

TunEd'CubeSat1

Training Project based on Experimental Launches

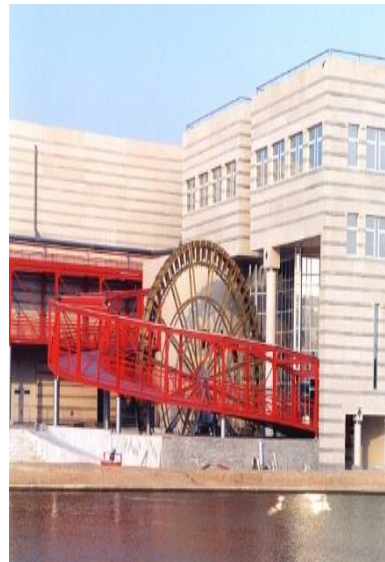
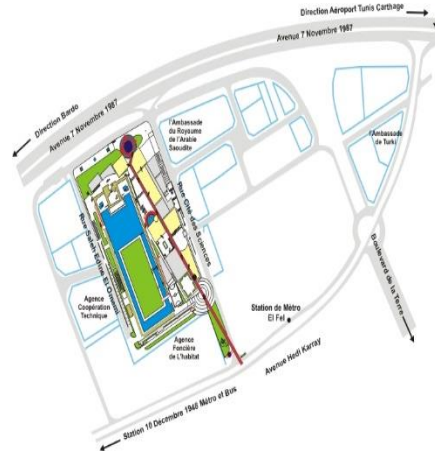
Imen Titouhi
Chief Scientific Mediator

Tunis Science City in Tunisia

Tunis Science City in Tunisia

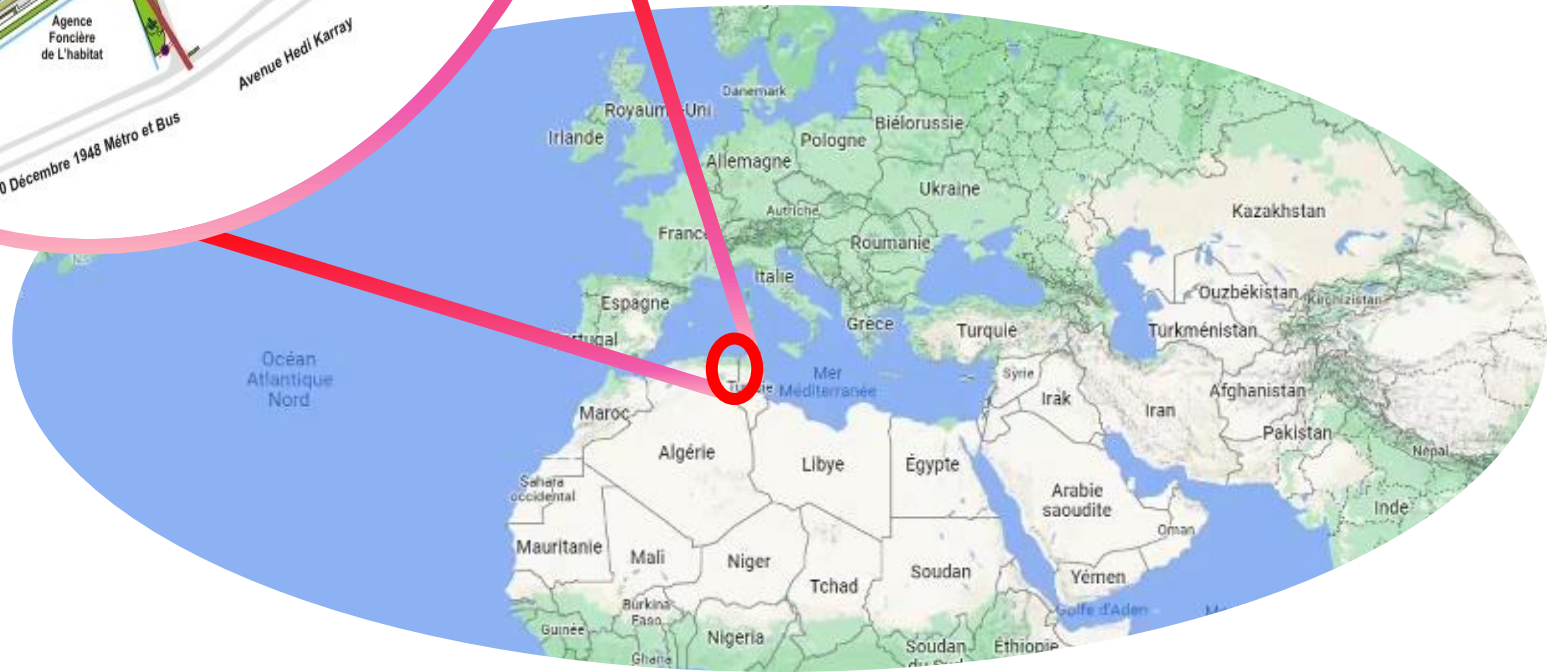
A science museum whose main mission is:

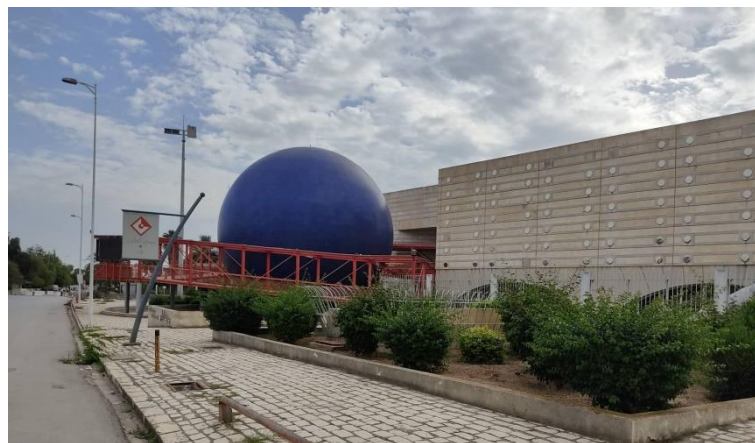
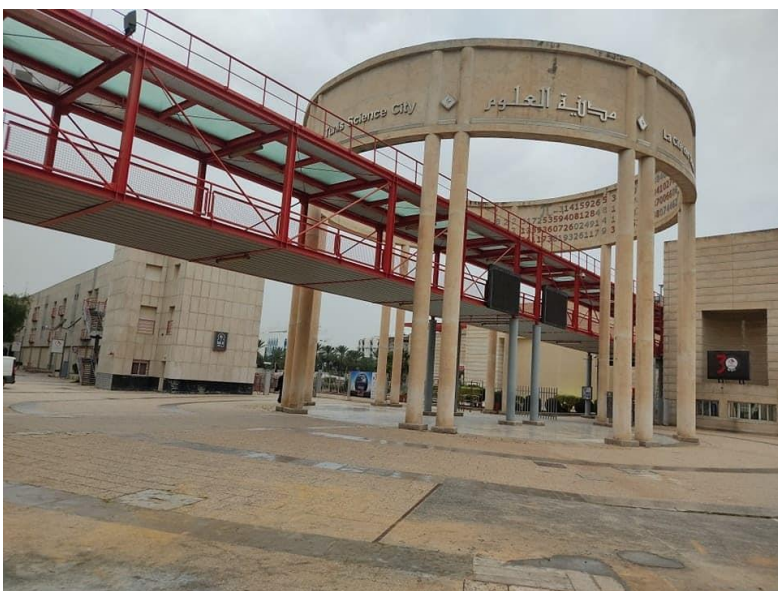
- ❖ To make science an inspiring experience.
- ❖ to understand scientific and technological innovations.
- ❖ To disseminate scientific and technological culture throughout the Tunisian territory.



Situation

Tunis Sciences City extends over 6ha, built around the remains of a basin called the Abou Fehr basin, built in the 13th century by Abdallah Al Moustancer Al Hafsi, second ruler of the Hafside dynasty (1249-1277).



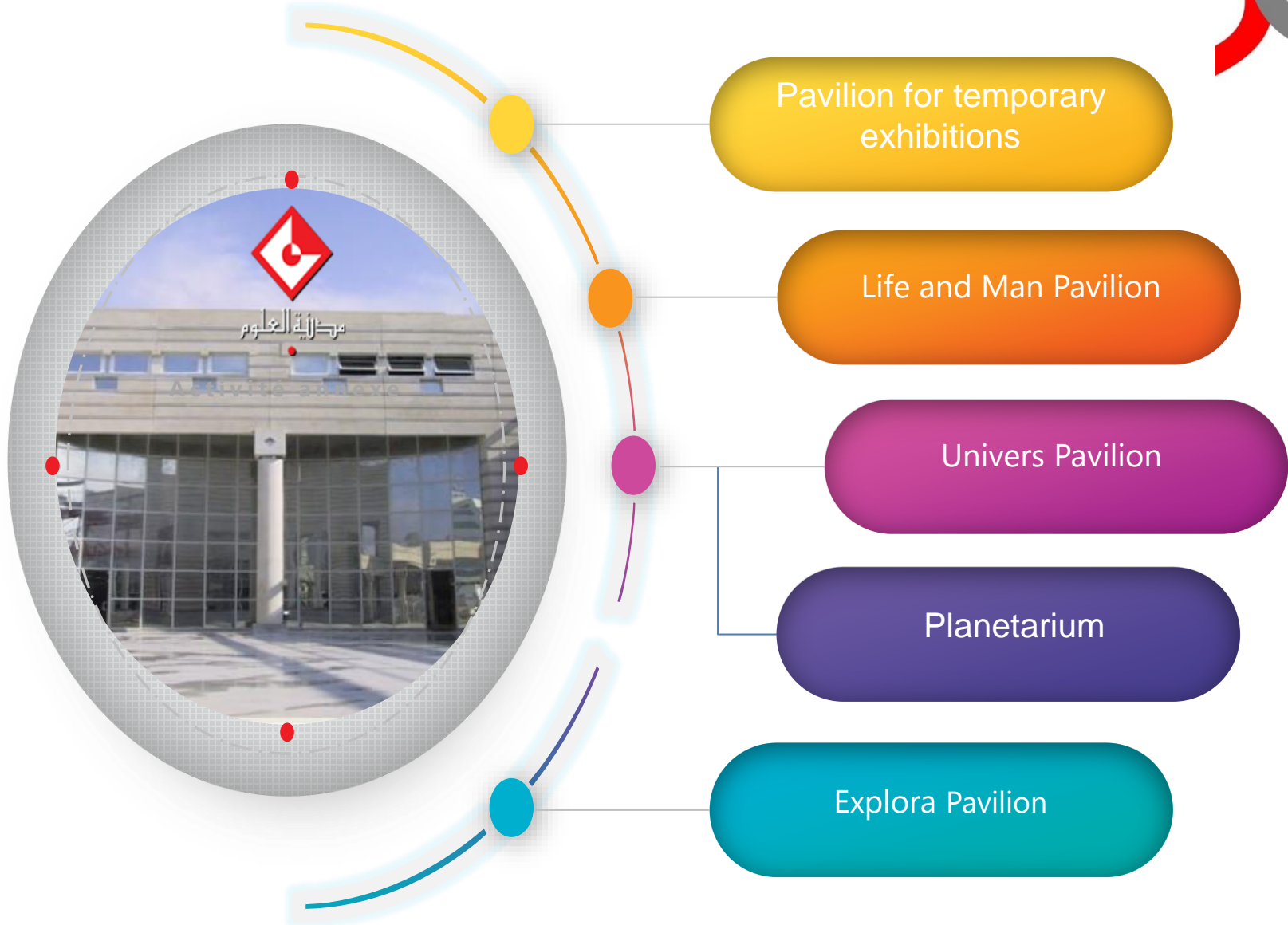




Tunis Science City in Tunisia



Exhibition halls



Univers Service



Univers Pavilion

Planetarium



activités

science UA1 nuit itinérances Temporaires

- Astronomical shows at the planetarium
- Guided tours in the pavilion
- workshops
- Astronomical evenings
- Lectures about astronomical phenomena
- training
- Le NASE cours.
- Summer schools
- International days



INTRODUCTION

La nuit des étoiles 2018 un rendez-vous exceptionnel à la Cité des Sciences à Tunis

A la tombée de la nuit du 27 juillet 2018, nous aurons la chance d'observer deux événements astronomiques : une superbe éclipse totale de Lune et un très beau rapprochement de la planète Mars. L'éclat de cette planète sera magnifiquement coloré, car le reflet de la lumière solaire sur sa surface « rouillée » acquiert une intense dominante rouge orangée.

PROGRAMME

Place d'Honneur

19h00 Accueil

19h30 Mot de bienvenue et présentation du programme

The night stars

المقدمة

ليلة النجوم 2018 موعد استثنائي بمدينة العلوم بتونس
خلال تظاهرة ليلة النجوم يوم الجمعة 27 جويلية 2018، سيكون الحظ حليفنا لمشاهدة ظاهرتين فلكيتين، سنشاهد خسوفاً كلياً رانعا للقمر وكذلك اقتراب كوكب المريخ من الأرض. سيكون كوكب المريخ في أقصى لمعانه حيث أن أشعة الشمس ستعكس على سطحه الصدي ليظهر في حلة حمراء برتقالية.

البرنامج

الساحة الشرفية

19:00 الاستقبال

19:30 كلمة الترحاب وتقديم البرنامج

19:45 موسيقى: أداء على الكمان "تأملات" للعازف محمد الغربي

20:00 فداوي فلكي مع الحكواتية رائدة قريمازي

20:30 موسيقى: أداء على الكمان "تأملات" للعازف محمد الغربي

21:00 مداخلات علمية حول الخسوف وكوكب المريخ

21:30 موسيقى: أداء على الكمان "تأملات" للعازف محمد الغربي

مشاهدة قمة الخسوف

22:00 محاضرة الدكتور عصام حجي الباحث بوكالة الفضاء NASA "الهبوط النهائي لمهمة روزينا

"Rosetta

نقاش





World space week



مملكة العلوم

Journée de l'Espace

Samedi
27 Octobre
2018

PROGRAMME

Conférences
Auditorium Al Khawarizmi

11h00 - 12h00
Nanosatellites :
la révolution des CubeSats.
Pr. Kamel BESSES, Directeur du Centre de
Recherche en Microélectronique et Nanotechnologie
de Sousse

12h00 - 13h00
La stratégie spatiale en Tunisie
Pr. Zohra Lili Chabaane, Télédétection, SIG et gestion des ressources en
eau, Département Génie Rural, des Eaux et Forêts à l'INAT, Directrice du
LR17AGR01 / GREEN-TEAM (LR- Gestion intégrée des Ressources
Naturelles : Télédétection, Analyse spatiale et Modélisation)

13h00 - 13h30 Discussion

Ateliers Scientifiques
Salle Sciences et Actualités

10h30 - 11h30 Les fusées : Action et réaction.
Tunisian Association of Young Astronomers (TAYA)


11h30 - 12h30 Les satellites artificiels : Orbites et missions.
M. Riadh BEN NESSIB (CST)

Expositions : Hall du Centre des Congrès du 27/10 au 04/11/2018

1. L'espace comment ça marche
2. Promenade au fil des ondes

www.cst.rnu.tn

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Rue la Cité des Sciences, Tunis 1082
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الهاتف: 00 216 71 766 000 - الفاكس: 00 216 71 767 777
البريد الإلكتروني: medina.sciences@cst.rnu.tn



TUNIS SCIENCE CITY

Journée Mondiale de L'ESPACE

PROGRAMME

14h00 à 15h10
Activité 1 : les satellites artificiels : orbites et missions.
Activité 2 : les missions actives sur la planète Mars

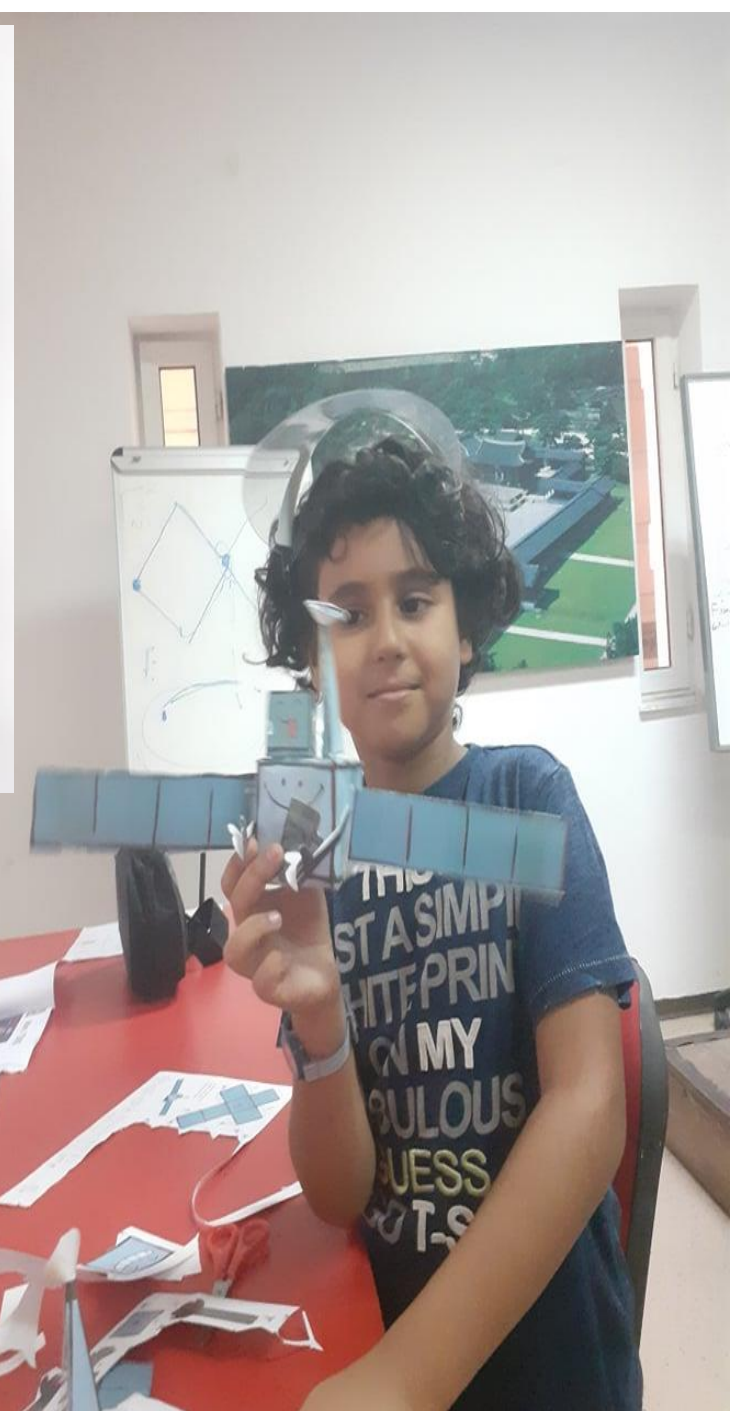
15h 10 à 15h30
Activité 3 : Projection de Film « 50 ans d'espace »

15h30 à 17h15
Activité 4 : La station spatiale internationale ISS.
Activité 5 : Le positionnement par satellites GPS.

Samedi 09 octobre 2021
Salle kawarizmi
à la Cité des Sciences à Tunis

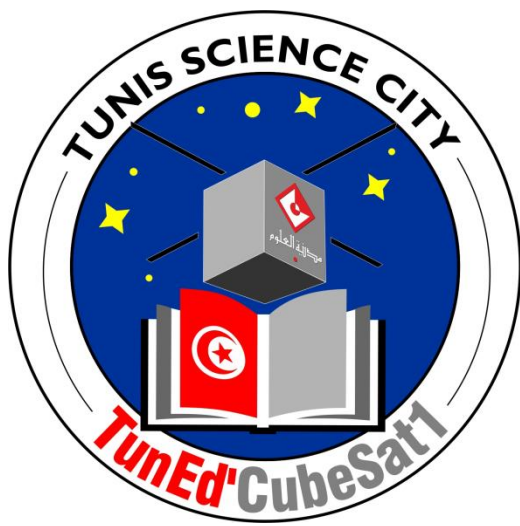
www.cst.rnu.tn

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Space for kids





TunEd'CubeSat1

Training Project based on Experimental Launches

Tunis Science City in Tunisia

TunEd'CubeSat1



TunEd'CubeSat1 satellites :

- EDUCATIONAL tools.
- For non-commercial purposes
- They will not be ORBITED.
- They will instead be launched using helium balloons.
- The satellites will be reused later for training sessions.

IN ORDER TO:

- Explore an exciting career in space and STEM.
- Learn about satellites.
- Understand the basic principles of orbital systems.
- Learn engineering and electronic components.
- Cover the fundamentals of environmental research, collaboration and teamworking.



November 14, 2022

Materiel Reception

December 23, 2022

Training

March 17, 2023

Launch of the satellite

November 14, 2022

Materiel Reception





الجمهورية التونسية

وزارة التعليم العالي
والبحوث العلميّة



China Children & Youth Science Center



COMSAT
九天微星



China's support

Satellite kits

- ◆ 2 sets of sounding satellites
- ◆ 8 sets of tethered satellites

Training support

Live Training Classes (online)

- ◆ Introduction to Cube Satellite and Recoverable Satellite
- ◆ Sounding satellite assembly guidance
- ◆ Sharing and Q&A

Others

Science knowledge and other learning material, such as,

- ◆ Dimensions and classification of satellites
- ◆ Satellite components
- ◆ Development History and applications of the CubeSat



Sounding satellites



Tethered satellites



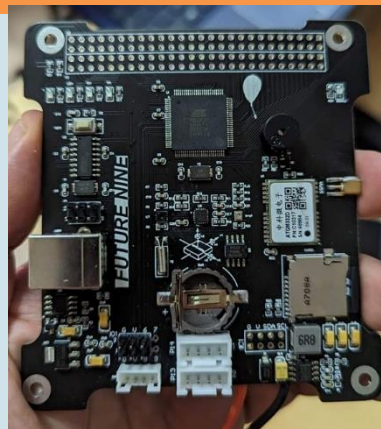
- ◆ 2 sets of sounding satellites
- ◆ 8 sets of tethered satellites



Sounding Satellite box

Control card:

- Humidity sensor
- Temperature sensor
- Pressure sensor
- Gyroscope



6 batteries rechargeables

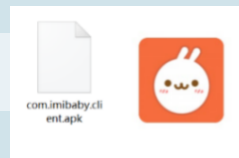
GoPro Cam



GPS Antenna



Antenna for transmitting and receiving data



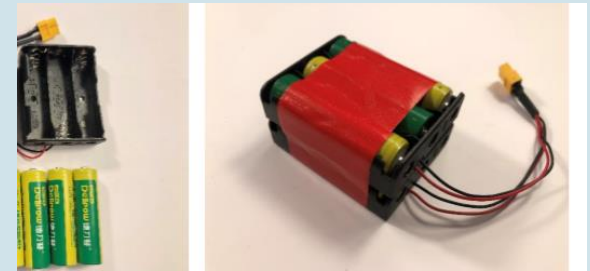
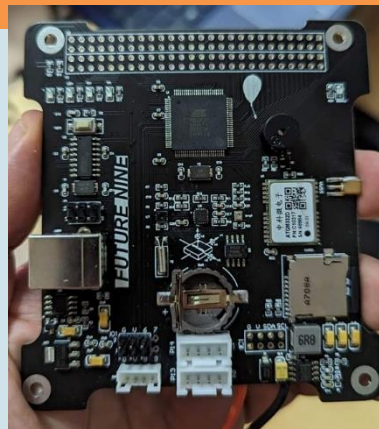
GPS Swatch



Tethered Satellite box

Control card:

- Humidity sensor
- Temperature sensor
- Pressure sensor
- Gyroscope



3 batteries rechargeables

FPV Cam with a separate communication system

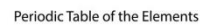


FPV screen

GPS Antenna



Antenna for transmitting and receiving data

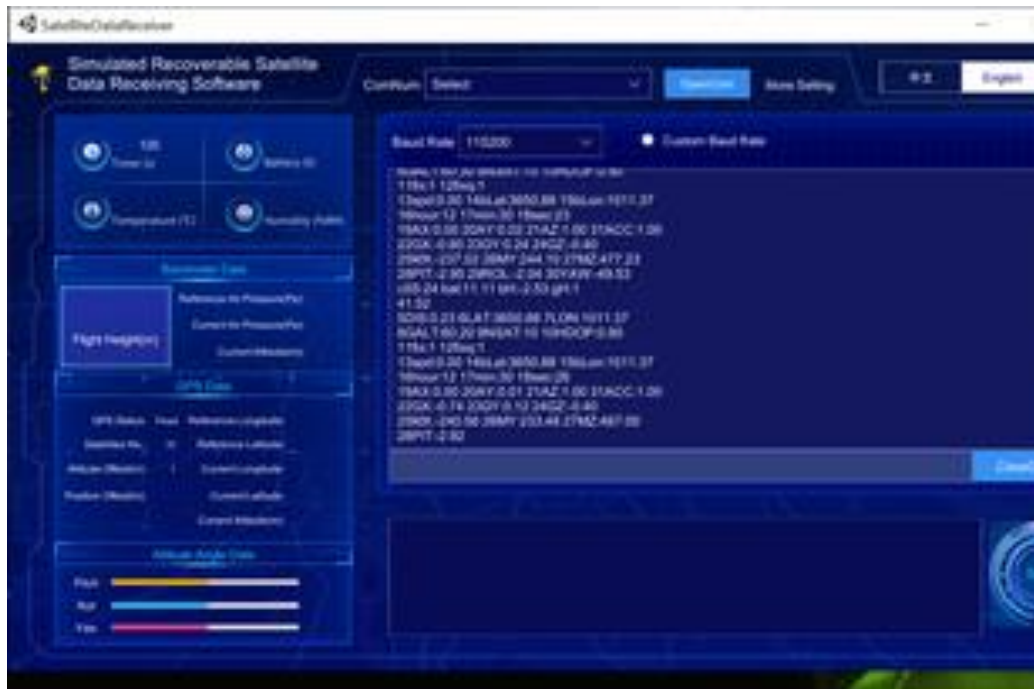




CDM v2.12.10
WHQL Certified



SatelliteDataRe
ceiver



Software Satellite Data Receiver.

```
7
8GALT : 60,30 9NSAT : 10 10HDOP : 0,90
11fix:1 12fixq:1
13vit:0,00 14bLat:3650,88 15bLon:1011,37
16h:12 17min:30 18sec:11
19AX : -0,13 20AY : 0,08 21AZ : 0,97
31ACC : 0,98
22GX : 6,10 23GY : -4,76 24GZ : 0,94
25MX : -288,32 26MY : 376,76 27MZ : 441,44
28PIT : -9,74 29ROL : 4,64 30LACET : -42,13
c5S:22 bat:11,13 bH:-2,90 gH:1
OTMP:29,67 1HUM:59,17
2bPRS : 99607,66 3PRS : 99664,72
4ALT : 1SAT : 10 10HDOP : 0,90
11fix:1 12fixq:1
13vit:0,00 14bLat:3650,88 15bLon:1011,37
16h:12 17min:30 18sec:14
19AX : -0,02 20AY : 0,00 21AZ : 1,00
31ACC : 1,00
22GX : -3,00 23GY : 2,75 24GZ : -0,71
25MX : -238,79 26MY : 256,48 27MZ : 472,11
28PIT : -0,42 29ROL : 3,14 30LACET : -50,99
c5S:22 bat:11,13 bH:-4,81 gH:1
OTMP:29,65 1HUM:58,94
2bPRS : 99607,66 3PRS : 99654,41
4ALT : 140,03
SDIS:0,23 6LAT:3650,88 7LON:1011,37
8GALT : 60,30 9NSAT : 10 10HDOP : 0,90
11fix:1 12fixq:1
13vit:0,00 14bLat:3650,88 15bLon:1011,37
16h:12 17min:30 18sec:17
19AX : 0,04 20AY : -0,04 21AZ : 0,99
31ACC : 1,00
22GX : 2,62 23GY : 0,55 24GZ : -0,53
25MX : -226,41 26MY : 240,56 27MZ : 480,64
28PIT : -0,61 29ROL : -5,19 30LACET : -49,77
c5S:23 bat:11,15 bH:-3,94 gH:1
40,59
SDIS:0,23 6LAT:3650,88 7LON:1011,37
8GALT : 60,30 9NSAT : 10 10HDOP : 0,90
```

December 23, 2022

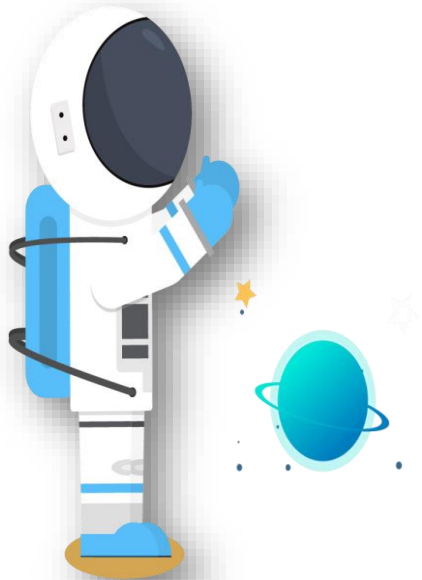
Training



Session de formation

Live Training
Classes (online)

- ◆ Introduction to Cube Satellite and Recoverable Satellite
- ◆ Sounding satellite assembly guidance
- ◆ Sharing and Q&A



**December 21, 2022:
The first training session:**





2022/12/28 11:31



2022/12/28 11:40

**December 28, 2022:
Second training session**



2022/12/28 11:31

Sounding Satellite



Weight: 800g.

Altitude: 30 000m (STRATOSPHERE)

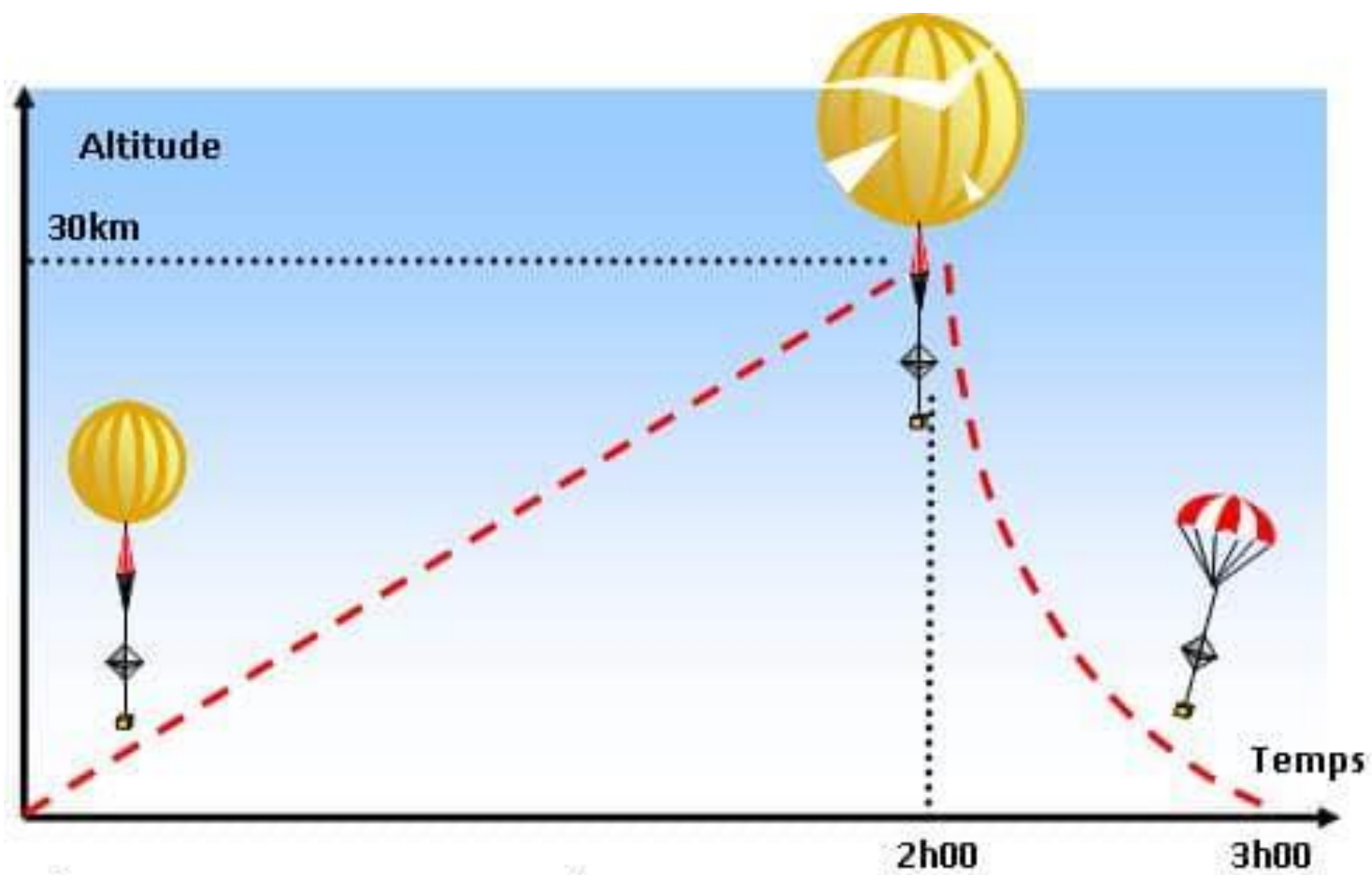
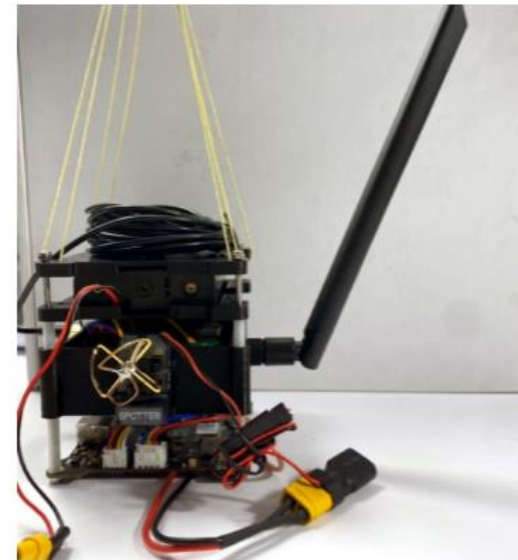
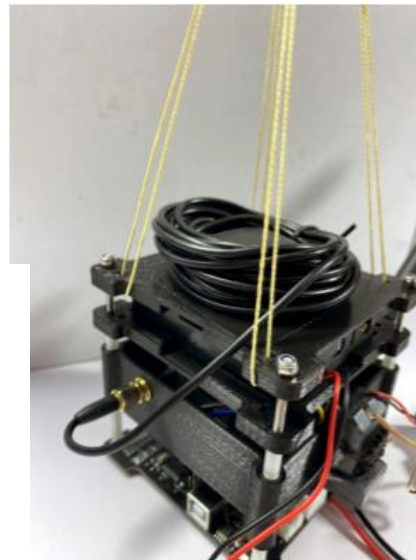


Fig3 : Profil de vol typique d'un ballon léger dilatable

February 19, 2023: The third training session



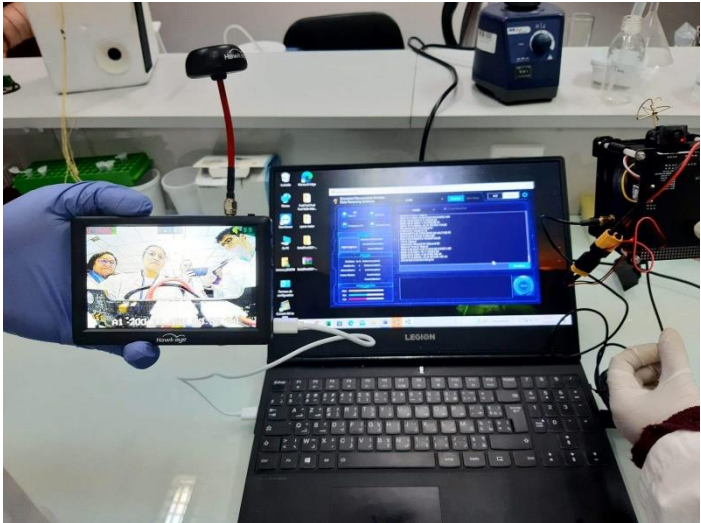
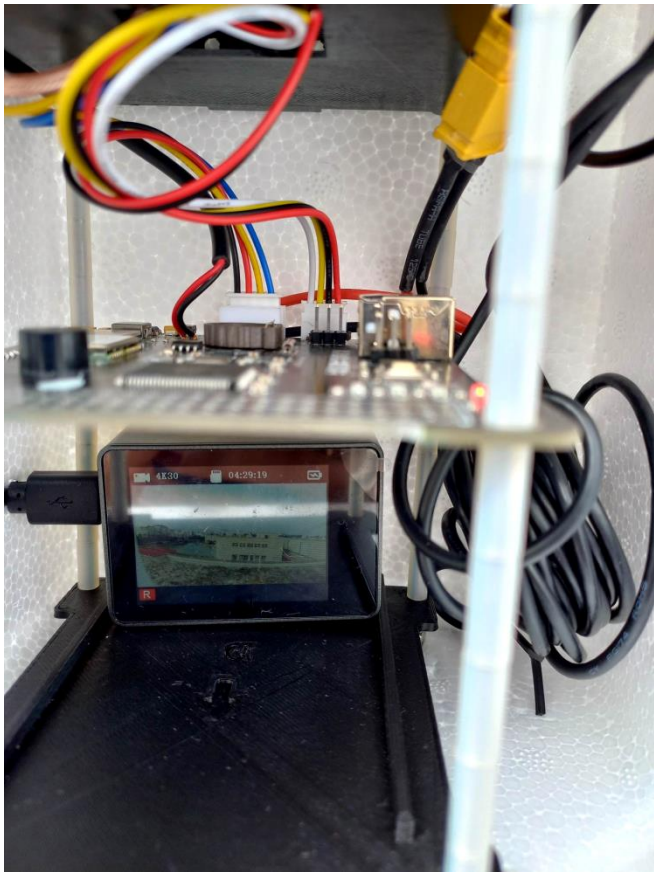
Tethered Satellite



weight: 200g.

Altitude between 20-300m
(TROPOSPHERE)





March 17, 2023

Launch of the satellites

The launch of the tethered satellite



Simulated Recoverable Satellite Data Receiving Software

ComNum:

120
Timer (s)

Battery (V)

Temperature (°C)

Humidity (%RH)

Barometer Data

Reference Air Pressure(Pa):
Current Air Pressure(Pa):
Flight Height(m)
Current Altitude(m):

GPS Data

GPS Status: Fixed Reference Longitude:
Satellites No.: 10 Reference Latitude:
Altitude Offset(m): 1 Current Longitude:
Position Offset(m): Current Latitude:
Current Altitude(m):

Attitude Angle Data

Pitch
Roll
Yaw

Baud Rate: ☐ Custom Baud Rate

8GALT:60.30 9NSAT:10 10HDOP:0.90
11fix:1 12fixq:1
13spd:0.00 14bLat:3650.88 15bLon:1011.37
16hour:12 17min:30 18sec:23
19AX:0.00 20AY:0.02 21AZ:1.00 31ACC:1.00
22GX:-0.80 23GY:0.24 24GZ:-0.40
25MX:-237.02 26MY:244.10 27MZ:477.23
28PIT:-2.95 29ROL:-2.04 30YAW:-49.53
c5S:24 bat:11.11 bH:-2.53 gH:1
41.52
5DIS:0.23 6LAT:3650.88 7LON:1011.37
8GALT:60.20 9NSAT:10 10HDOP:0.90
11fix:1 12fixq:1
13spd:0.00 14bLat:3650.88 15bLon:1011.37
16hour:12 17min:30 18sec:26
19AX:0.00 20AY:0.01 21AZ:1.00 31ACC:1.00
22GX:-0.74 23GY:0.12 24GZ:-0.40
25MX:-240.56 26MY:233.48 27MZ:467.00
28PIT:-2.92

7

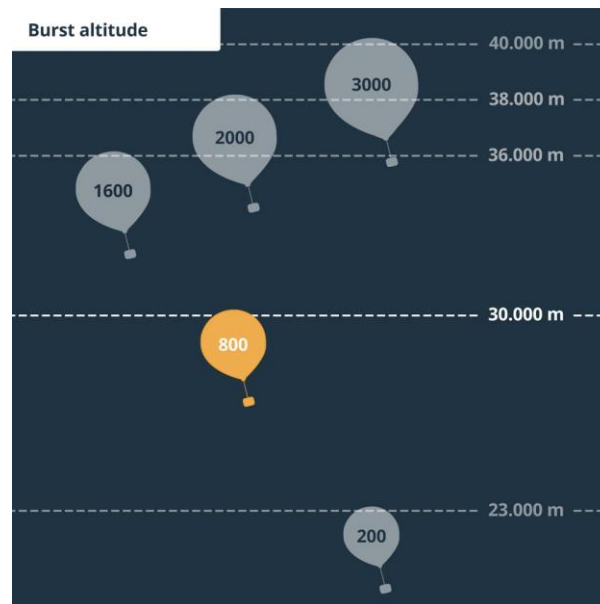
8GALT : 60,30 9NSAT : 10 10HDOP : 0,90
11fix:1 12fixq:1
13vit:0.00 14bLat:3650.88 15bLon:1011.37
16h:12 17min:30 18sec:11
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0TMP:29.65 1HUM:58.94
2bPRS : 99607.66 3PRS : 99654.41
4ALT : 140.03
5DIS:0.23 6LAT:3650.88 7LON:1011.37
8GALT : 60,30 9NSAT : 10 10HDOP : 0,90
11fix:1 12fixq:1
13vit:0.00 14bLat:3650.88 15bLon:1011.37
16h:12 17min:30 18sec:17
19AX : 0,04 20AY : -0,04 21AZ : 0,99
31ACC : 1,00
22GX : 2,62 23GY : 0,55 24GZ : -0,53
25MX : -226.41 26MY:240.56 27MZ:480.64
28PIT : -0,61 29ROL : -5,19 30LACET : -49,77
c5S:13 bat:11.15 bH:3.94 gH:1
40,59
5DIS:0.23 6LAT:3650.88 7LON:1011.37
8GALT : 60,30 9NSAT : 10 10HDOP : 0,90
11fix:1 12fixq:1





In the coming days

- To launch other training session on satellites for the benefit of engeneer students.
- To launch the sounding satellite which will rise up to 30 km.



**Thanks
for your
attention**

