



Drone Exploring: Career Spotlights

Exploration — Post

Overview: This session takes a serious look at drones in scientific exploration and research as a career field, including the roles involved (research drone pilot, robotics or aerospace engineer, remote sensing scientist), the education and skills needed, and realistic pay ranges across research, engineering, and government agency roles. Explorers plan a mock remote exploration mission, listing required equipment, redundancy plans, and data goals.

OBJECTIVES

- Understand the roles involved in scientific exploration using drones and robotics.
- Learn the education pathways (engineering, robotics, remote sensing, planetary science) relevant to this field.
- Identify realistic pay ranges across research, engineering, and government agency roles.
- Practice planning a mock remote exploration mission, including equipment, redundancy, and data goals.

SUPPLIES

- Laptop and projector to show footage or images of NASA's Ingenuity Mars helicopter and other exploration drones
- Printed handouts: Career Pathway — Exploration Drone/Robotics Specialist and Mission Planning Worksheet
- Whiteboard or flip chart and markers

ADVISOR NOTES

- This session is career-focused: Use real missions (like NASA's Ingenuity), real education pathways, and real pay ranges rather than a hobbyist framing.
- Emphasize that most exploration drone work is part of a larger science or engineering team, not a solo pilot role. Coursework in engineering, robotics, or science is often more important than flying skill alone.
- Discuss how this field spans government agencies (like NASA), universities, and private aerospace and robotics companies.
- Consider inviting a guest speaker who works in robotics engineering, planetary science, or field research to share their career path. See Optional Extensions.
- If no guest speaker is available, Advisors can run the entire session using this outline, the Career Pathway handout, and the resource links below.

SESSION OUTLINE

- **Welcome and Icebreaker** (10 min)
 - "If you could send a drone to explore anywhere — on Earth or beyond — where would you send it, and what would you want it to find out?"
- **Safety and Technical Moment: Designing for the Unknown** (10–15 min)
 - Discuss why exploration drones need extra redundancy (backup systems) since there's often no way to repair or retrieve them if something goes wrong.
 - Explain how engineers design for extreme conditions: heat, cold, low atmospheric pressure, or complete darkness.
- **Mini-Lesson: Careers in Drone-Based Exploration** (15–20 min)
 - Roles: research drone pilot, robotics or aerospace engineer, remote sensing scientist, planetary science researcher.
 - Typical pay: Research and field science roles often range \$50,000-\$90,000/year; robotics and aerospace engineering roles typically range \$80,000-\$130,000+/year depending on employer and experience.
 - Discuss education pathways: engineering or robotics degrees, planetary or earth science degrees, and internships with agencies like NASA or research universities.

- **Activity: Plan a Remote Exploration Mission (20–25 min)**
 - Small groups choose a remote or extreme environment and use the Mission Planning Worksheet to list required equipment, a redundancy and backup plan, and specific data goals for the mission.
- **Wrap-Up Discussion (10 min)**
 - Groups present their mission plans.
 - Discuss the concrete steps (coursework, internships, research experience) needed to pursue this as a career.

REFLECTION SECTION

Advisor Note: Some sample questions are below. They are designed to help the participants apply what they have learned to their own interests. You are welcome to use these questions or develop your own.

Focusing Questions

- What surprised you about how much backup planning goes into an exploration mission?
- Which part of this field (engineering, piloting, science research) sounds most interesting to you?

Analysis Questions

- Why does redundancy matter so much more for exploration missions than for everyday drone flights?
- How might the skills needed for this career differ from a typical commercial drone pilot job?

Generalization Questions

- How is planning for the unknown in exploration like planning for uncertainty in other fields?
- What other careers require this same mix of engineering, science, and careful risk planning?

Challenge: This week, research one real exploration mission (NASA, a university research team, or a private company) and identify what kinds of engineers or scientists worked on it.

OPTIONAL EXTENSIONS

Guest Speaker: Invite someone who works in robotics engineering, planetary science, or field research to share their career path and take questions, in person or by video call.

Advisor-Led Option: If no guest speaker is available, Advisors can run the full session using this outline, the Career Pathway handout, and the resource links below. No outside expert is required.

Resource Links: NASA's Jet Propulsion Laboratory (JPL) education resources; university robotics and aerospace engineering program pages; FAA Part 107 overview ([faa.gov/uas/commercial_operators](https://www.faa.gov/uas/commercial_operators)) for Explorers who also want to fly commercially.

Extension Project: Explorers who are 16 or older and interested in commercial drone work can begin studying for the FAA Part 107 knowledge test as a complementary skill.

Handout: Career Pathway — Exploration Drone/Robotics Specialist

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A typical path into this field looks like this:

1. Strong Math and Science Foundation

Coursework in physics, engineering, and computer science builds the foundation for this field.

2. Engineering, Robotics, or Science Degree

A degree in aerospace or robotics engineering, planetary science, or earth science is the most common pathway.

3. Internships and Research Experience

Internships with agencies like NASA, universities, or private aerospace or robotics companies build real mission experience.

4. Specialized Roles

Research and field science roles typically range \$50,000-\$90,000/year; robotics and aerospace engineering roles typically range \$80,000-\$130,000+/year.

Handout: Mission Planning Worksheet

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Use this worksheet to plan your mock remote exploration mission.

Planning Item	Your Plan	Notes and Risks
Environment and destination		
Required equipment		
Redundancy and backup plan		
Data goals		
Team roles needed		