Hamoud Alshammari

alshammarih3351@gmail.com | +966 56 417 5858 | Riyadh, Saudi Arabia | orbitar7.github.io | github.com/OrbitAR7 | LinkedIn

RESEARCH INTERESTS

Space systems across astrodynamics, spacecraft navigation and estimation, GNSS/PNT, and Earth observation and geodesy, with an emphasis on methods that are validated, account for their uncertainty, and hold up on real data.

EDUCATION

The University of Texas at Austin, Cockrell School of Engineering — Austin, TX, USA
M.S.E. in Aerospace Engineering · GPA 3.9/4.0 · Academic advisor: Prof. Ryan P. Russell — *Jan 2023 – Dec 2024*
Coursework: Orbit Determination; Satellite Geodesy; Stochastic Estimation & Control; Advanced Estimation Theory; Satellite Control Systems; Optimal Control; Celestial Mechanics; SAR; LiDAR; LEO Satellites for EO; ML in the Geosciences.

University of Wisconsin–Madison, College of Engineering — Madison, WI, USA
B.S. in Engineering Mechanics (Aerospace Engineering focus) — *Jan 2018 – Dec 2020*

PROFESSIONAL EXPERIENCE

Neo Space Group — Riyadh, Saudi Arabia
Aerospace Technology Engineer — *May 2025 – Present*

- R&D and technical due diligence across satellite communications, PNT, Earth observation and NB-IoT; independent quantitative checks of vendor performance claims and proofs of concept.
- Constellation-geometry analysis, including dilution-of-precision studies comparing single-shell and multi-inclination LEO designs under realistic elevation masks; link budgets and coverage/capacity models.
- Briefings for executive leadership and partners; defined proof-of-concept scope, milestones and success metrics.

RESEARCH EXPERIENCE

Center for Space Research, The University of Texas at Austin — Austin, TX, USA
Research Engineering/Scientist Professional — *Jan 2025 – Apr 2025*
Graduate Research Assistant — *Feb 2024 – Dec 2024*

- Lunar geodesy and reference-frame research in a collaboration between CSR and CU Boulder's Colorado Center for Astrodynamics Research (Profs. S. Bettadpur, L. Magruder; Prof. R. S. Nerem at CU).
- Reviewed lunar frame realizations and frame ties; assessed multi-source and NASA datasets for a consistent lunar frame.
- Co-authored internal technical documentation and presentations recording assumptions and frame-tie strategies for team reuse.

SELECTED GRADUATE PROJECTS

- **Orbit determination.** EKF, UKF and batch least squares on 6 days of three-station range/range-rate (EGM96 20×20, Sun/Moon, drag, SRP); smoothing cut epoch uncertainty from 7.9 m to 29 cm; drag estimates exposed a hidden maneuver.
- **Attitude determination & control.** Closed-loop ADCS with environmental torques, phase-plane RCS control (±0.5° dead band) and a six-state MEKF for attitude and gyro bias; a 100-run Monte Carlo showed the filter's σ matches its actual error.
- **Orbit maintenance.** Replicated TerraSAR-X's 11-day sun-synchronous repeat orbit with J2 and drag; 13 ΔV burns in 66 days kept it inside a 250 m control tube 99.7% of the time.
- **Geodesy & remote sensing.** Degree-variance spectra of gravity-field functionals from spherical-harmonic models; time-domain SAR back-projection; CNN tree detection from satellite/LiDAR data vs. DeepForest.

OPEN-SOURCE SOFTWARE (github.com/OrbitAR7)

- **GNSS & navigation:** *gnss-integrity-raim* (Python; chi-square FDE, protection levels validated by Monte Carlo), *gnss-pseudorange-solver* (C++; least squares, Sagnac, DOP), *constellation-dop-analyzer* (Python; DOP from real GPS/Starlink TLEs).
- **Estimation & astrodynamics:** *EstimationToolkit.jl* (Julia; 36 filters incl. IMM/GPB and particle flow, 568 tests), *tle-sgp4-cpp* (C++; SGP4 matching the reference to <1 µm), *orbit-propagator-cpp* (C++; two-body + J2, validated).
- **Simulation & geodesy:** *basilisk-link-budget* (Python; Basilisk tests), *gibbs-phenomenon-visualizer* (Python; SH leakage).

SKILLS

Programming: Python (NumPy, SciPy, PyTorch), MATLAB & Simulink, Julia, C/C++, shell scripting for HPC, Git, LaTeX.
Methods: EKF/UKF/MEKF, particle filters, batch least squares, Monte Carlo, SGP4/J2/drag propagation, spherical harmonics, SAR.
Languages: Arabic (native), English (fluent). **Service:** Habitat for Humanity builds (Houston, Raleigh, Wisconsin), 2018–20.

REFERENCES

Prof. Lori Magruder — Director, CSR, UT Austin
lori.magruder@austin.utexas.edu

Prof. Srinivas Bettadpur — Aerospace Eng. & CSR, UT Austin
srinivas@csr.utexas.edu

Prof. Moriba Jah — Aerospace Eng. & Oden Inst., UT Austin
moriba@utexas.edu

Prof. Ryan P. Russell — Aerospace Engineering, UT Austin
ryan.russell@austin.utexas.edu