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GNC Engineer, Navigation and State Estimation (Starlink)

at SpaceX

Redmond, WA

SpaceX was founded under the belief that a future where humanity is out exploring the stars is fundamentally more exciting than one where we are not. Today SpaceX is actively developing the technologies to make this possible, with the ultimate goal of enabling human life on Mars.

GNC ENGINEER, NAVIGATION AND STATE ESTIMATION (STARLINK)

At SpaceX we're leveraging our experience in building rockets and spacecraft to deploy Starlink, the world's most advanced broadband internet system. Starlink is the world's largest satellite constellation and is providing fast, reliable internet to 2M+ users worldwide. We design, build, test, and operate all parts of the system – thousands of satellites, consumer receivers that allow users to connect within minutes of unboxing, and the software that brings it all together. We've only begun to scratch the surface of Starlink's potential global impact and are looking for best-in-class engineers to help maximize Starlink's utility for communities and businesses around the globe.

As an engineer on this team, you will bring a passion and expertise in areas like control theory, state estimation, orbital mechanics, spacecraft systems design, optimization, and software development to join the Starlink guidance, navigation, and control (GNC). Come help us write the autopilot algorithms for thousands of satellites (the world's largest constellation!) and more than one million user terminals, enabling access to high speed broadband internet in all corners of the world.

RESPONSIBILITIES:

- Design, analysis, implementation of onboard angular and positional navigation logic for satellites, consumer antennas, and other Starlink devices.
 - Star tracker and signals based attitude determination and inertial propagation.
 - GNSS and signals based positioning and inertial propagation.
- Orbit determination of starlink sats and other objects of interest.
- Onboard estimation of payload alignment errors to maximize received inbound/outbound signal power.
- Space weather modeling and thermospheric density estimation and forecasting, to improve resilience of constellation against environmental factors.
- Work with hardware engineers on the design and specification of future navigation sensor packages, including both COTS solutions and in-house development.
- Model derivation and high fidelity simulation for development and validation of prototype features.
- Implementation, validation, unit testing, and deployment of production software (C++) pertinent to the systems described above.
- Provide engineering and data review support for hardware development, network level performance monitoring, special projects, and customer support team.

BASIC QUALIFICATIONS:

- Bachelor's degree in aerospace, physics, or an engineering discipline.
- Software development experience in C++.
- Experience in technical analysis scripting and visualization via Matlab or Python.
- Experience with generalized state estimation algorithms.
- Experience with attitude determination and/or GNSS positioning.

PREFERRED SKILLS AND EXPERIENCE:

- Master's degree or PhD in physics or an engineering discipline.
- Demonstrated project or professional experience in state estimation, feedback control, robotics, antenna design and actuation, or similar.
- Direct experience with inertial navigation systems.
 - Star tracker spot detection, pose estimation, propagation and filtering, and general firmware development.

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- Direct experience with GNSS.
 - Multi-GNSS measurement models.
 - Loosely/tightly coupled state estimation.
 - Carrier phase compensation and integer ambiguity resolution.
 - Ionospheric compensation and modeling via radio occultation measurements.
 - Externally supplied constellation ephemeris + clock augmentation.
 - PPP/RTK.
 - Experience with GNSS receiver and antenna hardware and integration (time synchronization, PTP, PPS, receiver firmware and RTCM protocol).
- Direct experience with generalized "signals of opportunity" ranging observations and navigation.
- Linux development experience.
- Strong understanding of classical dynamics, modeling and simulation, and software development.
- Capable of identifying and solving complex problems with little to no supervision or direction.
- Passion for advancing the commercial space industry.
- Ability to work in a fast paced, autonomously driven, and demanding start-up atmosphere.
- Excellent communication skills both written and verbal.

ADDITIONAL REQUIREMENTS:

- Must be willing to work extended hours and weekends as needed.

COMPENSATION AND BENEFITS:

Pay range:

GNC Engineer/Level I: \$120,000.00 - \$145,000.00/per year

GNC Engineer/Level II: \$140,000.00 - \$170,000.00/per year

Your actual level and base salary will be determined on a case-by-case basis and may vary based on the following considerations: job-related knowledge and skills, education, and experience.

Base salary is just one part of your total rewards package at SpaceX. You may also be eligible for long-term incentives, in the form of company stock, stock options, or long-term cash awards, as well as potential discretionary bonuses and the ability to purchase additional stock at a discount through an Employee Stock Purchase Plan. You will also receive access to comprehensive medical, vision, and dental coverage, access to a 401(k)-retirement plan, short & long-term disability insurance, life insurance, paid parental leave, and various other discounts and perks. You may also accrue 3 weeks of paid vacation & will be eligible for 10 or more paid holidays per year. Exempt employees are eligible for 5 days of sick leave per year.

ITAR REQUIREMENTS:

- To conform to U.S. Government export regulations, applicant must be a (i) U.S. citizen or national, (ii) U.S. lawful, permanent resident (aka green card holder), (iii) Refugee under 8 U.S.C. § 1157, or (iv) Asylee under 8 U.S.C. § 1158, or be eligible to obtain the required authorizations from the U.S. Department of State. Learn more about the ITAR [here](#).

SpaceX is an Equal Opportunity Employer; employment with SpaceX is governed on the basis of merit, competence and qualifications and will not be influenced in any manner by race, color, religion, gender, national origin/ethnicity, veteran status, disability status, age, sexual orientation, gender identity, marital status, mental or physical disability or any other legally protected status.

Applicants wishing to view a copy of SpaceX's Affirmative Action Plan for veterans and individuals with disabilities, or applicants requiring reasonable accommodation to the application/interview process should notify the Human Resources Department at (310) 363-6000.

Apply for this Job

* Required

First Name *

Last Name *

Email *

Phone *



Location (City) *

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Resume/CV * [Attach, or enter manually](#)

(File types: pdf, doc, docx, txt, rtf)

School *

Select a School

Degree *

Select a Degree

Discipline *

Select a Discipline

[+ Add another education](#)

LinkedIn Profile

Portfolio or Cover Letter

[Attach File](#)

(File types: pdf, doc, docx, txt, rtf)

How did you hear about this job? *

If event or other, please specify below.

Please specify

Active Security Clearance(s) *

Select one or more

SpaceX Employment History *

Please select

Are you legally authorized to work in the United States? *

Please select



Citizenship Status *

To conform to U.S. Government space technology export regulations, including the International Traffic in Arms Regulations (ITAR) you must be a U.S. citizen, lawful permanent resident of the U.S., protected individual as defined by 8 U.S.C. 1324b(a)(3), or eligible to obtain the required authorizations from the U.S. Department of State. Learn more about ITAR [here](#).

Please select ▼

If (f) Other, please explain:

Can you perform all of the essential functions of this role with or without reasonable accommodations? *

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Voluntary Self-Identification

For government reporting purposes, we ask candidates to respond to the below self-identification survey. Completion of the form is entirely voluntary. Whatever your decision, it will not be considered in the hiring process or thereafter. Any information that you do provide will be recorded and maintained in a confidential file.

As set forth in SpaceX's Equal Employment Opportunity policy, we do not discriminate on the basis of any protected group status under any applicable law.

Gender

Please select ▼

Are you Hispanic/Latino?

Please select ▼

Race & Ethnicity Definitions

If you believe you belong to any of the categories of protected veterans listed below, please indicate by making the appropriate selection. As a government contractor subject to the Vietnam Era Veterans Readjustment Assistance Act (VEVRAA), we request this information in order to measure the effectiveness of the outreach and positive recruitment efforts we undertake pursuant to VEVRAA. Classification of protected categories is as follows:

A "disabled veteran" is one of the following: a veteran of the U.S. military, ground, naval or air service who is entitled to compensation (or who but for the receipt of military retired pay would be entitled to compensation) under laws administered by the Secretary of Veterans Affairs; or a person who was discharged or released from active duty because of a service-connected disability.

A "recently separated veteran" means any veteran during the three-year period beginning on the date of such veteran's discharge or release from active duty in the U.S. military, ground, naval, or air service.

An "active duty wartime or campaign badge veteran" means a veteran who served on active duty in the U.S. military, ground, naval or air service during a war, or in a campaign or expedition for which a campaign badge has been authorized under the laws administered by the Department of Defense.

An "Armed forces service medal veteran" means a veteran who, while serving on active duty in the U.S. military, ground, naval or air service, participated in a United States military

operation for which an Armed Forces service medal was awarded pursuant to Executive Order 12985.

Veteran Status

Please select



Voluntary Self-Identification of Disability

Form CC-305
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Why are you being asked to complete this form?

We are a federal contractor or subcontractor. The law requires us to provide equal employment opportunity to qualified people with disabilities. We have a goal of having at least 7% of our workers as people with disabilities. The law says we must measure our progress towards this goal. To do this, we must ask applicants and employees if they have a disability or have ever had one. People can become disabled, so we need to ask this question at least every five years.

Completing this form is voluntary, and we hope that you will choose to do so. Your answer is confidential. No one who makes hiring decisions will see it. Your decision to complete the form and your answer will not harm you in any way. If you want to learn more about the law or this form, visit the U.S. Department of Labor's Office of Federal Contract Compliance Programs (OFCCP) website at www.dol.gov/ofccp.

How do you know if you have a disability?

A disability is a condition that substantially limits one or more of your "major life activities." If you have or have ever had such a condition, you are a person with a disability. **Disabilities include, but are not limited to:**

- Alcohol or other substance use disorder (not currently using drugs illegally)
- Autoimmune disorder, for example, lupus, fibromyalgia, rheumatoid arthritis, HIV/AIDS
- Blind or low vision
- Cancer (past or present)
- Cardiovascular or heart disease
- Celiac disease
- Cerebral palsy
- Deaf or serious difficulty hearing
- Diabetes
- Disfigurement, for example, disfigurement caused by burns, wounds, accidents, or congenital disorders
- Epilepsy or other seizure disorder
- Gastrointestinal disorders, for example, Crohn's Disease, irritable bowel syndrome
- Intellectual or developmental disability
- Mental health conditions, for example, depression, bipolar disorder, anxiety disorder, schizophrenia, PTSD
- Missing limbs or partially missing limbs
- Mobility impairment, benefiting from the use of a wheelchair, scooter, walker, leg brace(s) and/or other supports
- Nervous system condition, for example, migraine headaches, Parkinson's disease, multiple sclerosis (MS)
- Neurodivergence, for example, attention-deficit/hyperactivity disorder (ADHD), autism spectrum disorder, dyslexia, dyspraxia, other learning disabilities
- Partial or complete paralysis (any cause)
- Pulmonary or respiratory conditions, for example, tuberculosis, asthma, emphysema
- Short stature (dwarfism)
- Traumatic brain injury

Disability Status

Please select



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Submit Application

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