

Hardware Software Platforms Project Presentation

Helmet Impact Force Monitor

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Schedule

1. Introduction
2. Materials used
3. Configuration of the Raspberry 2
4. The circuit
5. Results
6. Improvements

Introduction

Objective :

Measure the force of the impact handled by a body during a fall.

How measure the force ?

Using an accelerometer we measure the G force exerted on the body.

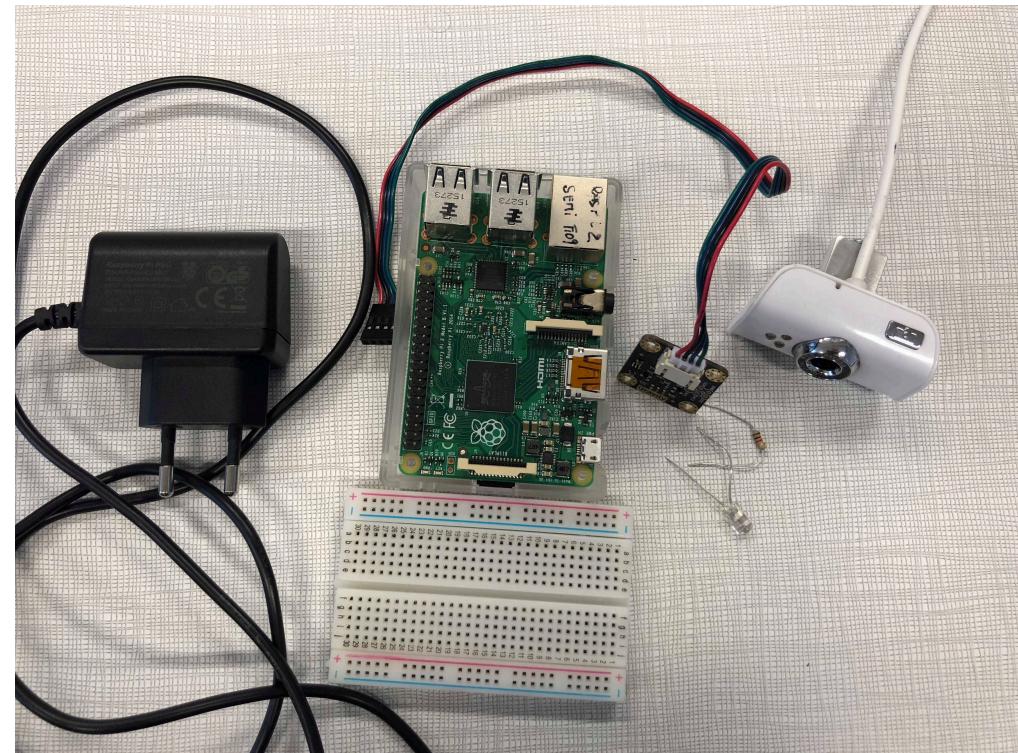
Interpretation ?

If the G-force > 9G → Fatal

If 4G<the G-force < 6G → Dangerous

Material used

- Raspberry Pi
- Power cable
- MicroSD card with NOOBS OS installed on it
- Accelerometer : LISD2H
- Red LED
- Resistor : $1\text{k}\Omega$
- Jumper wires
- Breadboard
- USB camera



Configuration of the Raspberry PI 2

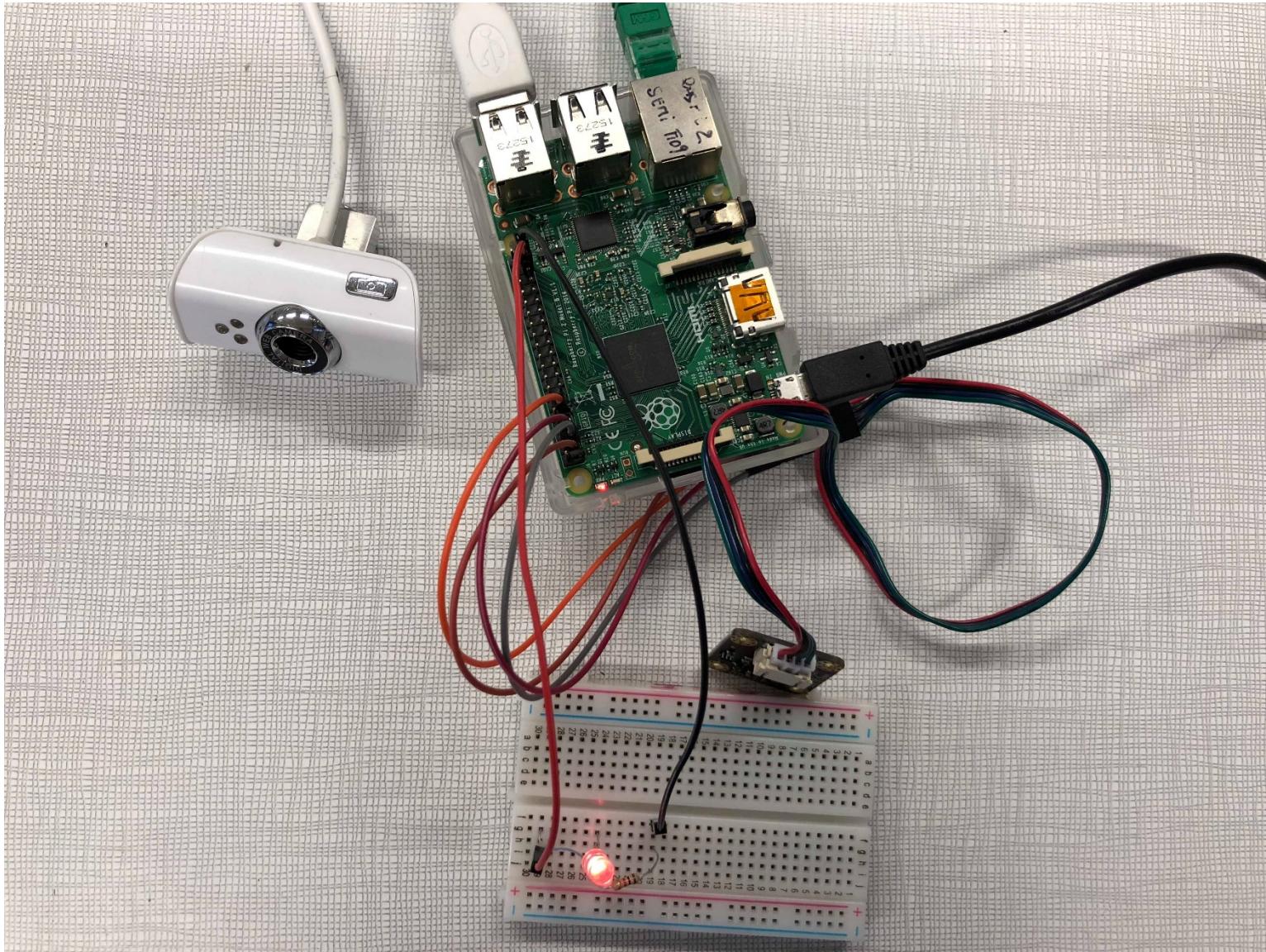
1. Enable SSH and I2C
2. Find the IP adresse using IP Tracker
3. Control the Raspberry Pi using Putty
4. Download the code on the Rapsberry Pi using FileZilla

The circuit

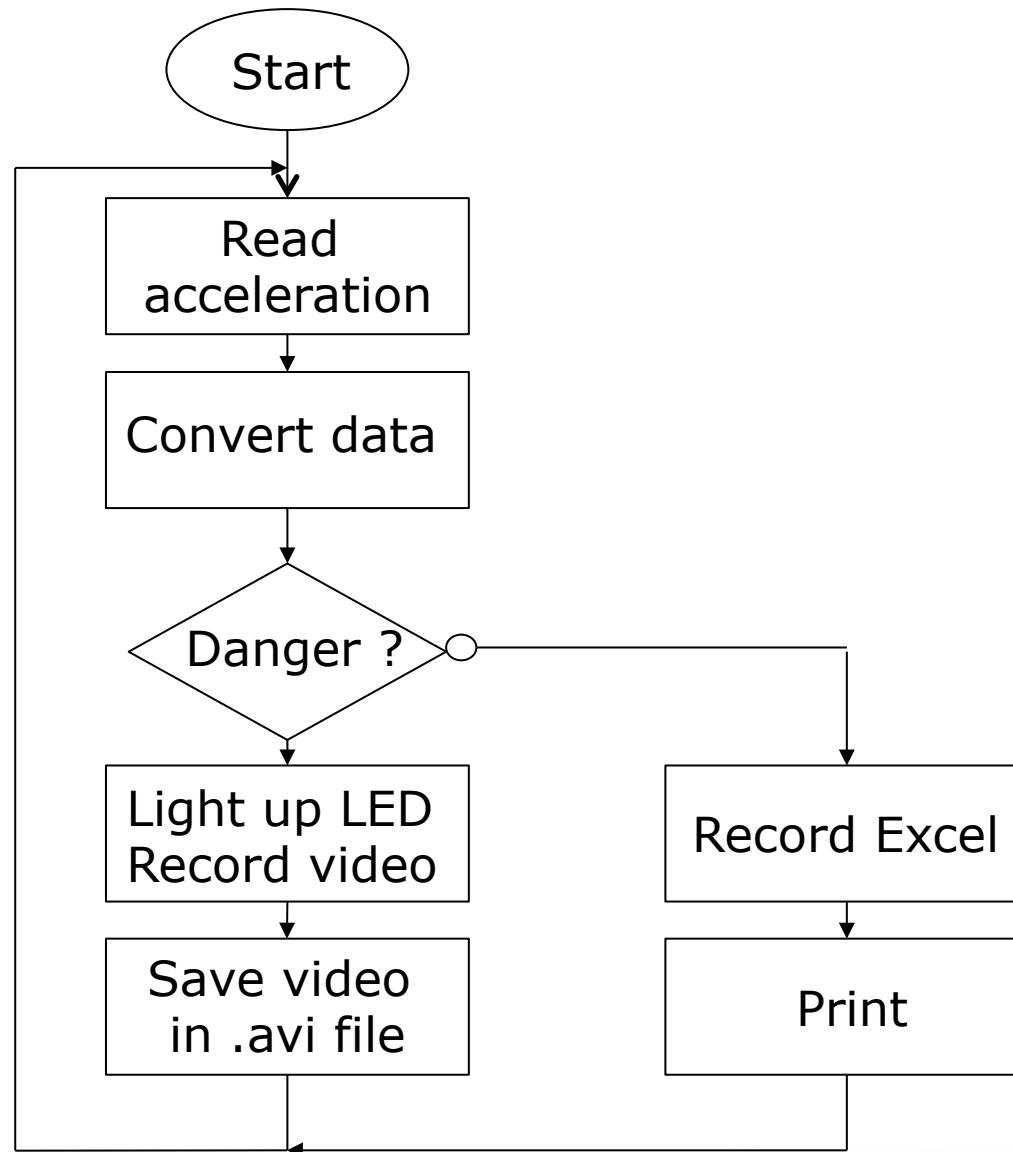


Physical Pins						
GPIO#	2nd func	pin#	pin#	2nd func	GPIO#	
N/A	+3V3	1	2	+5V	N/A	
GPIO2	SDA1 (I2C)	3	4	+5V	N/A	
GPIO3	SCL1 (I2C)	5	6	GND	N/A	
GPIO4	GCLK		8	TXDO (UART)	GPIO14	
N/A	GND	9	10	RXD0 (UART)	GPIO15	
GPIO17	GEN0	11	12	GEN1	GPIO18	
GPIO27	GEN2	13	14	GND	N/A	
GPIO22	GEN3	15	16	GEN4	GPIO23	
N/A	+3V3	17	18	GEN5	GPIO24	
GPIO10	MOSI (SPI)	19	20	GND	N/A	
GPIO9	MISO (SPI)	21	22	GEN6	GPIO25	
GPIO11	SCLK (SPI)	23	24	CE0_N (SPI)	GPIO8	
N/A	GND	25	26	CE1_N (SPI)	GPIO7	
EEPROM	ID_SD	27	28	ID_SC	EEPROM	
GPIO5	N/A	29	30	GND	N/A	
GPIO6	N/A	31	32	-	GPIO12	
GPIO13	N/A	33	34	GND	N/A	
GPIO19	N/A	35	36	N/A	GPIO16	
GPIO26	N/A	37	38	N/A	GPIO20	
N/A	GND	39	40	N/A	GPIO21	

The circuit



Blocks diagram



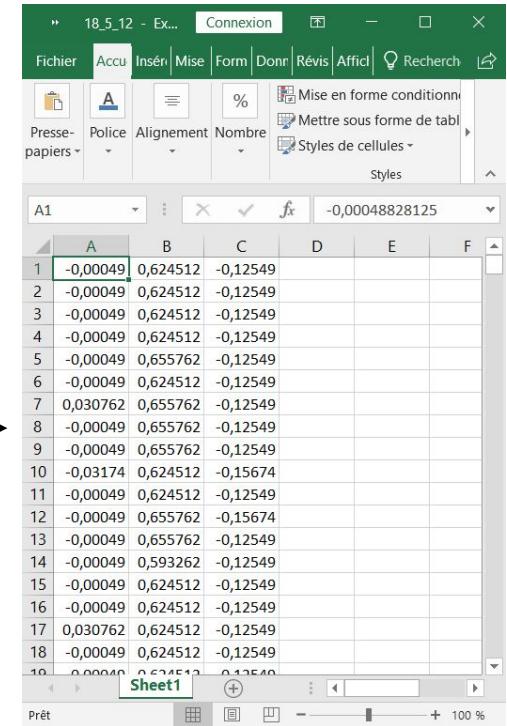
Improvements

1. Output on Excel

Modification of the code to import the results on Excel

```
AllSensorData - Bloc-notes
Fichier Edition Format Affichage ?
Wed Apr 18 14:45:36 2018      x: 0.06201171875      y: 0.62451171875
8      x: 0.09326171875      y: 0.65576171875      z: -0.0942382125
.62451171875      z: -0.03173828125Wed Apr 18 14:45:41 2018      x: -0
z: 1.37451171875Wed Apr 18 14:45:44 2018      x: 2.90576171875
d Apr 18 14:45:47 2018      x: -0.25048828125      y: 0.53076171875
4:45:49 2018      x: -0.21923828125      y: 0.53076171875      z: -0
x: 0.53076171875      y: 0.03076171875      z: -0.34423828125Fri 1
25      y: -0.31298828125      z: -0.28173828125Fri May 11 11:20:31 2018
1.21923828125      z: -0.25048828125Fri May 11 11:20:33 2018      x: -0
6171875Fri May 11 11:20:36 2018 x: 0.62451171875      y: 0.24951171875
0.62451171875      y: 0.24951171875      z: 0.09326171875Fri May 11 11
12548828125      z: 0.59326171875Fri May 11 11:31:15 2018      x: 0
701171875Fri May 11 11:33:11 2018      x: 0.62451171875      y: -0
:14 2018      x: 1.12451171875      y: 0.12451171875      z: -0
8      x: 3.90576171875      y: 2.24951171875      z: -0.6879882125
00048828125      z: 0.40576171875Fri May 11 13:55:24 2018      x: 0
1875Fri May 11 13:55:33 2018      x: 0.53076171875      y: 0.03076171875
2018      x: 0.49951171875      y: -0.00048828125      z: 0.37451171875
018      x: -0.00048828125      y: 0.65576171875      z: 0.18701171875
: 0.62451171875 z: 0.12451171875Fri May 11 13:58:43 2018      x: -0
```

Before/after

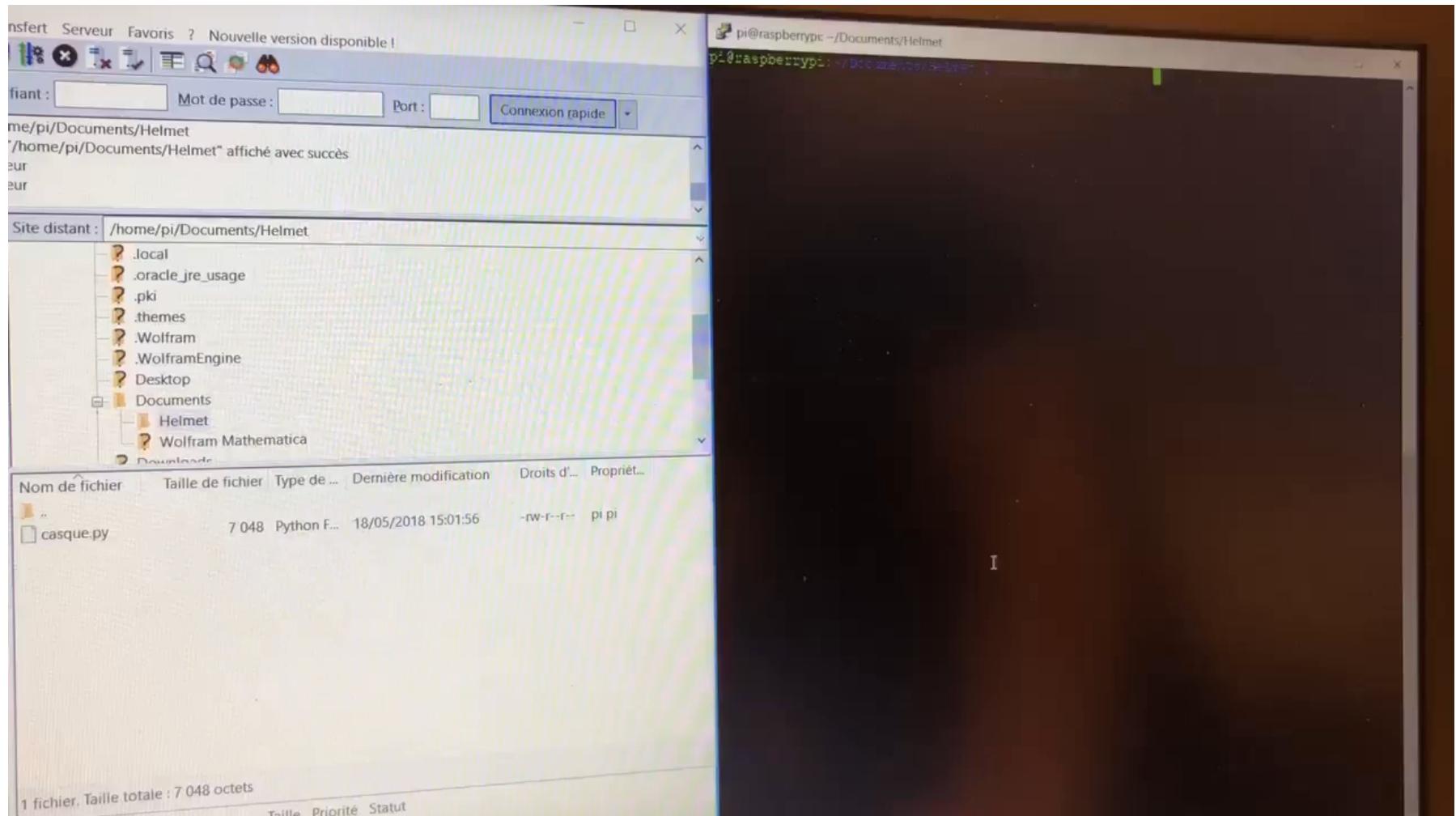


The screenshot shows a Microsoft Excel spreadsheet titled "18_5_12 - Ex...". The data consists of three columns: A, B, and C. Column A contains numerical values starting from -0,00049 and increasing by 0,00049 up to 0,00040. Column B contains values 0,624512, 0,624512, 0,624512, ..., 0,624512. Column C contains values -0,12549, -0,12549, -0,12549, ..., -0,12549. The table has 19 rows, with row 19 being the last visible row. The formula bar at the top shows the formula =-0,00048828125.

A	B	C
-0,00049	0,624512	-0,12549
-0,00049	0,624512	-0,12549
-0,00049	0,624512	-0,12549
-0,00049	0,624512	-0,12549
-0,00049	0,655762	-0,12549
-0,00049	0,624512	-0,12549
0,030762	0,655762	-0,12549
-0,00049	0,655762	-0,12549
-0,00049	0,655762	-0,12549
-0,03174	0,624512	-0,15674
-0,00049	0,624512	-0,12549
-0,00049	0,655762	-0,15674
-0,00049	0,655762	-0,12549
-0,00049	0,593262	-0,12549
-0,00049	0,624512	-0,12549
-0,00049	0,624512	-0,12549
0,030762	0,624512	-0,12549
-0,00049	0,624512	-0,12549
-0,00040	0,624512	-0,12549

Improvements

2. Installation of a camera



Improvements

2. Installation of a camera

