

MM7: SDG2 SPACE4SDGS CHALLENGE ZERO HUNGER



SDG 2: Zero Hunger – Space Agriculture Innovation

- Design a user-friendly system, such as an app or a network of sensors, that gives farmers access to real-time satellite data about their crops. This system should help farmers make smarter decisions about planting, watering, and protecting their crops to improve food availability and reduce waste.

Challenge:

For this project, your mission is to design an innovative system that uses satellite data to improve agriculture. This system should help farmers monitor their crops, identify problems like drought or pests early, and use resources (like water and fertilisers) efficiently. Your goal is to help reduce hunger by supporting sustainable farming practices that can grow more food with fewer resources.

Considerations

- User Perspective: What challenges do farmers face in monitoring and managing their crops? How can technology make their work easier?
- Satellite Data: How can you use satellite data to improve crop health, detect problems, and guide sustainable farming practices?
- Impact on Hunger: How will your system help farmers produce more food? How does this connect to reducing hunger and supporting Zero Hunger (SDG 2)?

Background

In many parts of the world, farmers face challenges in growing enough food to feed their communities due to unpredictable weather, lack of access to quality resources, and climate change impacts. These challenges contribute to hunger and food insecurity, especially in rural or underserved areas. The United Nations' Sustainable Development Goal (SDG) 2, Zero Hunger, focuses on ending hunger, achieving food security, and promoting sustainable agriculture by 2030.

One way we can support farmers is by using space technology. Today, satellites orbiting Earth can gather real-time data on weather, soil conditions, and even the health of crops. This data can help farmers plan their work better, make more efficient use of water and fertilizers, and detect issues (like pests or droughts) early before they harm crops. However, for many farmers, especially those in rural areas, accessing and understanding satellite data can be challenging.

Why Sustainable Agriculture Matters

Using satellite data, farmers can adopt more sustainable practices. This means using fewer

resources (like water and fertilisers), which helps protect the environment and makes farming more cost-effective. Sustainable agriculture benefits not only farmers but also entire communities, ensuring that there's enough food to go around while conserving resources for future generations.



By designing a system that gives farmers access to satellite data in an easy-to-use way, you can help improve food production, reduce hunger, and protect the planet's resources. Through your project, you'll explore the challenges farmers face, imagine creative solutions using space technology, and contribute to the vision of Zero Hunger.

How Space Technology Supports Agriculture through different types of data:

- **Weather Forecasting:** Satellites monitor temperature, precipitation, and humidity to predict short- and long-term weather, helping farmers decide when to plant, water, and harvest.
- **Soil Moisture and Health:** Satellites can detect moisture levels and assess soil health, which informs farmers about when to irrigate or fertilise, improving water efficiency and crop health.
- **Crop Monitoring:** Using images and sensors, satellites track crop growth, detect signs of disease, and measure plant health, helping farmers spot problems early and reduce crop loss.

Your Mission

Create a concept for a satellite-based system or a mobile app that provides people in underserved areas with tools or information that help them overcome poverty.

Your project should:

- **Target Users:** Small farmers in rural areas who need support to improve crop yields and monitor farm health.
- **Features:** Your design should include key features like:
 - Weather forecasting to help farmers plan planting and watering.
 - Soil and crop health data to spot problems like drought, pests, or nutrient deficiencies.
 - Recommendations for sustainable practices, like when to water or fertilise crops.
- **Usability:** Design the interface so it's easy for farmers to understand and use. Think about how you could make it accessible for those who might not have strong internet or advanced devices.
- **Sustainability:** Include ways that your system can help reduce waste, save water, and protect the environment.

Questions to Consider

1. What data is most helpful for farmers to increase yields and protect crops?
2. How will your design work if farmers have limited internet access or use basic devices?
3. How does your solution promote sustainability, reducing the need for resources like water and fertilisers?

Design Process Overview

Step 1: Introduction: What is the available and Who are your users?

- Explore examples of satellite and app solutions for supporting agriculture
- Think about how space technology can gather different data



Step 2: Empathy

- Create user profiles for the people you want to help. What are their challenges, and what would help improve their lives?

Step 3: Defining the Problem

- Define the main problem that your project will solve. For example, is it access to markets, weather information for farming, or something else?

Step 4: Ideate

- Brainstorm different ideas for how your system could work. How would people use it? What kind of information would it provide?

Step 5: Ideate 2 – Good Idea / Bad Idea

- Refine your ideas. Focus on the most promising ones and think about how they could be even better or more accessible.

Step 6: Prototype

- Create a model or sketch of your satellite system or app. This could include the type of information it provides, how people interact with it, and what it looks like.

Step 7: Test

- Share your prototype with others to get feedback. Use their suggestions to make improvements and ensure it's easy to understand for your users

Deliverables

- User Profile: A description of a typical farmer and their needs.
- System Overview: A one-page summary explaining how your system uses satellite data to support sustainable agriculture.
- Prototype: A simple model or mock-up, such as a sketch or digital layout.
- Presentation: Share your system's impact on reducing hunger through improved agriculture

Each step will take one or more lessons and your teacher will also guide you with lessons and resources from the 'Space Design Challenge Problem to Pitch' Module



VISIT

The United Nations Office for Outer Space Affairs (UNOOSA) works to promote international cooperation in the peaceful use and exploration of space, and in the utilisation of space science and technology for sustainable economic and social development.

<https://www.unoosa.org/oosa/en/ourwork/space4sdgs/sdg1.html>

Step 1: Introduction: What is the available and Who are your users?

- Use the Internet to explore examples of satellite and app solutions that support Agriculture
- Think about how space technology can reach people in ways that other services can't.

Step 2: Empathy: Create user profiles for the people you want to help. What are their challenges, and what would help improve their lives?



Support: Use the resources in MM7: Problem to Pitch Space Design Challenge, Lesson 2, Empathy

These prompts are designed to support you to empathise and focus on the unique needs of different types of users by imagining their situation and putting yourself in their shoes. You can use this to select a user that you will design for using the resources in Lesson 2 and the prompts below.

User Persona Prompts for Farmers and Rural Communities

- Rural Farmer in a Remote Area
 - "Imagine you are a farmer living in a remote village with limited access to weather forecasts and market prices. You rely on agriculture for your income, but frequent droughts and unpredictable weather make it difficult to plan your crops. How would a satellite-based app that provides real-time weather and soil information help you improve your farming practices and income stability?"
- Daily Life and Challenges:
 - What does a typical day look like for a farmer in a rural area? What kinds of decisions do they make each day related to their crops?
 - What are the biggest challenges this farmer might face during a growing season? Think about factors like weather, pests, water shortages, or lack of resources.
 - How do they currently find information about the best times to plant, water, and harvest crops?
- Access to Technology:
 - What types of technology might this farmer have access to? Do they use a smartphone, basic mobile phone, or computer? What might limit their access to this technology?
 - How comfortable might they feel using an app or digital platform to help them monitor their crops?
- Needs and Pain Points:
 - What specific information would be most helpful for this farmer to know daily? For example, would they benefit from updates about upcoming weather, water levels, or pest alerts?
 - What frustrates them the most about their current process of managing crops? Where do they feel they're losing money, time, or resources?
- Impact of Satellite Data:
 - How could real-time satellite data help this farmer make better decisions? Imagine they could check soil moisture or plant health every day—how might that change the way they manage their crops?
 - How would their lives be different if they could predict problems like drought or disease outbreaks before they happen?
- Usability and Accessibility:
 - If you were designing an app or system for this farmer, what would he want it to look like? Would simple icons, clear images, or audio instructions to make it easier to use?
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- How could you design a system that's accessible even if they have limited internet or only basic technology? Would text updates or low-data options work best?
- Environmental and Financial Impact:
 - What would it mean to this farmer to use less water, fewer fertilisers, and reduce crop losses? Think about how this could help their budget and reduce their environmental impact.
 - How could having a successful, predictable crop yield impact their family, community, and food availability in their area?
- Long-Term Vision:
 - Imagine how this technology could benefit the farmer's community over the next 5–10 years. What changes might they see if more farmers started using data to improve crop health and reduce waste?
 - How could this system help improve food security, not just for this farmer, but for the wider community and region?

Creating User Profiles

After working through the prompts, ask learners to create a user profile for a typical farmer who might use the system. This can include:

- Name, age, and location of the farmer
- A description of their daily challenges and pain points
- Technology they have access to and comfort level with digital tools
- Their specific needs for improving crop management
- An example of how they would use the system to make better farming decisions

Step 3: Defining the Problem: Define the main problem that your project will solve. For example, is it weather information for farming, details of fertiliser?

Support: Use the resources in MM7: Problem to Pitch Space Design Challenge, Lesson 3, Define e.g. on the problem tree what are the root causes (weather, seed quality) and the “branches” (poor nutrition, farmers poor mental health) to show interconnected issues.

Step 4: Ideate: Brainstorm different ideas for how your system could work. How would people use it? What kind of information would it provide?

Step 5: Refine your ideas. Focus on the most promising ones and think about how they could be even better or more accessible.

Support: Use the resources in MM7: Problem to Pitch Space Design Challenge, Lesson 4 and 5, Ideate

Step 6: Prototype: Create a model or sketch of your satellite system or app. This could include the type of information it provides, how people interact with it, and what it looks like.

Support: Use the resources in MM7: Problem to Pitch Space Design Challenge, Lesson 6 Prototype

Prototypes can be 3D or 2D if using wireframes for software / apps. You can read this article to help you

<https://www.figma.com/resource-library/what-is-wireframing/>



Mock-ups can help you imagine how a user might interact with your satellite data-based app or system. Follow the steps in Canva to create a user Interface (UI) Mock-up for Satellite Solution

Steps in Canva:

1. Open a New Project:
 - Create a Custom Dimensions project, and set it to 1080x1920 pixels (this mimics a mobile screen format).
2. Set Up a Mobile Background:
 - In Elements, search for “mobile screen” to find a blank phone outline. Place it in the centre of the canvas.
3. Design the App’s Home Screen:
 - Inside the mobile frame, add a rectangle for a menu bar at the bottom and a circle or square near the top for the main icon or app name.
 - Use text to title this screen as “Satellite Access App” or “Global Weather.”
4. Add Buttons or Icons for Key Functions:
 - Create buttons or icons for each function, such as Weather Data, Plant health, Soil data. Place each button within the phone screen as a tapable icon.
 - Label each icon clearly with small text beneath or beside it.
5. Add a Sample Data Preview:
 - Use a rectangle as a sample “data preview” section in the middle, where satellite data like “Weather Update: Sunny, 75°F” or “Fertiliser: 5 km away” would appear.
 - Use smaller text for this data to simulate a realistic UI (user interface) feel.
6. Enhance with Colours and Borders:
 - Add borders to each button/icon for a polished look, and apply a consistent colour theme (e.g., blue and white for a “tech” feel).
7. Review, Download, and Save:
 - Make sure everything is aligned neatly and easy to read.
 - Download the mock-up once it’s polished!

Here’s a video of creating a mock-up in canva which might have different steps than above but will still help you How To Create Mockups In Canva 2024 (Step By Step), [The Social Guide](https://www.youtube.com/watch?v=2400MwF21Ds)
<https://www.youtube.com/watch?v=2400MwF21Ds>

You can also use cardboard - Cardboard Prototyping | Techniques, [Cal Maritime Makerspace](https://www.youtube.com/watch?v=qxXj2RhKjZY)
see <https://www.youtube.com/watch?v=qxXj2RhKjZY>

Or Paper Mobile Application Design : Paper Prototype Video, [Cor-mac](https://www.youtube.com/watch?v=y20E3qBmHpg)
<https://www.youtube.com/watch?v=y20E3qBmHpg>

Step 7: Test: Share your prototype with others to get feedback. Use their suggestions to make improvements and ensure it’s easy to understand and helpful for your users.

Support: Use the resources in MM7: Problem to Pitch Space Design Challenge, Lesson 7 Test