Small Satellites Contribute to the United Nations’ Sustainable Development Goals

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Advancing justice in Earth’s complex systems using designs enabled by space
Technology from space helps every country in global our effort to reach the Sustainable Development Goals
Six space technologies currently support the Sustainable Development Goals:

- Satellite Earth Observation
- Satellite Positioning & Navigation
- Human Space Flight & Microgravity Research
- Satellite Communication
- Space Technology Transfer
- Inspiration from Research & Education
Space Enabled employs six research methods in support of the Sustainable Development Goals:

- Design
- Art
- Social Science
- Complex Systems Modeling
- Satellite Engineering
- Data Science
Space Enabled applies the six Research Methods and the six Space Technologies in collaborative projects with organizations at four levels.

- Multilateral Organizations
- National Governments
- Regional and City Governments
- Universities, non-profits and companies

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Creating a future in which anyone can use satellite earth observation to understand their environment
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A Flower Against Pollution
How we are collaborating with Green Keeper Africa to monitor an invasive plant that is used to clean oil-based waste

Green Keeper Africa
Green Keeper Africa is an entrepreneurial company based in Cotonou, Benin. They pay local community members to harvest the invasive water hyacinth plant and convert it into kits that absorb oil pollution caused by industry. Their work improves the environment and creates a new eco-friendly source of income. Green Keeper Africa has invited Space Enabled to work together to create an Observation System for Invasive Plants to monitor the water hyacinth and its impact on the community.

Satellite Earth Observation
Space Enabled is working with Green Keeper Africa to use imagery and measurements from earth observation satellites to monitor the water hyacinth. We are combining information from government and commercial satellites that show how the water hyacinth grows and drifts through rivers and lakes.

Aerial Earth Observation
Space Enabled is exploring with Green Keeper Africa how they might use cameras mounted on radio controlled planes, drones, solar air balloons or kites to track the growth of the invasive water hyacinth plant.

Measuring
The growth of the invasive water hyacinth plant is impacted by environmental factors such as the temperature, salinity and nutrient content of the water as well as local weather patterns. Space Enabled is working with Green Keeper Africa to explore how they can use sensors placed in local waterways to measure environmental changes. In the long term, these measurements may help Green Keeper Africa predict where the invasive water hyacinth plant will bloom.
Environmental model

Information about the environment collected using technology

Estimates of environmental threats to human well-being

Impacts of human behavior on environmental dynamics

Human vulnerability and societal impact model

Priorities for improving human well-being

Social parameters

Socio-economic parameters for human resilience

Human decision making model

Information needs for human decision makers

Technology design model
Creating a future in which we take care of the space environment around the earth and reduce space debris
Green Satellite Propulsion
Will candle wax become a safe and affordable fuel for small satellites?

The Space Enabled Research Group is investigating the use of candle wax, also known as paraffin wax, as an propellant to operate small thrusters on satellites. Thrusters are used to change the orientation or orbit of a satellite. Traditional satellite propellants are expensive and cause cancer when handled by humans. Candlewax is affordable and safe for humans to handle. It may also have the benefit of serving as a thermal insulator to protect satellites from the temperature changes on orbit as they are heated by sun or cooled in earth’s shadow.

New Designs for Satellite Missions
How do we create a future with less space debris?

Space Enabled is rethinking the lifecycle of satellite missions and creating a future with less space debris. We are exploring modular satellite designs that will allow us to reconfigure satellite components and replace broken parts of satellites in space. This prototype shows a 3-Unit CubeSat that can demonstrate reconfigurability and paraffin wax propulsion.
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Earth Observation
Planet “Dove” Satellites

https://qzprod.files.wordpress.com/2017/02/planet-dove-nasa-nanoracks.png
Satellite Communication
India to launch GSAT-6 communication satellite Thursday
Telesat to announce manufacturing plans for LEO constellation in coming months.
Satellite Positioning
Microgravity Research
Space Spinoffs
Inspiration
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Learn more:

spaceenabled.media.mit.edu

Watch Danielle Wood’s TED Talk

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