IoT mission idea presentation

Essien Ewang

UNISEC-Global PoC/Regional coordinator MIC, Nigeria
Institute of Space Science and Engineering, NASRDA

17th May 2025

Outlines

- UNISEC-Nigeria
- Background of IoT mission idea

- Mission overview/requirements
  - Oil spill
  - Water level monitoring
  - Soil properties monitoring

- Frequency for IoT uplink

- Conducting hearing session with stakeholders

- Future task

UNISEC-Nigeria

- It was fully established in 2013

- Participated in CLTP 1, 2, and 3
- Attend UNISEC-Global meetings for some years now
- Organised MIC seminars, workshops, practical space activities intermediately
- Participated and emerged among the winners in the MIC 2024

The chapter is made of:

- Member universities: 15
- Students: 110
- Professors : 9
- Cooperate members: 2

Empowering university students with hands-on experience in space technology, guiding in designing, building, and launching small satellites and subsystems for real-world applications.

Background of IoT mission idea

Early oil spill detection and clean up

Flood detection and monitoring

Identify Needs

- Identify three socio-economic/environmental problems that can be addressed using IoT missions

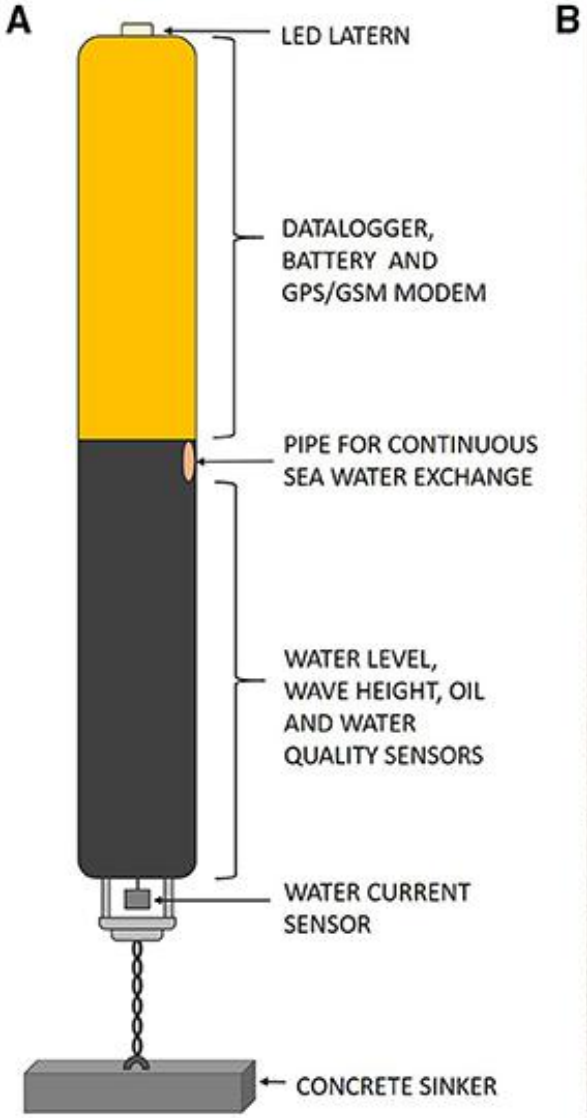
- Nigeria faces staggering losses in these areas, impacting both the economy and the environment.

Agriculture field monitoring

- strengthening regulations and adopting satellite technology to improve environmental monitoring efforts.

Missions overview/requirements

Oil Spill Monitoring



B

Type of sensor:

- **Hydrocarbon Sensors**

Data collected:

- **Monitoring of early detection of oil spillage in the environment**

Data Frequency:

- **When oil spill is detected, the frequency is every one hour. Otherwise, every day.**

Impact:

- **to initiate early and prompt cleanup efforts**

Deployment area:

- **Sensor place every 2-3 km along the ocean area in considerations.**

Water level monitoring

Type of sensor

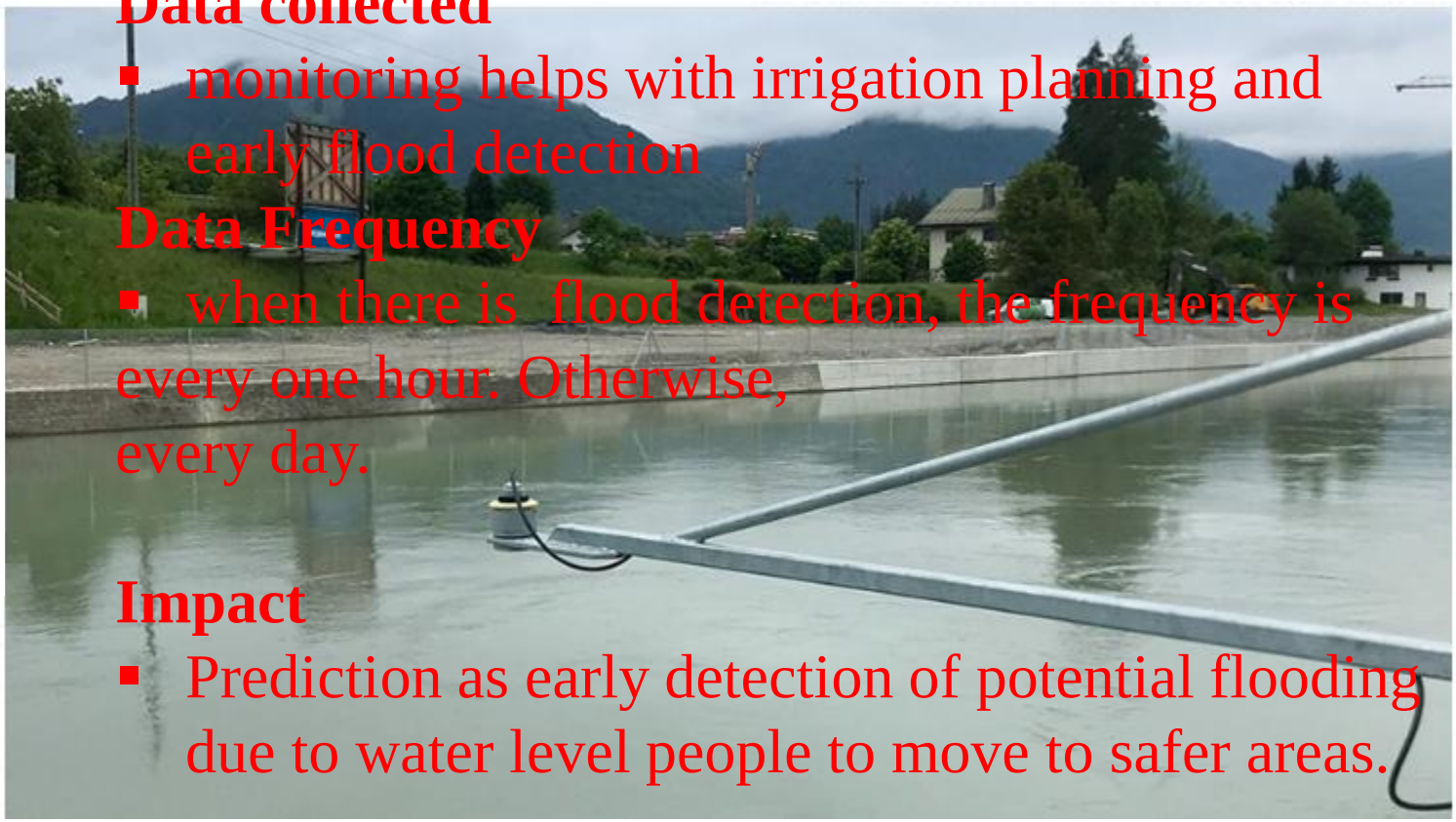
- Water Level Detection Sensors

Data collected

- monitoring helps with irrigation planning and early flood detection

Data Frequency

- when there is flood detection, the frequency is every one hour. Otherwise, every day.



Impact

- Prediction as early detection of potential flooding due to water level people to move to safer areas.

Deployment area

- Every 2 km in agricultural and high-risk areas

Soil properties monitoring

Type of sensor

Soil moisture content ,PH, Temperature and nutrient level

Data collected

Monitoring of Soil moisture content ,PH, Temperature… provide real time data for precision

Data Frequency

During planting season, the frequency is every day. Otherwise, weekly

Impact

food security, implementations of precision agriculture for crop yield increased.

Deployment area

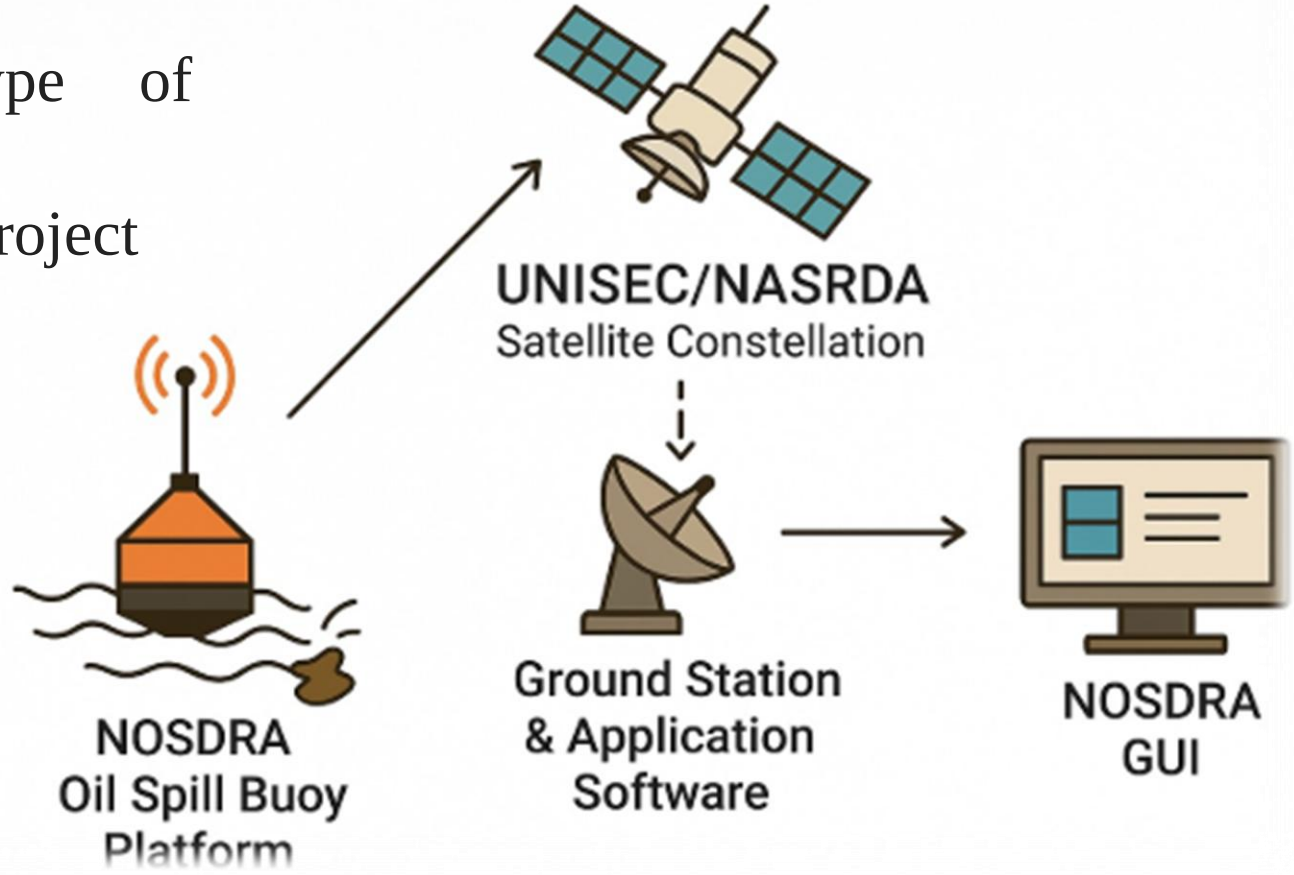
Every 2 km in agricultural areas

Selection of frequency for IoT uplink

Country	Frequency	RF power limit	Note
Nigeria	399.9- 400.05 MH_Z (E-S)	Maximum EIRP 5 dBW	Large antenna due to the longer wavelength
Nigeria	400.15- 401MH_Z(S-E)	-65 dBm/MHz, and the peak EIRP is limited to -44.5 dBm/120 kHz	Large antenna
Nigeria	406- 406.1 MH_Z (E-S)	-65 dBm/MHz	Large antenna

Conducting hearing session with stakeholders

- This involves:
  - collecting feedback from each type of stakeholder
  - estimating costs for each mission in the project



- The NOSDRA and space application provides the ground infrastructures
  - Sensors on oil spillage site
  - NOSDRA user interface
  - Logistics

This is will serve as one of the important component of the collaboration between UNISEC-Global and NOSDRA and others for the benefit of our country.

Future task

- Continue with Nano-Satellite IOT constellation mission program

- Collaborate with the local/international institutions on Nanosat development program to stimulate capacity development in universities and industries for expansion of local chapter activities

Thank you for listening

Contact: ewang.arcsste@gmail.com