

What is an Accelerometer in CPX?

The **accelerometer** is a **motion sensor** built inside the Circuit Playground Express (CPX). It detects **movement** and **tilt** in **three directions (axes)**:

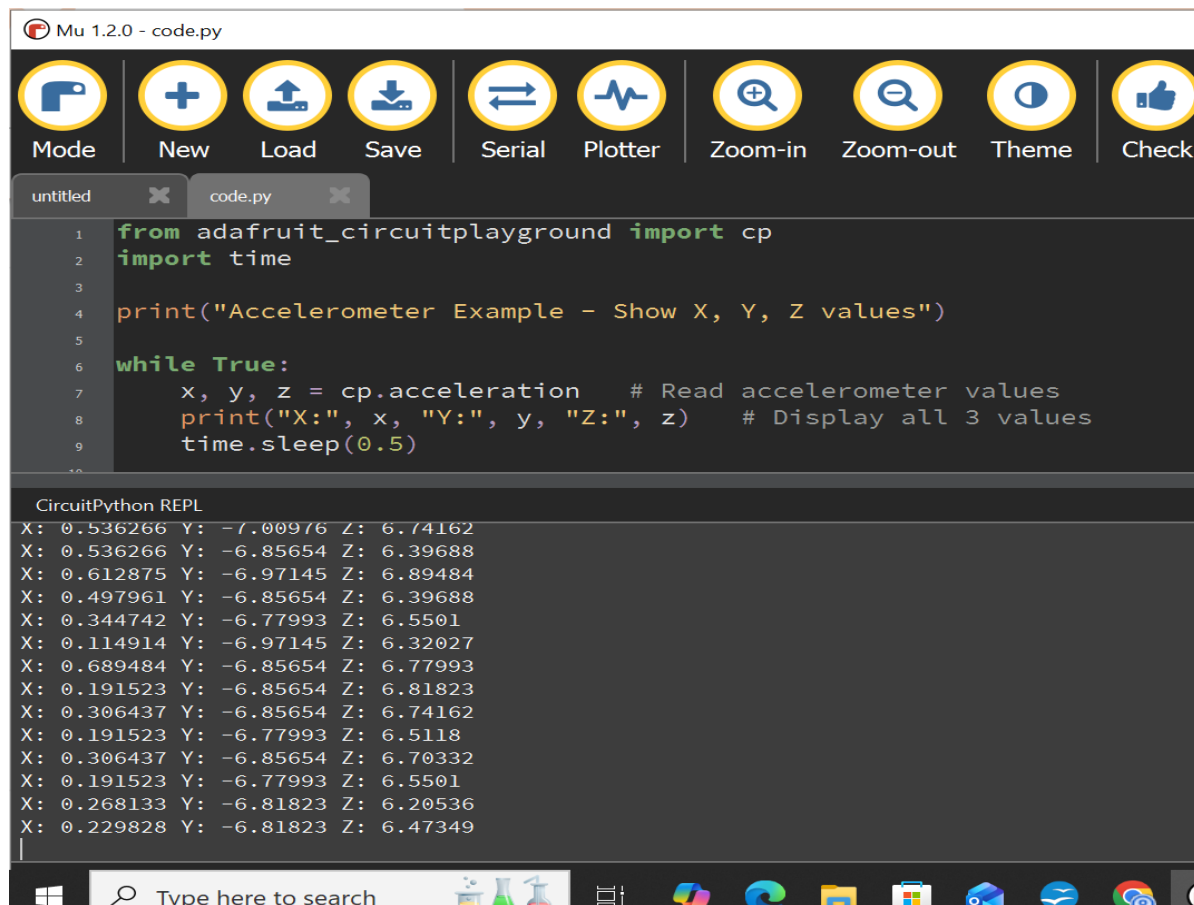
Axis	Detects Movement	Example
X-axis	Left ↔ Right	Tilt the board left or right
Y-axis	Forward ↔ Backward	Tilt up or down
Z-axis	Up ↔ Down (gravity)	Detects if the board is flat or facing up/down

So, when you tilt or move the CPX, the accelerometer gives **values** for each direction. These values change continuously depending on how the board moves.

How Tilt Detection Works

- The accelerometer senses the **force of gravity** acting on each axis.
- When the board is **flat**, $Z \approx +9.8$ (gravity), and $X, Y \approx 0$.
- When you **tilt left/right**, the **X value** increases or decreases.
- When you **tilt forward/backward**, the **Y value** changes.
- You can use these changing values to **detect tilt direction or motion**.

Example Program: Display X, Y, Z Values



The screenshot shows the Mu 1.2.0 IDE interface. The top toolbar includes icons for Mode, New, Load, Save, Serial, Plotter, Zoom-in, Zoom-out, Theme, and Check. Below the toolbar, there are two tabs: 'untitled' and 'code.py'. The 'code.py' tab is active, displaying the following Python code:

```
1 from adafruit_circuitplayground import cp
2 import time
3
4 print("Accelerometer Example - Show X, Y, Z values")
5
6 while True:
7     x, y, z = cp.acceleration # Read accelerometer values
8     print("X:", x, "Y:", y, "Z:", z) # Display all 3 values
9     time.sleep(0.5)
```

Below the code editor, the 'CircuitPython REPL' window shows the output of the program, displaying a series of X, Y, and Z acceleration values:

```
X: 0.536266 Y: -7.00976 Z: 6.74162
X: 0.536266 Y: -6.85654 Z: 6.39688
X: 0.612875 Y: -6.97145 Z: 6.89484
X: 0.497961 Y: -6.85654 Z: 6.39688
X: 0.344742 Y: -6.77993 Z: 6.5501
X: 0.114914 Y: -6.97145 Z: 6.32027
X: 0.689484 Y: -6.85654 Z: 6.77993
X: 0.191523 Y: -6.85654 Z: 6.81823
X: 0.306437 Y: -6.85654 Z: 6.74162
X: 0.191523 Y: -6.77993 Z: 6.5118
X: 0.306437 Y: -6.85654 Z: 6.70332
X: 0.191523 Y: -6.77993 Z: 6.5501
X: 0.268133 Y: -6.81823 Z: 6.20536
X: 0.229828 Y: -6.81823 Z: 6.47349
```

The bottom of the screen shows the Windows taskbar with the search bar and various application icons.

Step-by-Step Explanation

Step 1:

```
from adafruit_circuitplayground import cp
```

Imports the CPX library to use built-in sensors.

Step 2:

```
x, y, z = cp.acceleration
```

Reads the **accelerometer values** for X, Y, and Z axes.

Step 3:

```
print("X:", x, "Y:", y, "Z:", z)
```

Displays the live sensor readings in the console (REPL).

Step 4:

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

Adds a small delay so values don't update too fast.

Result

When you run this code:

- Keep CPX flat $\rightarrow Z \approx +9.8, X \text{ \& } Y \approx 0$
- Tilt left/right $\rightarrow X$ value changes
- Tilt forward/back $\rightarrow Y$ value changes

You can watch the printed numbers changing as you move the board!