香港教育大學
The Education University of Hong Kong

FACULTY OF LIBERAL ARTS AND SOCIAL SCIENCES
博文及社會科學學院

科學與環境學系
Department of Science and Environmental Studies

2023-2024 Quality Education Fund Thematic Network - Tertiary Institutes

STEAM Education with Self-directed and Progressive Learning of Engineering Design Process for Problem-solving

透過STEAM教育自主及循序漸進學習以工程設計流程解難

Micro:bit Test for Parachute

九龍婦女福利會李炳紀念學校

Acceleration

Get the acceleration value (milli g-force) in one of three dimensions, or the combined force in all directions (x, y, and z).

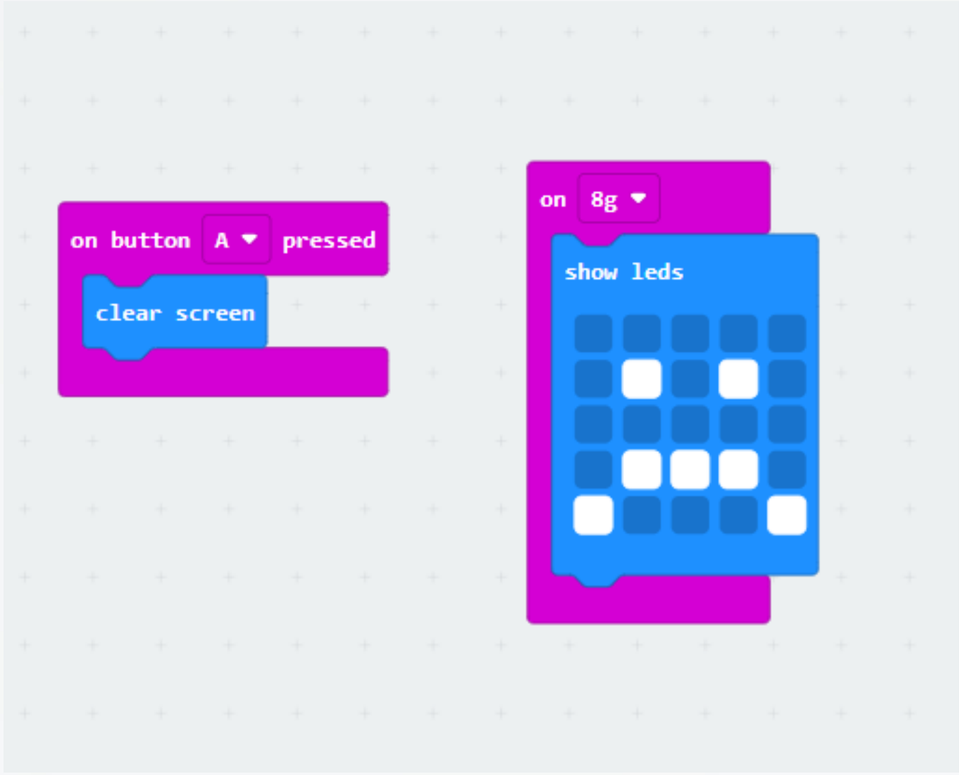
Find the acceleration of the micro:bit (how fast it is speeding up or slowing down).

Behind the MakCode Hardware: Accelerometer

https://youtu.be/byngcwjO51U

Use Micro:bit to replace Egg Drop

From Microsoft MakeCode



Function: Easy to make code

Limitation: difficult to explain why 8g should be the standard

8g= eight time gravitational acceleration

重力加速度(g)是一個物體僅受重力作用的情況下所具有的加速度。

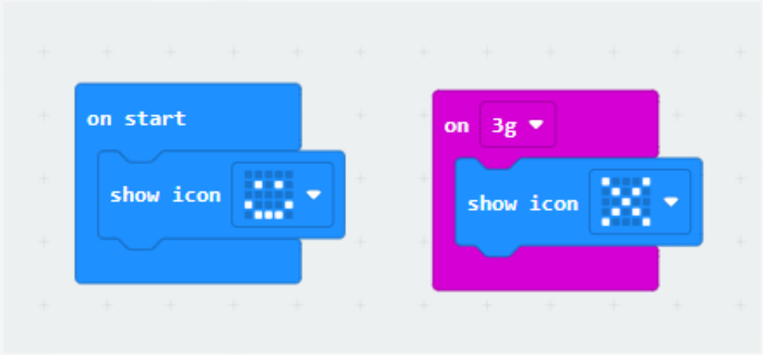
References:

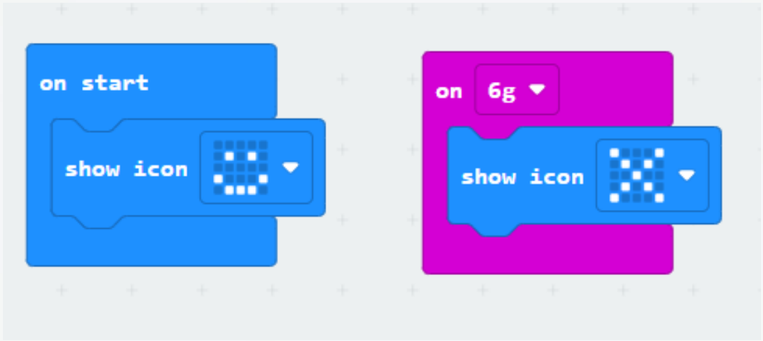
Microsoft MakeCode (2020). Science Experiments 06 Egg Drop. https://youtu.be/tnDJFdC3Nd4?si=URZNVs7akd1IX6rY

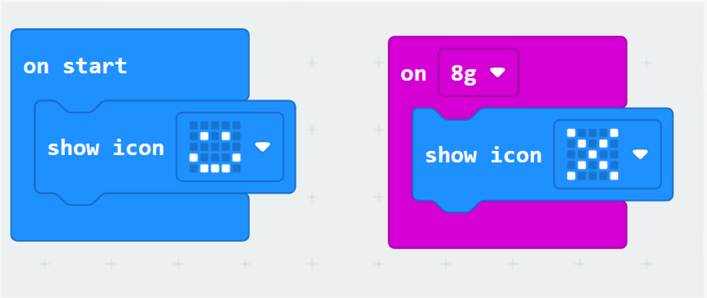
Use Micro:bit to replace Egg Drop

From Microsoft MakeCode

On 3g, 6g, 8g







Use Micro:bit to replace Egg Drop

Tried the test using radio (two micro:bits)- (problem with using radio - not sure if the receiver micro:bit did receive the signal each time successfully)

Drop on 2(m)					
3g	✗	☺	✗	✗	✗
8g	☺	☺	✗	☺	☺

Drop on 2(m) with the parachute					
3g	☺	✗	✗	☺	✗

Drop on 1/F with the parachute					
3g	✗	☺	✗	✗	✗
6g	☺	☺	✗	☺	☺

Drop on 2/F		
3g	☺	✗
6g	✗	✗
8g	☺	☺

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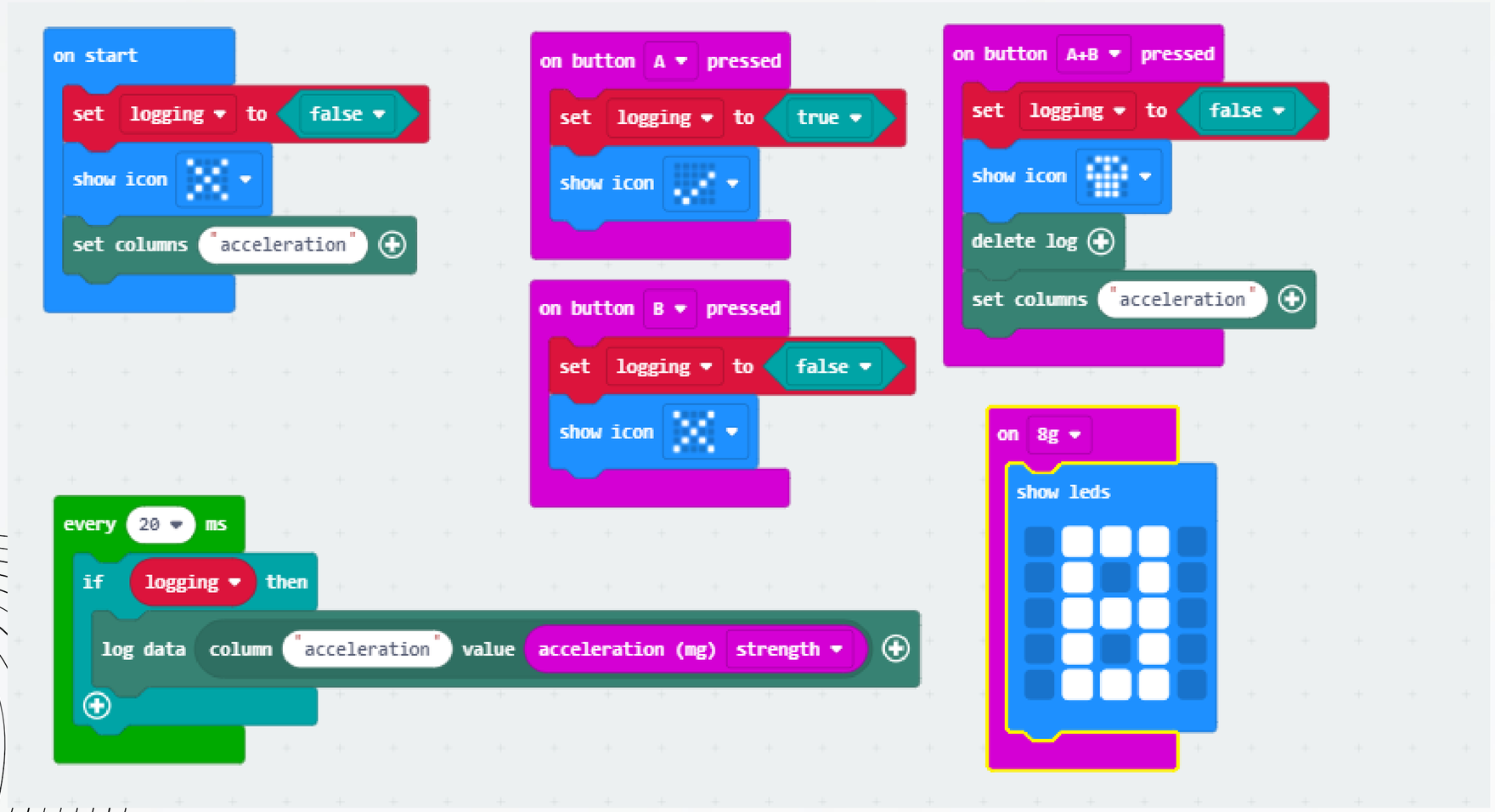
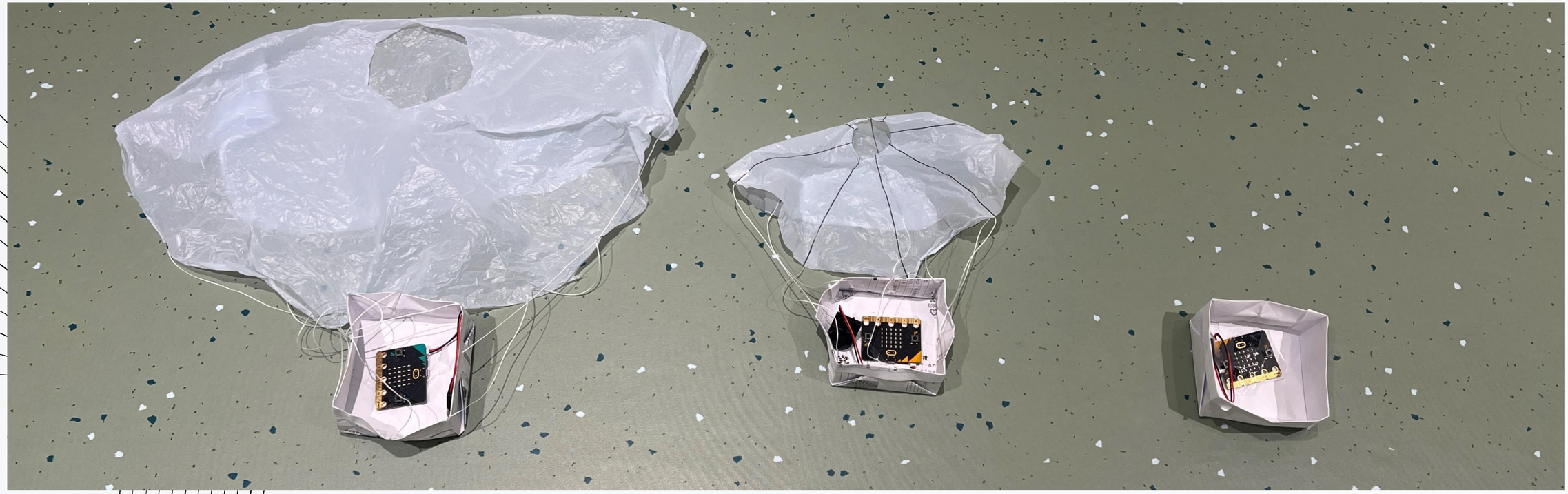
Acceleration with strength

To understand the connection between the coding for acceleration with strength and "on 8g"

From Microsoft MakeCode



Drop with a) big parachute, b) small parachute and c) without parachute (from one floor upper)



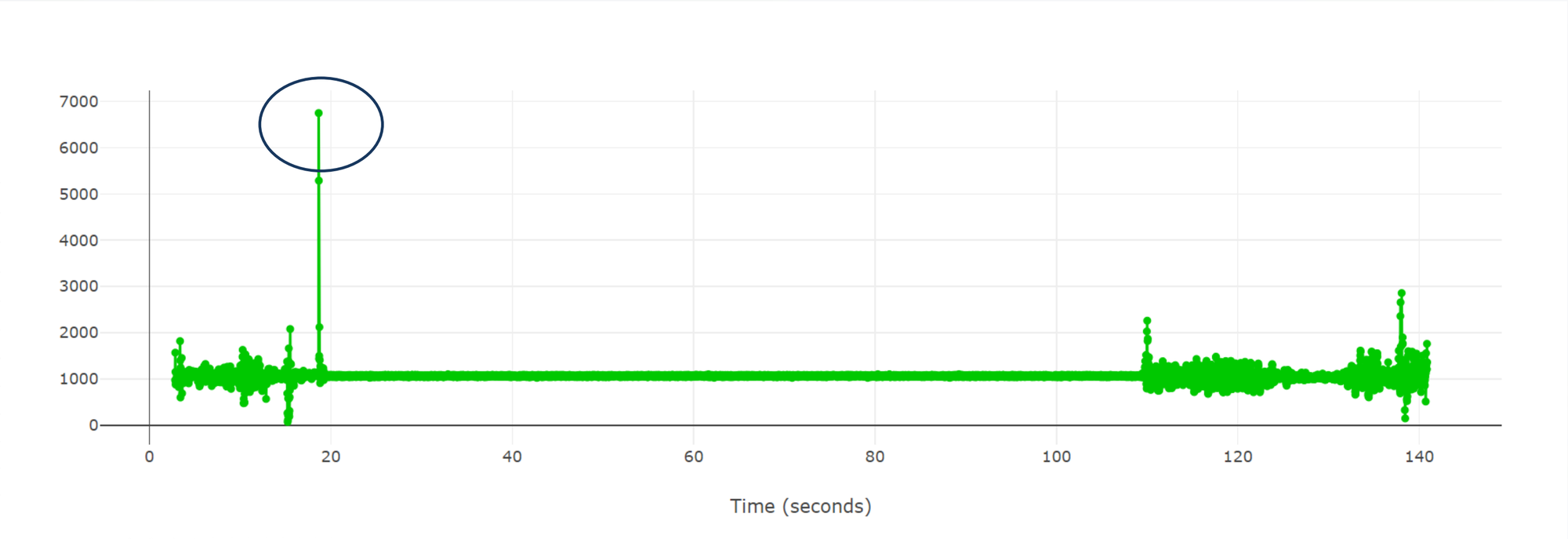
Test Results

Test 1a: drop with big parachute	Pass ☺
Test 1b: drop with small parachute	Fail
Test 1c: drop without parachute	Fail
Test 2a: drop with big parachute	Pass ☺
Test 2b: drop with small parachute	Fail
Test 2c: drop without parachute	Fail
Test 2d: drop without parachute	Fail (micro:bit disconnected)

Test 1a

< 8g

Drop with big parachute

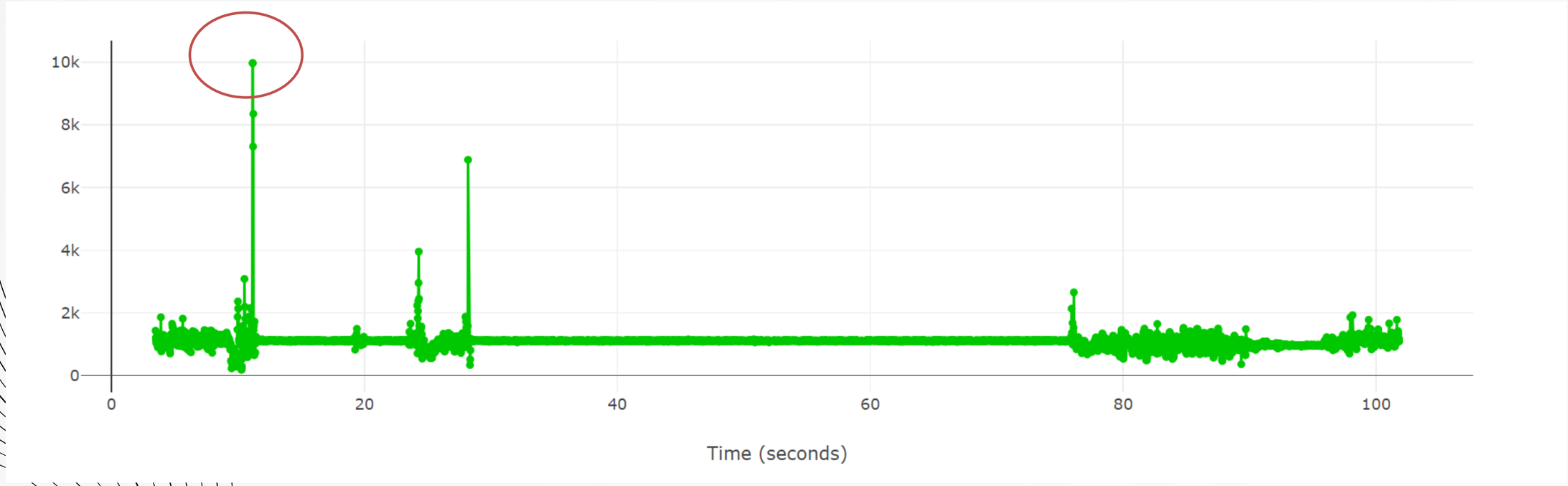


☺ Pass

Test 1b

Drop with small parachute (8g)

> 8g

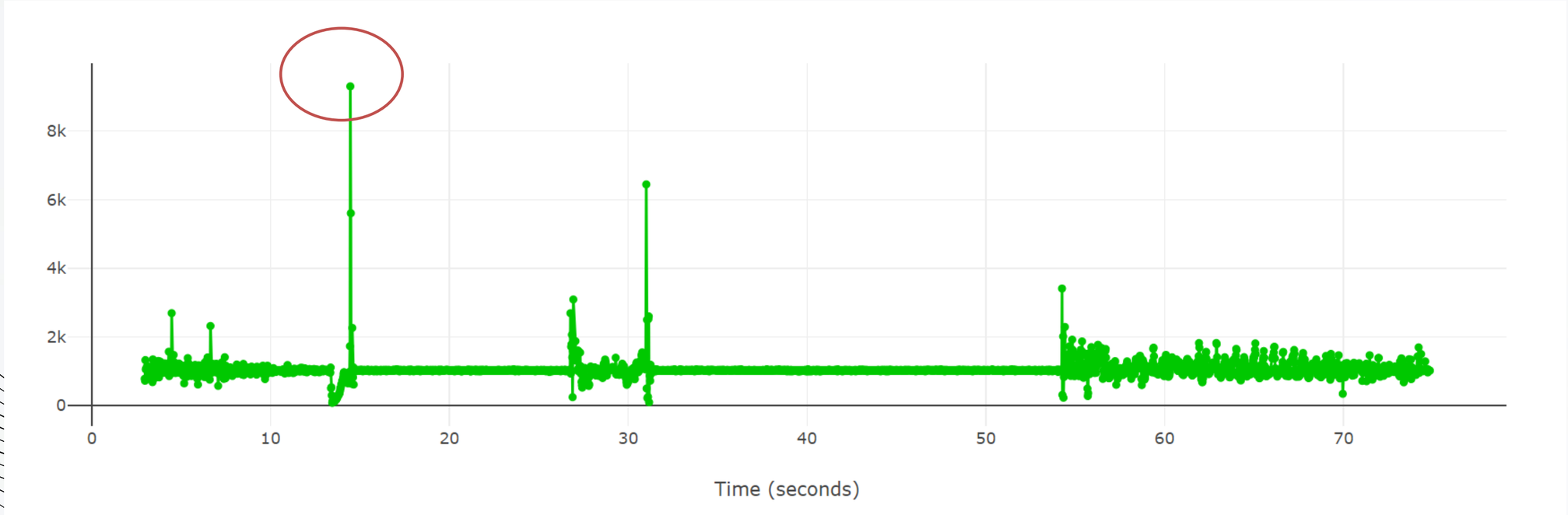


Fail

Test 1c

Without parachute (Green)

> 8g

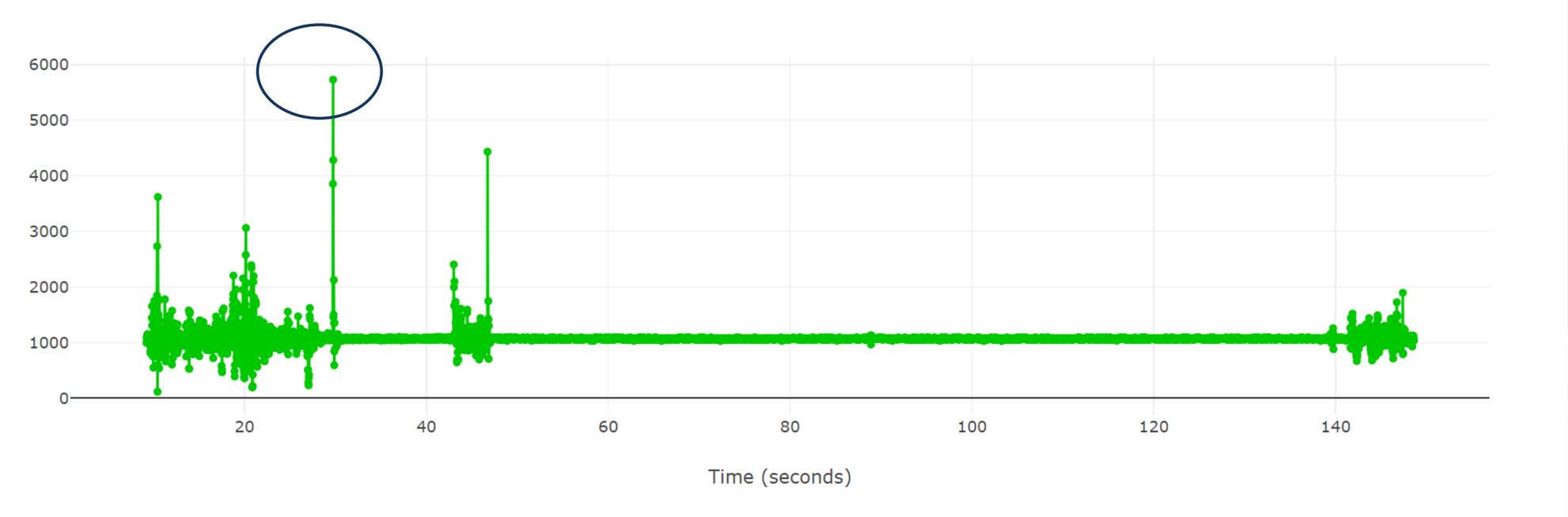


Fail

Test 2a

With parachute (big)

< 8g

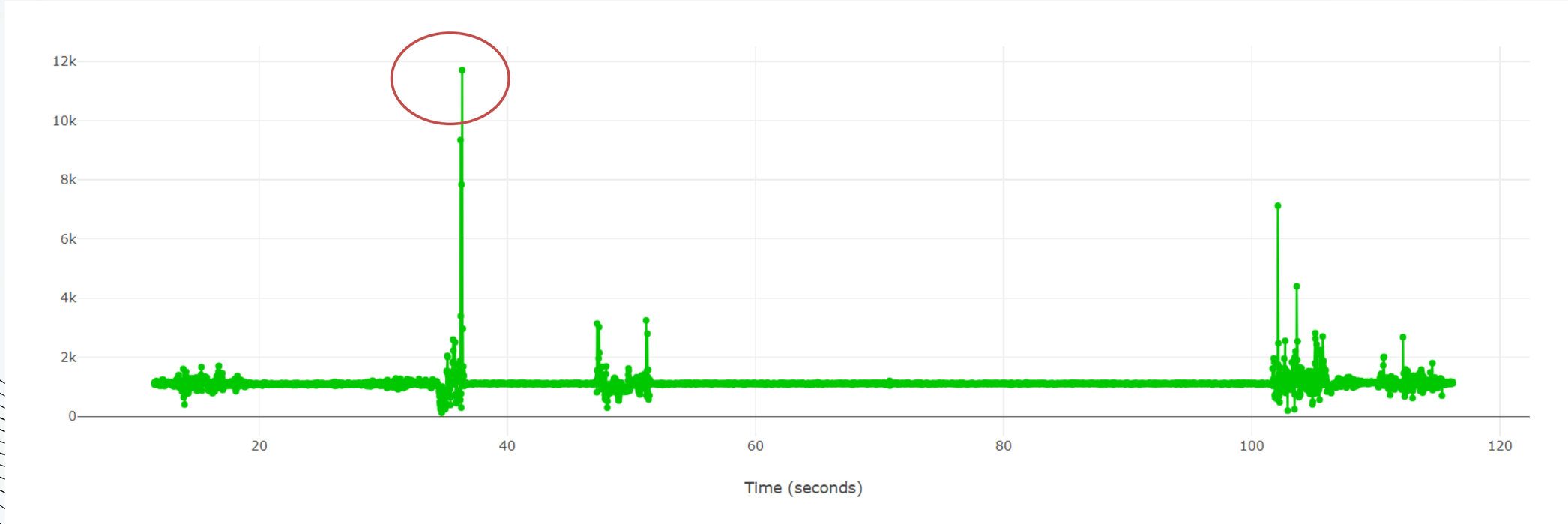


☺ Pass

Test 2b

With parachute (small)

> 8g

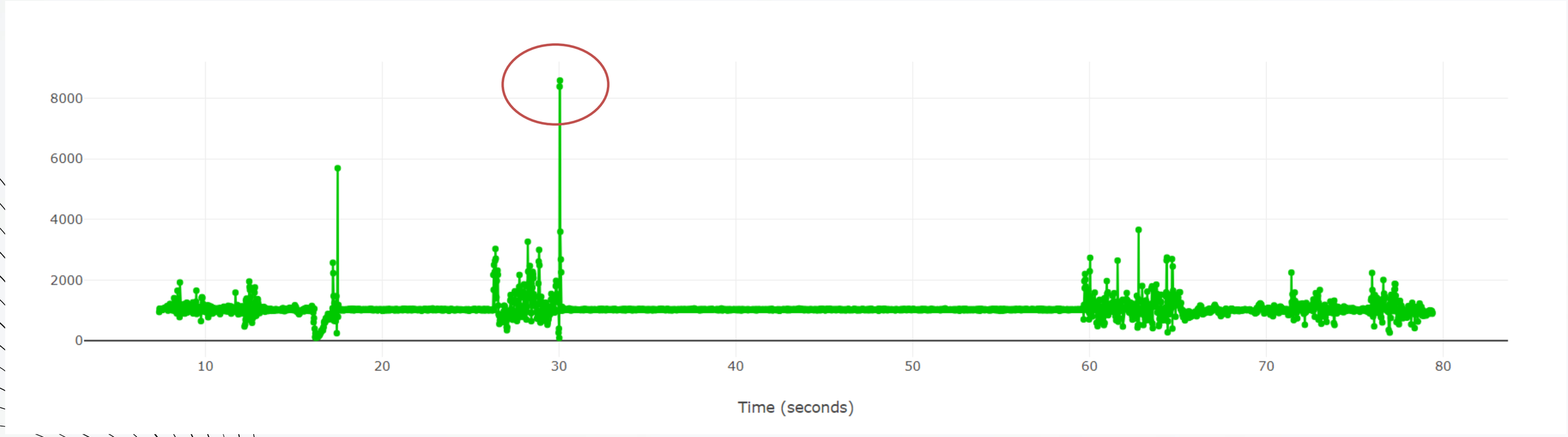


Fail

Test 2c

Without parachute

> 8g

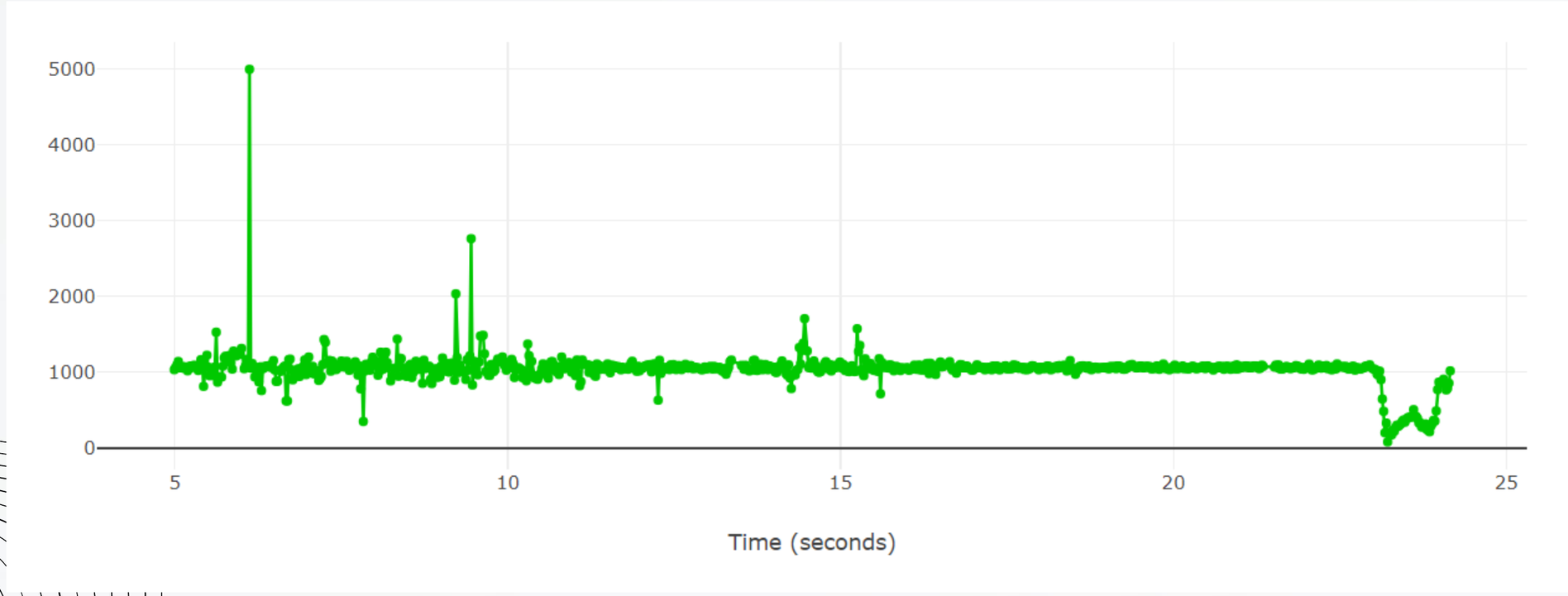


Fail

Test 2d

Without parachute

the micro:bit was disconnected



Fail

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Coding for students-
using Micro:bit to replace Egg Drop

From Microsoft MakeCode