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Alphasat for Modern Tanzania

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Introduction

Alphasat For Modern Tanzania Is A Locally Built Solution Designed To Show How Student-innovated Space Technology Can Solve These Problems. This Prototype Demonstrates How A Small Satellite Can Collect Data On Crop Conditions, Soil Moisture, Water Levels, And Other Environmental Factors And Transmit It In Real-time To Farmers And Researchers.

The Relevance Of This Project Is Further Supported By The Launch Of Kenya's Taifa-1 Satellite In April 2023, Which Was Designed For Similar Earth Monitoring Purposes. Taifa-1 Demonstrates How African Countries Can Develop Local Space Technologies To Support National Development. Alphasat, Following A Similar Path, Focuses On Providing Agricultural Data To Help Smallholder Farmers Make Informed Decisions, Improve Food Security, And Build Climate Resilience.

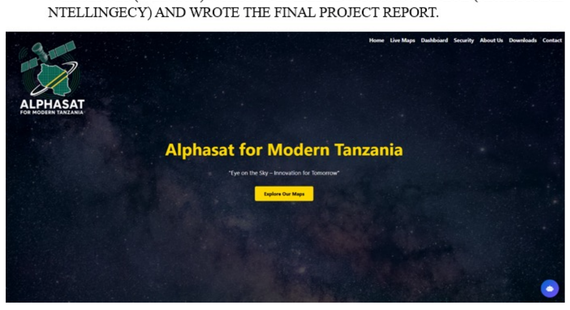
Research Question:

How Can A Locally Developed Earth Observation Satellite Prototype Provide Affordable And Reliable Agricultural And Environmental Data To Support Sustainable Development In Tanzania And The African Region?

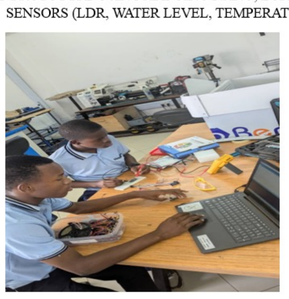
Hypothesis:

If A Locally Developed Earth Observation Satellite Prototype Is Equipped With Environmental Sensors And Wireless Data Communication, Then It Can Provide Accurate, Real-time Information That Will Improve Agricultural Productivity, Natural Resource Management, And Disaster Response In Tanzania And Neighboring Countries.

- COMPILED RESULTS, REVIEWED THE FUNCTIONALITY, DISPLAYING VIA WEBSERVER(WEBSITE) WHICH IS EMBEDED WITH ASSITIVE AI (ARTIFFICIAL NTELLINGECY) AND WROTE THE FINAL PROJECT REPORT.



ASSEMBLED PROTOTYPE USING ARDUINO NANO, LORA MODULES, AND SENSORS (LDR, WATER LEVEL, TEMPERATURE).



CONDUCTED BRAINSTORMING ON LOCAL AGRICULTURAL CHALLENGES AND HOW SPACE TECHNOLOGY CAN HELP. DESIGNED THE SYSTEM STRUCTURE

Configured Code And Tested Data Transmission Between Satellite And Ground Station Using Lora Protocol

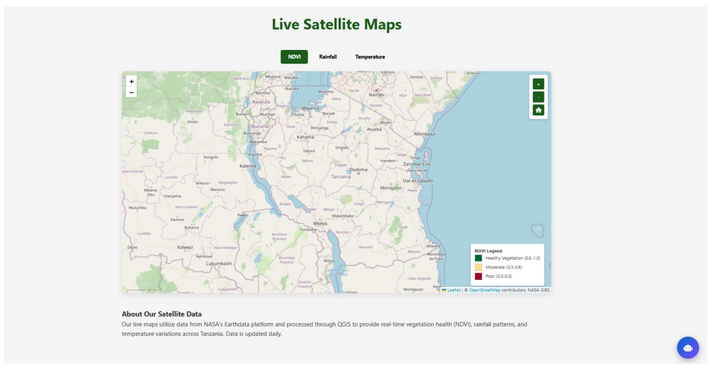
Conducted Field Testing In School Compound Under Varying Weather Conditions

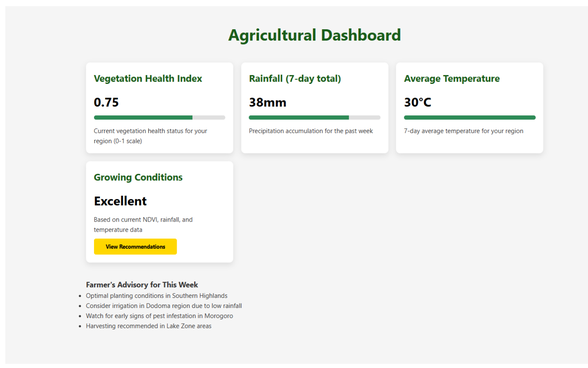
Collected, Recorded, And Analyzed Sensor Data (Light Intensity And Water Levels). Documented Observations

Results

The Prototype Successfully Detected Environmental Variables Such As Light Intensity And Water Levels Using The Respective Sensor

- Lora Modules Transmitted Real-time Data To The Ground Station Up To A Tested Range Of [500cms].
- The Data Was Visible Via Serial Monitor And Interpreted To Reflect Conditions Critical For Agriculture Such As Drought Indicators Or Low Light Conditions.
- The System Demonstrated How A Localized Satellite-ground Communication Model Could Enhance Access To Agricultural Data In Rural Areas.





Conclusion

Interpretation: The Alphasat Prototype Validated The Idea That Local Earth Observation Tools Can Be Effective For Agriculture And Climate Monitoring.

Hypothesis Review: The Project Supported The Hypothesis That Locally Developed Satellites Can Provide Affordable And Accurate Real-time Agricultural/Environmental Data.

Implications: This Can Revolutionize The Way Farmers And Authorities Monitor Crops, Prepare For Disasters, And Manage Natural Resources

Alphasat For Modern Tanzania Has Proven That Even With Limited Resources, Tanzanian Students Can Create Powerful Space-tech Prototypes To Address Agricultural And Environmental Issues. The Prototype Offers Potential For Real-world Applications If Developed At Scale, Supporting Sustainable Development And Technological Independence

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