Guide to Working in the Aerospace Industry

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TECHNICAL CAPABILITIES & RESEARCH FOCUS AREAS

TECHNICAL FOCUS AREAS

- Digital Engineering
- Architecture Enablers including modularity
- Deep Tech; AI/ML, quantum and photonics
- Space Traffic Management

RESEARCH FOCUS AREAS

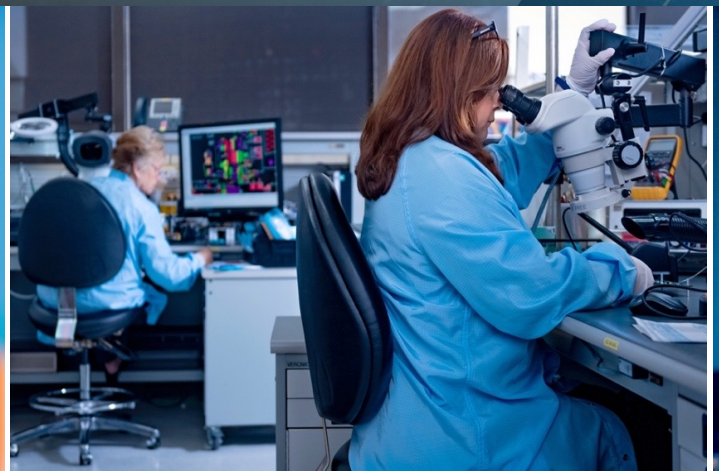
- Electrical Engineering / Microelectronics
- Photonics and Quantum Technologies
- Remote Sensing and Astronomy
- Space and Atmospheric Science, including space weather and heliophysics
- Advanced Manufacturing; additive manufacturing, robotics, AI/ML
- Material Science and material nano-analysis/microscopy
- Propulsion; chemical/hybrid technologies, small sat propulsion, electric/plasma propulsion
- Energy Technology; space photovoltaics and battery technology
- Chemistry/Materials analysis; propulsion, materials strength analysis, spectroscopy
- Composites and materials for space applications

AEROSPACE ENGINEERING-SPECIFIC RESEARCH FOCUS AREAS

- RF and microwave technologies; radar, antennas, microwave hardware
- Computer Science and Digital Engineering; Digital modeling and simulation fusion
- Aerospace engineering; orbital mechanics, attitude control, cluster flight/RPO
- Computer science; AI/ML research

List is not comprehensive

TECHNICAL DISCIPLINES FOR INTERN AND NEW GRADUATE JOB OPPORTUNITIES



- Aerospace Engineering
- Chemistry
- Computer Engineering
- Electrical and Computer Engineering
- Computer Science (AI/ML)
- Cyber and Cyber Security
- Electrical Engineering
- Mathematics
- Mechanical Engineering
- Physics
- Software Engineering
- Systems Engineering
- Robotics

List is not comprehensive

Technical Positions Require a Government Security Clearance

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Outline

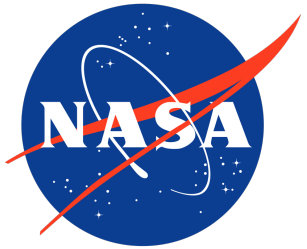
- Who's Who – Government, Contractors, FFRDCs
- Case Study– The Next Weather Satellite Constellation
- Where do I fit in?

Caveats

- This brief reflects my personal opinions, not of my company.
- This brief is a very coarse overview and is not meant to be comprehensive.
- I am inherently biased.

Government

- “The Customer”
- Includes Department of Defense, Department of Energy, NASA, NOAA etc.
- Hold the power to make decisions on funding, proposal winners.



U.S. AIR FORCE

Contractors

- Can be large and small companies
- Profit motivated
- Live and Die by the Contract
- Build hardware
- Roles generally focus on one mission

FFRDCs (Federally Funded Research and Development Centers)

- Non-profit organizations
- Act as the “technical arm” to government customers
- Academic environment
- Generally, do not build hardware
- Roles cover many programs and customers

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Sandia National Laboratories

MIT LINCOLN LABORATORY

Case Study – The Next Weather Satellite

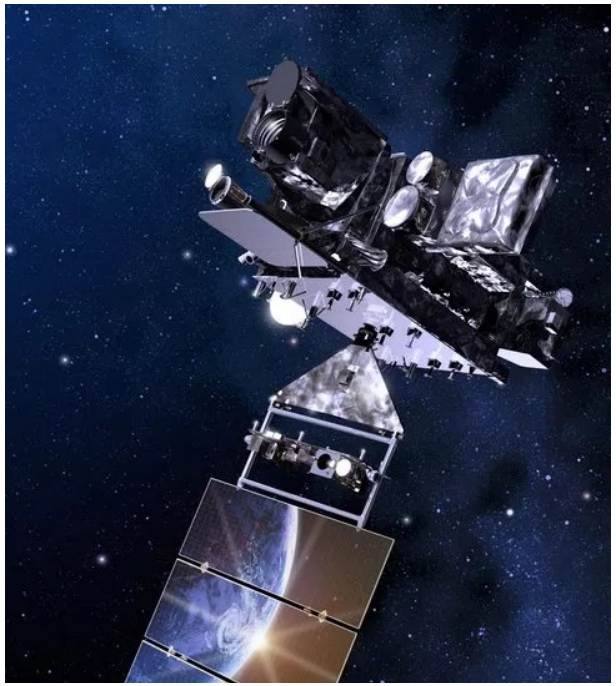

Image of GOES-T Weather Satellite
(Image credit: Lockheed Martin)

How does the government procure a successful weather satellite constellation?

1. *Research current technology, task Subject Matter Experts (SMEs) usually at FFRDCs to determine what improvements are needed in the next generation of satellites.*
   - What sensors are currently being used on weather satellites? How can they be improved? What orbit is optimal for certain applications? How many satellites will be needed?

2. *Write a proposal call with the needed requirements*
   - SMEs and government write carefully crafted proposal calls based on the previous research for contractors to apply to.
   - “Satellite will need to detect specific weather features”, “Satellite will need to observe every part of continental United States every 60 minutes”

3. *Contractors write proposals based on the call.*
   - Can they meet all the requirements listed? (i.e., sensitivity of the sensors, optimal orbit)
   - “What have we built before?”, “What modeling do we need to write a strong proposal?”, “Can we build it in the budget provided?”

Case Study – The Next Weather Satellite

How does the government procure a successful weather satellite constellation?

4. *Government and FFRDCs evaluate the proposals.*
   - Is the contractor analysis correct? Can they successfully meet the requirements of the mission based on their proposal?
   - The contractor says they can observe the continental US every 20 minutes based on their constellation design, is this correct? Does their sensor design allow the mission to meet the requirements?

5. *Selection is made and Contractor begins building the satellite.*
   - Can the contractor meet the deadline? When unforeseen complications arise can the satellite still meet the mission? Say the read noise on a detector increases. Can the sensor still meet the detection specifications?

6. *Launch and Operations*
   - Launch vehicle certification. Data dissemination – Where is the data going? How is it calibrated? How is it exploited?

Where do I fit in?

- Most positions need US Citizenship
- Holding a clearance is preferred but necessary.
- Contractors tend to employ for specific roles (i.e., for a contract) so it can be difficult to find a good fit.
- FFRDCs are more of an academic environment and are more willing to employ highly educated people to train

Aerospace Needs You!

- Highly educated people are in high demand in this field.
- Many opportunities/employers in the field for you to continue to use your physics background and grow your career.
- Many interesting and hard problems to solve!

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