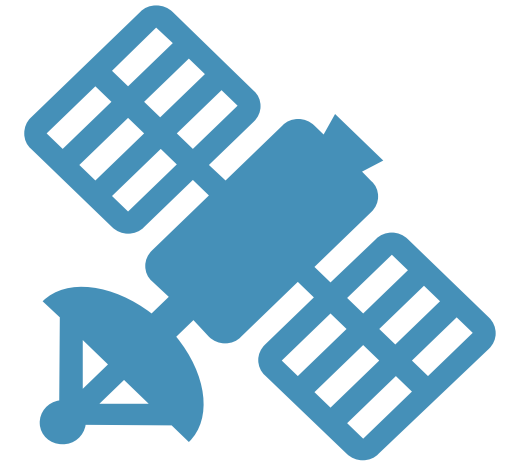# THE ROADMAP TO COTE D'IVOIRE'S NANOSATELLITE PROJECT

UN/IAF Sept 29th –Oct 1th

PRESENTER: DR EDOE MENSAH, ACTING MANAGER OF THE NANOSATELLITE PROJECT

INSTITUTION: INSTITUT NATIONAL POLYTECHNIQUE FELIX HOUPHOUËT-BOIGNY (INP-HB)

YAMOUSSOUKRO, COTE D'IVOIRE

OUTLINE

- **CONTEXT AND MOTIVATION**

- **SOME OF THE CHALLENGES COTE D'IVOIRE IS FACING**

- **SPACE SCIENCE AND TECHNOLOGY SOLUTION TO THE CHALLENGES**

- **MISSION , VISON AND GOALS, POTENTIAL SPACE MISSIONS**

- **TYPE OF NANOSATELLITE ENVISIONNED AND PARTNERSHIPS**

- **CONCLUSION**

CONTEXT AND MOTIVATION

Socio-economic development using space science and technology

- African Space Strategy report: 90% of the objectives of the 8 departments of the AUC require the space sector for their realizations.

- The UN: the 2030 Agenda for Sustainable Development:
  - ✓ 17 SDGs
  - ✓ 169 specific targets
  - ✓ 190 Member States

CONTEXT AND MOTIVATION

▪ Miniatuarization of satellite and the decrease of satellite cost.:

The advent of nanosatellites has made space technology accessible to developing countries, thanks to the miniaturization and low development and launch costs of satellites.

CONTEXT AND MOTIVATION

East **Africa** :

Kenya : **3 satellites**

Ouganda : **1 satellite**

Ethiopia : **2 satellites**

15 african countries with 53 satellites into orbites

21 countries have space agencies

Hybrides
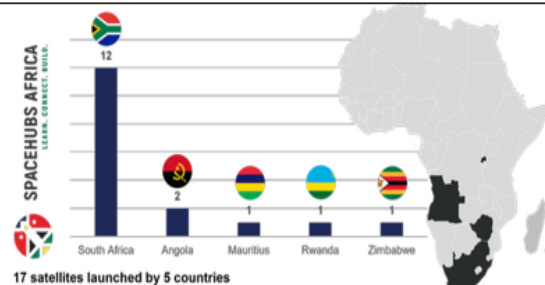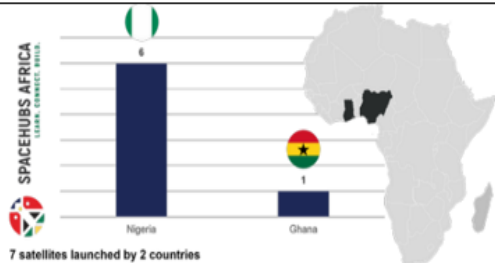
RASCOM : 2 satellites

RASCOM has 45 member countries and it is a commercial and operating company, RascomStar-QAF (RQF), created in 2000. RASCOM has launched a total of two satellites in geostationary orbites: RASCOM-QAF-1 in 2008 and RASCOM-QAF-1R in 2010.

COTE D'IVOIRE IN BREF

- **Population:** 29 Millions inhabitants
- **Capital:** Yamoussoukro (Political), Abidjan (Economic)
- **Official language:** French
- **Area:** 352 000 km2
- **Economy:** Agricultural-based
- **Main crop:** Cocoa (1st in the world, 1.2 tons)
- **Religion:** Muslim (42%), Christian (34%), Other (24%)
- **Tourism:** The Basilica Our lady of peace, the largest church in the world

THREE MAJOR CHALLENGES COTE D'IVOIRE IS FFACING
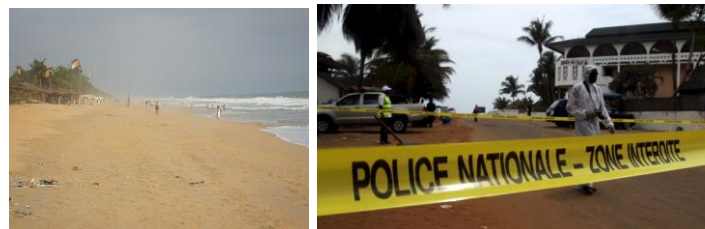
Agriculture and Food security

- Swollen shot virus (cocoa)
- Deadly coconut yellowing (virus)
- Cassava « Ebola » virus

Fighting climate-related disasters

- Coastal Erosion
- Landslide
- Flooding

Homeland security and counter-terrorism

- Terrorist attack in Gd. Bassam, 2016, (19 Deads, 33 Wounded)
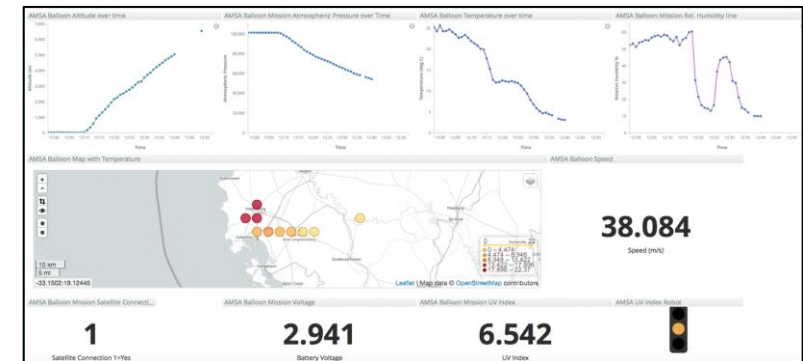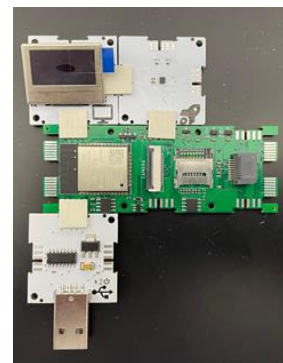
ACHIEVEMENTS IN SPACE RELATED SKILLS

Suborbital Launch Challenge (2022) (cancelled)

Team: Cote d'Ivoire, Senegal, Togo, Burkina Faso, Ghana

IoT Sensors: **ESP32**

LORA   **ESP32**

38.084
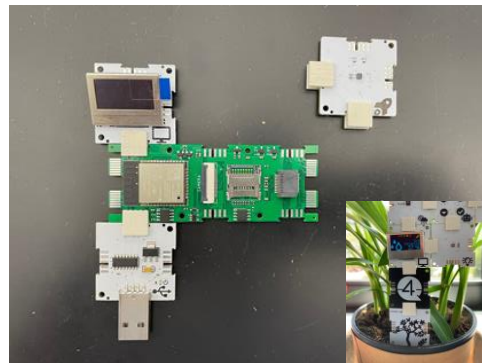
1   2.941   6.542
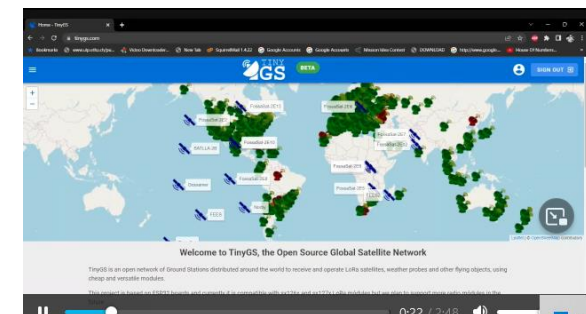
NASA TECHRISE CHALLENGE 2024

HAB August 2024

Design, build, and launch science and technology experiments on a high-altitude balloon or rocket-powered lander test flight

Team: Cote d'Ivoire, Senegal, Togo, Burkina Faso, Ghana

IoT Sensors + ESP32:
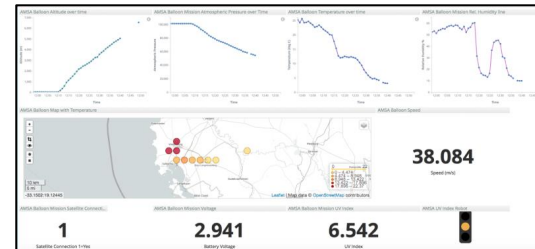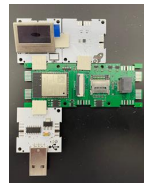
Cloud: Kibana Dashboard

TinyGS   +   Antenna

Lora Satellite and TinyGS Network

COTE D'IVOIRE'S SPACE AMBITION
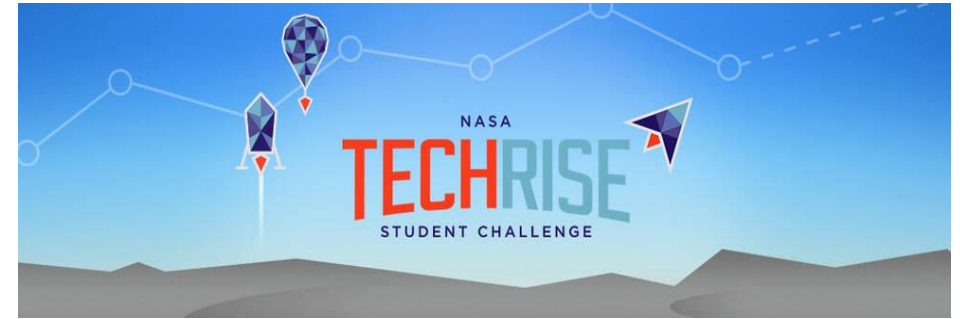

The project of creation of Cote d'Ivoire space agency in 2023 or 2024

The project of construction of a nanosatellite in 2024

The project of creation of a school of aeronautic and space 2025 or 2026

The ministry of Higher Education and Scientific Research mandate the Institut National Polytechnique to build the first nanosatellite for the country.

COTE D'IVOIRE'S FIRST NANOSATELLITE

Mission

- Develop applications to promote the use of space science and technology as an effective tool for Côte d'Ivoire's development;
- Contribute to the realization of the Ivorian space agency's agenda and promote the development of the space industry in Côte d'Ivoire.

Vision

- To enable Cote d'Ivoire to become a new space faring nation
- To provide the country with an effective technological tool for its development and reinforce its leadership in Africa.

Goals

- To strengthen human capital and infrastructure development in space technology to ensure territorial security, environmental and rational management of the country's resources.
- Develop space technology applications in areas essential to the socio-economic development of Côte d'Ivoire.

THE OPTIONS FOR OUR FUTURE NANOSATELLITE WITH PAYLOADS

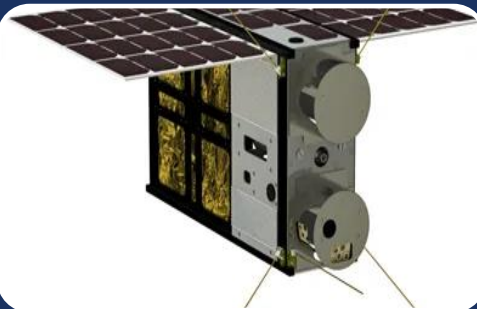
1U Cubesat: Single payload
- Satellite IoT-SDR

3U Cubesat: Double payloads
- Satellite IoT-SDR
- Multispectral/Hyperspectral Camera

6U Cubesat: Multiple payloads
- M2M/IoT-SDR, Spectrometer IR
- Hyperspectral Camera
- AIS, ADS-B

POTENTIAL SPACE MISSION DEFINITIONS

Being able to design, develop and operate a 1U, 3U or 6U satellite with single or multiple payloads (M2M/IoT-SDR and MS/HS , IR camera, AIS or ADS-B) to collect data to:

- Allow farmers to optimize the yield of their crops by maximizing the efficiency of fertilizers (IoT and MS) or to detect plant diseases before they spread (HS)
- Allow marine ressource managers to combat illegal fishing by detecting illegal fishing boats (AIS)
- Help manage scarce ressource: water, oil (IoT, HS)
- Help forest managers to detect fire by measuring ambiant temparature (IoT and IR)
- Allow flood prevention and mitigation, pre-flood assessment, response, recovery (MS, IoT)
- Allow environnmental managers to track climate change by measuring GHG: (IoT)
- Allow forest managers to fight deforestation by measuring the rate of deforestation using (HS, MS, IR)
- Help homeland security officers to fight terrorist threats (HS, M2M)

PLANNING FOR NANOSATELLITE PROGRAMME

Tasks	Decision	Time (in month)
1. Choice of size of cubesats	1U and 3U	--
2. Funding	No	3
3. Selection of the manufacturer	No	1
4. Construction and launching	No	12

ACCESS TO SPACE FOR ALL IN AFRICA

▪ **UNOOSA KiboCube Programme**: INP-HB intends to apply to the Kibocube programme

▪ **OASEAS:** the 1st analog space research facility in subsaharian africa (Kenya)

▪ **Partnership** with new space faring-nations and non space-faring nations to build a constellation of satellites (Senegal, Cote d'Ivoire, others countries)

▪ **AFCONSAT:** (Constellation ,2019, ANUC, Ghana): space ressources sharing for new space-faring and non space-faring nations in Africa to address SDGs
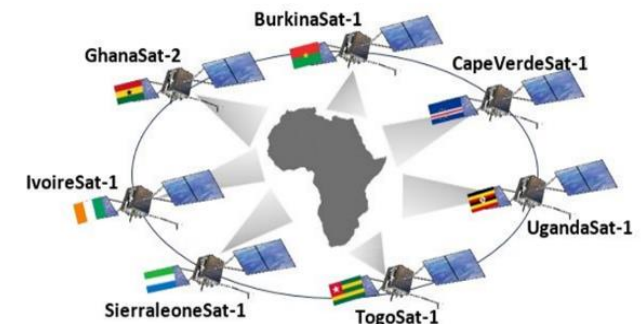
CONCLUSION

- Cote d'Ivoire made a decision to build and launch its 1st nanosatellite by 2024 or 2025

- Preliminary steps had been taken (Ist draft of the project proposal)

- The choice of 1U and 3U cubesats was made by the officials

- The project will start at the latest in 2024 with an 1U and 3U Cubesat

- Cote d'Ivoire intends to apply for the Kibocube programme (1U cubesat)

- Partnership is seeked in various spaces areas

The Basilica Our Lady of Peace in Yamoussoukro, Cote d'Ivoire

Next time you visit Cote d'Ivoire , please come to visit the basilica in Yamousssoukro

THANK YOU FOR YOUR ATTENTION

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