentages must use numbers from `0` to `100`:

```
CodyNick.RGB_Matrix.set(cn, 0, [100, 50, 0])
```

Coordinates must be between `0` and `3`:

```
CodyNick.RGB_Matrix.set_xy(cn, 3, 3, 7)
```

This is outside the matrix:

```
CodyNick.RGB_Matrix.set_xy(cn, 4, 0, 7)
```

If old LEDs stay on, clear the matrix before drawing the next pattern:

```
CodyNick.RGB_Matrix.clear(cn)
```

Page summary:
The RGB LED Matrix can be controlled by LED number or by `(x, y)` coordinate. Colors can be written as built-in color codes, RGB hex values, or RGB percentage lists.

Joystick

Purpose Of This Page

This page explains how to read the CodyJoy Pro joystick using Python.

The CodyJoy Pro includes several built-in features, including:

- RGB LED Matrix.
- Joystick.
- Sound Maker.

This page focuses only on the joystick.

By the end of this page, students will be able to:

- Detect joystick direction.
- Detect joystick button clicks.
- Read all joystick states at once.
- Use joystick input inside a Python loop.

CodyJoy Pro with joystick

Figure 1 - CodyJoy Pro device. The board includes an RGB LED Matrix, joystick, and Sound Maker.

Start Code

Every CodyNick Python script should import the CodyNick library and connect to the CodyNick device.

```
import CodyNick


cn = CodyNick.CN()
```

The variable `cn` represents the connected CodyNick device.

Joystick Directions

The joystick can be moved in four main directions:

- Up
- Down
- Left
- Right

The joystick can also be pressed like a button. This is called a click.

Check One Direction

Use `Joystick.position()` to check one direction.

Function format:

```
CodyNick.Joystick.position(cn, direction)
```

The direction should be one of:

```
"up"
"down"
"left"
"right"
```

Example:

```
import CodyNick

cn = CodyNick.CN()

if CodyNick.Joystick.position(cn, "up"):
    print("Joystick is up")
```

This prints a message if the joystick is moved up.

Check For A Click

Use `Joystick.click()` to check whether the joystick button is pressed.

Function format:

```
CodyNick.Joystick.click(cn)
```

Example:

```
import CodyNick

cn = CodyNick.CN()

if CodyNick.Joystick.click(cn):
    print("Joystick clicked")
```

Read All Joystick States

Use `Joystick.states()` to read the current joystick state once.

Function format:

```
CodyNick.Joystick.states(cn)
```

This returns a list.

Examples of possible results:

Result	Meaning
`[]`	No direction or click
`["UP"]`	Joystick is moved up
`["DOWN"]`	Joystick is moved down
`["LEFT"]`	Joystick is moved left
`["RIGHT"]`	Joystick is moved right
`["CLICK"]`	Joystick button is pressed
`["UP", "CLICK"]`	Joystick is moved up and clicked

Example:

```
import CodyNick

cn = CodyNick.CN()

states = CodyNick.Joystick.states(cn)
print(states)
```

Example: Print Joystick Movement

This example continuously checks the joystick and prints the direction.

```
import CodyNick
import time

cn = CodyNick.CN()

while True:
    if CodyNick.Joystick.position(cn, "up"):
        print("up")
```

```
    if CodyNick.Joystick.position(cn, "down"):
        print("down")

    if CodyNick.Joystick.position(cn, "left"):
        print("left")

    if CodyNick.Joystick.position(cn, "right"):
        print("right")

    if CodyNick.Joystick.click(cn):
        print("click")

    time.sleep(0.1)
```

The `time.sleep(0.1)` line slows the loop down slightly. Without it, Python may print too many messages very quickly.

Example: Read Once Per Loop

For larger programs, it is often better to read the joystick once per loop using `states()`.

```
import CodyNick
import time

cn = CodyNick.CN()

while True:
    states = CodyNick.Joystick.states(cn)

    if "UP" in states:
        print("up")
    elif "DOWN" in states:
        print("down")
    elif "LEFT" in states:
        print("left")
    elif "RIGHT" in states:
        print("right")
    elif "CLICK" in states:
        print("click")
```

```
    time.sleep(0.1)
```

This style is useful when one program needs to react to different joystick actions.

Example: Count Button Clicks

This example counts how many times the joystick button is clicked.

```
import CodyNick
import time

cn = CodyNick.CN()

click_count = 0
was_clicked = False

while True:
    is_clicked = CodyNick.Joystick.click(cn)

    if is_clicked and not was_clicked:
        click_count = click_count + 1
        print("Clicks:", click_count)

    was_clicked = is_clicked
    time.sleep(0.05)
```

The variable `was_clicked` helps count one click at a time instead of counting the same press many times.

Function Summary

Function	Purpose	Example
`Joystick.position(cn, "up")`	Check if joystick is up	`if Joystick.position(cn, "up"):`
`Joystick.position(cn, "down")`	Check if joystick is down	`if Joystick.position(cn, "down"):`
`Joystick.position(cn, "left")`	Check if joystick is left	`if Joystick.position(cn, "left"):`
`Joystick.position(cn, "right")`	Check if joystick is right	`if Joystick.position(cn, "right"):`
`Joystick.click(cn)`	Check if joystick button is pressed	`if Joystick.click(cn):`
`Joystick.states(cn)`	Read all joystick states once	`states = Joystick.states(cn)`

Practice Tasks

Try these exercises:

1. Print `up` when the joystick is moved up.
2. Print all four directions when they happen.
3. Print `clicked` when the joystick button is pressed.
4. Count how many times the joystick is clicked.
5. Print the full list returned by `Joystick.states(cn)`.
6. Write a program that prints only when the direction changes.

Common Mistakes

Direction names must be lowercase when using `Joystick.position()`.

Correct:

```
CodyNick.Joystick.position(cn, "up")
```

Not correct:

```
CodyNick.Joystick.position(cn, "UP")
```

The result from `Joystick.states()` uses uppercase state names:

```
states = CodyNick.Joystick.states(cn)

if "UP" in states:
    print("up")
```

If the terminal prints too fast, add a short delay inside the loop:

```
time.sleep(0.1)
```

> **Page summary:**
> The joystick can be read by checking one direction, checking for a click, or reading all current states at once. Use `Joystick.states(cn)` when a program needs to make several decisions from one joystick reading.

Sound Maker (Buzzer)

Purpose Of This Page

This page explains how to play musical notes with the CodyJoy Pro Sound Maker using Python.

The CodyJoy Pro includes several built-in features, including:

- RGB LED Matrix.
- Joystick.
- Sound Maker.

This page focuses only on the Sound Maker.

By the end of this page, students will be able to:

- Play a musical note.
- Choose how long a note should play.
- Use sharp notes such as `F#2`.
- Use flat notes such as `Gb2`.
- Play a note and continue immediately.
- Play a note and wait until it is done.

CodyJoy Pro with Sound Maker

Figure 1 - CodyJoy Pro device. The board includes an RGB LED Matrix, joystick, and Sound Maker.

Start Code

Every CodyNick Python script should import the CodyNick library and connect to the CodyNick device.

```
import CodyNick


cn = CodyNick.CN()
```

The variable `cn` represents the connected CodyNick device.

Play A Note

Use `CJP_Sound_Maker.play()` to play a note.

Function format:

```
CodyNick.CJP_Sound_Maker.play(cn, note, duration_ms)
```

Example:

```
import CodyNick

cn = CodyNick.CN()

CodyNick.CJP_Sound_Maker.play(cn, "F#2", 300)
```

This plays note `F#2` for `300` milliseconds.

The program continues immediately after starting the sound.

Play Until Done

Use `CJP_Sound_Maker.play_until_done()` when Python should wait until the note is finished.

Function format:

```
CodyNick.CJP_Sound_Maker.play_until_done(cn, note, duration_ms)
```

Example:

```
import CodyNick

cn = CodyNick.CN()

CodyNick.CJP_Sound_Maker.play_until_done(cn, "C4", 500)
print("The note is finished")
```

This plays note `C4` for `500` milliseconds. The message is printed after the note is done.

Duration

The duration is written in milliseconds.

Common examples:

Duration	Meaning
`100`	0.1 second
`250`	0.25 second
`500`	0.5 second

Duration	Meaning
`1000`	1 second

Example:

```
CodyNick.CJP_Sound_Maker.play(cn, "A4", 1000)
```

This plays note `A4` for one second.

Sharp And Flat Notes

Sharp notes use `#`.

Example:

```
CodyNick.CJP_Sound_Maker.play(cn, "F#2", 300)
```

Flat notes use `b`.

Example:

```
CodyNick.CJP_Sound_Maker.play(cn, "Gb2", 300)
```

`F#2` and `Gb2` are the same pitch.

Example: Play A Short Melody

This example plays a short melody using `play_until_done()`.

```
import CodyNick

cn = CodyNick.CN()

CodyNick.CJP_Sound_Maker.play_until_done(cn, "C4", 250)
CodyNick.CJP_Sound_Maker.play_until_done(cn, "D4", 250)
CodyNick.CJP_Sound_Maker.play_until_done(cn, "E4", 250)
CodyNick.CJP_Sound_Maker.play_until_done(cn, "G4", 500)
```

Because `play_until_done()` waits, the notes play one after another.

Example: Melody With A Loop

This example stores notes in a list and plays them in a loop.

```
import CodyNick

cn = CodyNick.CN()

notes = ["C4", "D4", "E4", "F4", "G4", "A4", "B4", "C5"]

for note in notes:
    CodyNick.CJP_Sound_Maker.play_until_done(cn, note, 250)
```

This plays a simple scale from `C4` to `C5`.

Example: Continue Immediately

This example starts a note and immediately continues to the next line.

```
import CodyNick

cn = CodyNick.CN()

CodyNick.CJP_Sound_Maker.play(cn, "C5", 500)
print("This prints while the sound may still be playing")
```

Use `play()` when the program should continue immediately.

Use `play_until_done()` when the program should wait.

Function Summary

Function	Purpose	Example
`CJP_Sound_Maker.play(cn, note, duration_ms)`	Play and continue immediately	`play(cn, "F#2", 300)`
`CJP_Sound_Maker.play_until_done(cn, note, duration_ms)`	Play and wait until done	`play_until_done(cn, "C4", 500)`

Supported Notes

The Sound Maker supports notes from `B0` to `D#8`.

The table below shows the supported sharp-note notation and approximate frequencies.

Note	Hz	Note	Hz	Note	Hz	Note	Hz
B0	31	C1	33	C#1	35	D1	37
D#1	39	E1	41	F1	44	F#1	46
G1	49	G#1	52	A1	55	A#1	58

Note	Hz	Note	Hz	Note	Hz	Note	Hz
B1	62	C2	65	C#2	69	D2	73
D#2	78	E2	82	F2	87	F#2	93
G2	98	G#2	104	A2	110	A#2	117
B2	123	C3	131	C#3	139	D3	147
D#3	156	E3	165	F3	175	F#3	185
G3	196	G#3	208	A3	220	A#3	233
B3	247	C4	262	C#4	277	D4	294
D#4	311	E4	330	F4	349	F#4	370
G4	392	G#4	415	A4	440	A#4	466
B4	494	C5	523	C#5	554	D5	587
D#5	622	E5	659	F5	698	F#5	740
G5	784	G#5	831	A5	880	A#5	932
B5	988	C6	1047	C#6	1109	D6	1175
D#6	1245	E6	1319	F6	1397	F#6	1480
G6	1568	G#6	1661	A6	1760	A#6	1865
B6	1976	C7	2093	C#7	2217	D7	2349
D#7	2489	E7	2637	F7	2794	F#7	2960
G7	3136	G#7	3322	A7	3520	A#7	3729
B7	3951	C8	4186	C#8	4435	D8	4699
D#8	4978						

Practice Tasks

Try these exercises:

1. Play `C4` for `500` milliseconds.
2. Play `A4` for one second.
3. Play `F#2` for `300` milliseconds.
4. Play the same pitch using `Gb2`.
5. Create a list of notes and play them in a loop.
6. Write a short melody using at least five notes.
7. Compare `play()` and `play_until_done()` by printing a message after each function call.

Common Mistakes

Notes must be written as strings:

```
CodyNick.CJP_Sound_Maker.play(cn, "C4", 500)
```

This is not correct:

```
CodyNick.CJP_Sound_Maker.play(cn, C4, 500)
```

The duration is in milliseconds, not seconds:

```
CodyNick.CJP_Sound_Maker.play(cn, "C4", 1000)
```

This plays for one second.

Use `play_until_done()` when the next note should wait:

```
CodyNick.CJP_Sound_Maker.play_until_done(cn, "C4", 250)
CodyNick.CJP_Sound_Maker.play_until_done(cn, "D4", 250)
```

If `play()` is used for many notes in a row, later notes may start before earlier notes are finished.

> **Page summary:**
> The Sound Maker plays musical notes by name. Use `play()` to start a note and continue immediately, or use `play_until_done()` when Python should wait until the note is finished.

Seven Segment Display

Purpose Of This Page

This page explains how to show numbers on the CodyNick Seven Segment Display using Python.

The Seven Segment Display is useful for showing:

- Scores.
- Counts.
- Sensor values.
- Timer values.
- Simple numeric feedback.

By the end of this page, students will be able to:

- Display a positive number.
- Display a negative number.
- Display a decimal number.
- Update the displayed value inside a Python program.

CodyNick Seven Segment Display

Figure 1 - CodyNick Seven Segment Display for showing numeric values.

Start Code

Every CodyNick Python script should import the CodyNick library and connect to the CodyNick device.

```
import CodyNick


cn = CodyNick.CN()
```

The variable `cn` represents the connected CodyNick device.

Display A Number

Use `Seven_Segment.display()` to show a number.

Function format:

```
CodyNick.Seven_Segment.display(cn, value)
```

Example:

```
import CodyNick

cn = CodyNick.CN()

CodyNick.Seven_Segment.display(cn, 1234)
```

This displays `1234`.

Display A Negative Number

The display can show negative values.

Example:

```
import CodyNick

cn = CodyNick.CN()

CodyNick.Seven_Segment.display(cn, -123)
```

This displays `-123`.

Display A Decimal Number

The display can also show decimal values.

Example:

```
import CodyNick

cn = CodyNick.CN()

CodyNick.Seven_Segment.display(cn, 1.234)
```

This displays `1.234` if the value fits on the display.

Using Strings Or Numbers

The value can be passed as a number:

```
CodyNick.Seven_Segment.display(cn, 1234)
```

It can also be passed as a string:

```
CodyNick.Seven_Segment.display(cn, "1234")
```

Both examples display the same value.

Display Range

The display is designed for short numeric values.

Typical useful values are:

Type	Example
Positive integer	`1234`
Negative integer	`-123`
Decimal number	`1.234`
Small decimal	`-1.23`

Very large or very small values may not fit on the display.

In the CodyNick Python library, values outside the normal display range are treated as out of range.

Example: Count Up

This example counts from `0` to `9`.

```
import CodyNick
import time

cn = CodyNick.CN()

for number in range(10):
    CodyNick.Seven_Segment.display(cn, number)
    time.sleep(0.5)
```

The number changes every half second.

Example: Countdown

This example counts down from `5` to `0`.

```
import CodyNick
import time

cn = CodyNick.CN()
```

```
for number in range(5, -1, -1):
    CodyNick.Seven_Segment.display(cn, number)
    time.sleep(1)
```

The third value in `range(5, -1, -1)` means the loop counts down by `1`.

Example: Show Decimal Values

This example displays a few decimal values.

```
import CodyNick
import time

cn = CodyNick.CN()

values = [1.234, 2.5, 3.75, -1.23]

for value in values:
    CodyNick.Seven_Segment.display(cn, value)
    time.sleep(1)
```

Function Summary

Function	Purpose	Example
`Seven_Segment.display(cn, value)`	Display a number	`display(cn, 1234)`

Practice Tasks

Try these exercises:

1. Display `1234`.
2. Display `-123`.
3. Display `1.234`.
4. Count from `0` to `9`.
5. Count down from `9` to `0`.
6. Display a list of decimal values.
7. Create a timer that counts seconds.

Common Mistakes

The first argument must be the connected CodyNick device:

```
CodyNick.Seven_Segment.display(cn, 1234)
```

This is not correct:

```
CodyNick.Seven_Segment.display(1234)
```

If a value is too long, it may not appear as expected on the display.

Use short numeric values:

```
CodyNick.Seven_Segment.display(cn, 1234)
```

When using a loop, add a delay so each value can be seen:

```
time.sleep(0.5)
```

> **Page summary:**
> The Seven Segment Display shows short numeric values. Use `Seven_Segment.display(cn, value)` to display integers, negative numbers, or decimal numbers from Python.

Quick Reference Handbook

CodyNick Python Quick Reference Handbook

Start Code

```
import CodyNick


cn = CodyNick.CN()
```

`cn` is the connected CodyNick device object. Pass it as the first argument to CodyNick hardware functions.

RGB LED Matrix

Set One LED By Number

```
CodyNick.RGB_Matrix.set(cn, led, color)
```

Parameter	Description
`cn`	Connected CodyNick device
`led`	LED number from `0` to `15`
`color`	Color code `0..7`, RGB hex string, or RGB percentage list

Accepted `color` formats:

```
0
"#00FFFF"
[0, 100, 100]
```

Examples:

```
CodyNick.RGB_Matrix.set(cn, 15, 0)
CodyNick.RGB_Matrix.set(cn, 15, "#00FFFF")
CodyNick.RGB_Matrix.set(cn, 15, [0, 100, 100])
```

Set One LED By Coordinate

```
CodyNick.RGB_Matrix.set_xy(cn, x, y, color)
```

Parameter	Description
`cn`	Connected CodyNick device
`x`	Horizontal coordinate from `0` to `3`
`y`	Vertical coordinate from `0` to `3`
`color`	Color code `0..7`, RGB hex string, or RGB percentage list

Coordinate system:

```
(0,3)  (1,3)  (2,3)  (3,3)
(0,2)  (1,2)  (2,2)  (3,2)
(0,1)  (1,1)  (2,1)  (3,1)
(0,0)  (1,0)  (2,0)  (3,0)
```

Example:

```
CodyNick.RGB_Matrix.set_xy(cn, 0, 0, "#FF0000")
```

Clear All RGB LEDs

```
CodyNick.RGB_Matrix.clear(cn)
```

Turns off all RGB LEDs.

Built-In Color Codes

Code	Name	Hex
0	Red	`#FF0000`
1	Cyan	`#00FFFF`
2	Blue	`#0000FF`
3	Yellow	`#FFFF00`
4	Magenta	`#FF00FF`
5	Green	`#00FF00`
6	Orange	`#FF8000`

Code	Name	Hex
7	White	`#FFFFFF`

Joystick

Check One Direction

```
CodyNick.Joystick.position(cn, direction)
```

Parameter	Description
`cn`	Connected CodyNick device
`direction`	`"up"`, `"down"`, `"left"`, or `"right"`

Returns `True` or `False`.

Example:

```
if CodyNick.Joystick.position(cn, "up"):
    print("up")
```

Check Button Click

```
CodyNick.Joystick.click(cn)
```

Returns `True` when the joystick button is pressed.

Read All Current States

```
CodyNick.Joystick.states(cn)
```

Returns a list such as:

```
[]
["UP"]
["LEFT"]
["CLICK"]
["UP", "CLICK"]
```

Example:

```
states = CodyNick.Joystick.states(cn)
```

CJP Sound Maker

Play A Note And Continue

```
CodyNick.CJP_Sound_Maker.play(cn, note, duration_ms)
```

Parameter	Description
`cn`	Connected CodyNick device
`note`	Musical note from `B0` to `D#8`, such as `"C4"`, `"F#2"`, or `"Gb2"`
`duration_ms`	Duration in milliseconds

Example:

```
CodyNick.CJP_Sound_Maker.play(cn, "F#2", 300)
```

Play A Note And Wait Until Done

```
CodyNick.CJP_Sound_Maker.play_until_done(cn, note, duration_ms)
```

Same parameters as `play()`, but Python waits until the note is finished.

Example:

```
CodyNick.CJP_Sound_Maker.play_until_done(cn, "C4", 500)
```

Seven Segment Display

Display A Number

```
CodyNick.Seven_Segment.display(cn, value)
```

Parameter	Description
`cn`	Connected CodyNick device
`value`	Number or numeric string to show

Examples:

```
CodyNick.Seven_Segment.display(cn, 1234)
CodyNick.Seven_Segment.display(cn, -123)
CodyNick.Seven_Segment.display(cn, 1.234)
```

Motion Detection

Detect Motion

```
CodyNick.Motion_Detection.detect(cn)
```

Parameter	Description
`cn`	Connected CodyNick device

Returns:

```
True
False
```

Example:

```
if CodyNick.Motion_Detection.detect(cn):
    print("motion detected")
```

Connection Control

Close The Connection

```
cn.close()
```

Closes the serial connection to the CodyNick device.

> **Quick summary:**
> Use `RGB_Matrix` for RGB LEDs, `Joystick` for joystick input, `CJP_Sound_Maker` for notes, `Seven_Segment` for numeric output, and `Motion_Detection` for PIR motion sensing.