

## Professional Experience

**Second Order Effects** | El Segundo, CA

Jan. 2022 - Current

*Staff Systems Engineer, Special Projects.* Hybrid systems architect and technical advisor, specializing in ambiguous and novel problems across aerospace and advanced energy. Leading high-mix low-volume production of digitizers for power-plant scale plasma diagnostics, collaborating with fusion scientists to support 70+ instrument interfaces. Designed pointing, acquisition, and tracking system for space-based power beaming including control architecture and actuator/sensor selection. Supporting system design for star trackers (radiometry, link budgets, optomechanics) and spacecraft docking systems (soft capture system). Driving company-wide root-cause analysis training. Developing RAG-based tools to democratize program context.

Founded a 7-person cross-disciplinary R&D team tackling high-novelty, high-uncertainty engineering programs. Led turnaround of ~\$6M in at-risk projects through realignment of technical execution and business goals. Recruited multiple senior technical and people leaders.

*Mechanical Engineering Manager.* Stabilized and matured mechanical discipline during leadership transition. Developed 3-year roadmap, and foundational review processes. Architected SCARA-type robotic arm for autonomous EV fleet charging at scale: mechanism trade studies, actuator/sensor/camera selection, integration and test, and roadmapping. Performed due-diligence on novel electrostatic end effector and developed low profile, ultra-sensitive capacitive sensors for semiconductor clients.

*Senior Systems Engineer.* Hands-on technical contributor across diverse early-stage programs. Invented novel high bandwidth temperature sensor (patent pending). Developed a museum-quality digital display for interactive and generative art from concept to low volume production. Architected modular powertrain control systems and wavefront correction actuators for a telescope.

**Honeybee Robotics** | Exploration Technologies Division in Altadena, CA

Sept. 2017 - Nov. 2021

*Lead, Robotic Systems Group.* Systems engineer for LAMPS, a Phase A NASA GCD program to design a 10kW vertically deployable solar array for lunar habitation. Led development of KARLE, a TRL6 sample handling system for lunar exploration with NASA GSFC. Invented novel methods for solid-state sample analysis and manipulation for integration into robotic sampling systems for Europa with JPL. Directed knowledge sharing and processes improvement efforts.

*Robotics Engineer III / Project Engineer.* Led design of pneumatic sampling system for Dragonfly (New Frontiers 4 mission); won NASA mission selection, matured novel architecture from TRL1 to TRL5 in 16mo. Developed piezo-pneumatic drilling approach for CLPS payload LISTER. Led SBIR, PICASSO, SESAME work on cryogenic thermo-mechanical drilling.

## Independent Consulting

*The Choreodaemonic Platform (2025).* Created 14-DOF robotic puppeteer from scratch working after-hours over 4 weeks. Sole technical contributor to design and build, actuator selection, kinematics, and control software (C++) with real-time setpoint streaming via Open Sound Control. Successfully installed for live performance including projection art and multiple dancers.

*Lind Art & Technology (2023-2024).* Designed custom connector for 2x BLDC + CAN interface for 20kW electric surfboard, balancing extreme environment requirements with unique need for user serviceability (patent pending). Owned mechanical design of tightly-integrated remote from prototype to DFM/DFA, working with foreign EE, FW, and contract manufacturing.

*Alta Motors (2016-2017).* Developed robotic fixtures and controllers for assembly of custom, high-energy-density batteries including QA instrumentation and PLM-compatible technician tools for electric motocross bike.

## Internships

*Alta Motors (2016).* Developed instrumented mechanisms for battery assembly during production ramp.

*SpaceX (2015).* Designed and qualified coaxial connectors and supported enclosure architectures for point-to-point avionics.

*Columbia University (2013, 2014).* Developed high-throughput neuron injury device and flexible cell culture plates.

*Max-Planck Institute (2012).* Built diagnostic tools and fixtures for plasma wakefield accelerator research.

## Education

**University of Pennsylvania** | Philadelphia, PA

M.S.E. in Robotics, GRASP Lab, '16

B.S.E. Cum Laude in Mechanical Engineering and Applied Mechanics, '16

## Technical Skills

<b>Software</b>	SolidWorks, Inventor, SolidCAM, Altium, COMSOL, Confluence/Jira, github
<b>Actuator types</b>	BLDC, BDC, stepper, piezo MLA, solenoid, distributed-mode loudspeakers, paraffin/SMA, pneumatic
<b>Sensor types</b>	TC/RTD, pressure, encoder, potentiometer, Hall effect, accelerometer/gyroscope, ultrasonic/laser distance, capacitive/inductive proximity, phototransistor, strain gauge, camera, fluid mass flow
<b>Programming</b>	Prefer Linux env., Python/MATLAB for prototyping or analysis, C++ for real-time (controllers)
<b>DFM</b>	GD&T, Machine tools, 3D printing (FDM, SLA, SLS), laser cutting, waterjet, urethane casting, injection molding, sheet metal, PCB/PCBA, EB welding, harnessing, electroforming, wire-EDM, optical alignment, woodworking
<b>Embedded</b>	STM32, RBPi, Particle IoT, Arduino, LabJack, NI-DAQ, Copley, Elmo
<b>Other</b>	Customer interfacing, graphical illustration, technical documentation/writing, industrial design

## Publications

Full-text and more available at [tighecosta.com/publications](http://tighecosta.com/publications)

- Solid State Sample Handling with Amplified Piezo Actuators.** Costa JT, Ridilla A, Sanasarian L, Zacny K. *Proceedings of the 2022 IEEE Aerospace Conference*, Big Sky, MT. March 2022.
- Survey, Evaluation, and Advancement of Sample Sensing Techniques for Future Missions.** Costa JT, Sanasarian L, Sanigepalli V, Lam S, Stolov L, Palmowski J, Kancans R, Tosi LP, Roberts E, Kriechbaum K. *Proceedings of the 2022 IEEE Aerospace Conference*, Big Sky, MT. March 2022.
- Development and Testing of a Sample Handling System for In-Situ Lunar Geochronology with KArLE.** Costa JT, Lang CT, Corrigan P, Emery JW, Thompson LA, Jensen NA, Rideout HT, Indyk S, Yen B, Zacny K, Mullin M, Cattani F, Frese E, Stysley P, Cohen BA. *Proceedings of the 2022 IEEE Aerospace Conference*, Big Sky, MT. March 2022.
- Dragonfly Mass Spectrometer Boldly Goes Where No Other Ion Trap Mass Spectrometer Has Gone Before: Saturn's Moon Titan.** Grubisic A, Trainer M, Brinckerhoff W, Van Amerom F, Li X, Danell R, Kaplan D, Malespin C, Costa JT, Rehnmark F, Zacny K, Lorenz R, Barnes J, Turtle E. *Proceedings of the 2020 ASMS Conference on Mass Spectrometry and Allied Topics*, June 2020.
- Development and Testing of a Sample Cup for Laser-Based Instruments.** Costa JT, Grubisic A, Sparta J, Li X, Castillo M, Holmes V, Crandall C, Yen B, Rehnmark F, Trainer M, Lorenz R, Zacny K. *Proceedings of the 2019 Astrobiology Science Conference (AbSciCon)*, June 2019.
- SLUSH: Search for Life Using Submersible Heated Drill.** Zacny K, Hand K, Sotin C, Howell S, Cwik T, Mueller J, Ehlmann B, Nagihara S, Tipton M, Liller S, Rehnmark F, Costa JT, Bergman D, Hovik W. *Proceedings of the 2019 Astrobiology Science Conference (AbSciCon)*, June 2019.
- Sampling the Ocean Worlds: Drilling and Pneumatic Transfer.** Sparta J, Costa JT, Sanigepalli V, Yu D, Ng P, Bailey J, Yen B, Rehnmark F, Zacny K, Lorenz R. *Proceedings of the 2019 Astrobiology Science Conference (AbSciCon)*, June 2019.
- Application of Pneumatics in Delivering Samples to Instruments on Planetary Missions.** Zacny K, Lorenz R, Rehnmark F, Costa JT, Sparta J, Sanigepalli V, Yen B, Yu D, Bailey J, Bergman D, Hovik W. *Proceedings of the 2019 IEEE Aerospace Conference*, March 2019.
- SLUSH: Search for Life Using Submersible Heated Drill.** Zacny K, Costa JT, Rehnmark F, Mueller J, Cwik T, Zimmerman W, Chow P. *Proceedings of the 49th Lunar and Planetary Science Conference*, August 2018. #2083
- Drilling Into Titan Cryogenic Materials: Water-Ammonia Ice and Paraffin Wax.** Sparta J, Lorenz R, Costa JT, Rehnmark F, Zacny K. *Proceedings of the 49th Lunar and Planetary Science Conference*, August 2018. #3008
- Cryogenic Sample Acquisition and Delivery System (CryoSADS) for Titan and Europa.** Zacny K, Lorenz R, Rehnmark F, Costa JT, Bailey J, Traeden N, Mank Z, Sparta J. *Proceedings of the 42nd COSPAR Scientific Assembly*, July 2018.
- Pneumatic Sample Acquisition and Transfer for 'Ocean Worlds' Landers.** Lorenz R, Zacny K, Costa JT, Rehnmark F, Sparta J, Traeden N, Mank Z. *Proceedings of the 15th International Planetary Probe Workshop (IPPW)*, June 2018.
- Surface and Subsurface Sampling Drills for Life Detection on Ocean Worlds.** Rehnmark F, Zacny K, Costa JT, Mank Z, Bailey J, Sparta J, Chow P, Traeden N. *Proceedings of the 15th International Planetary Probe Workshop (IPPW)*, June 2018.
- Pneumatic Sample Transport for Ocean Worlds.** Sparta J, Zacny K, Lorenz R, Rehnmark F, Costa JT, Mank Z, Bailey J, Traeden N. *Proceedings of the 15th International Planetary Probe Workshop (IPPW)*, June 2018.
- SLUSH: Europa Hybrid Deep Drill.** Zacny K, Mueller J, Costa JT, Zimmerman W, Gray A, Cwik T, Chow P, Rehnmark F, Adams G. *Proceedings of the 2018 IEEE Aerospace Conference*, June 2018. DOI: 10.1109/AERO.2018.8396596
- Designing for Uniform Mobility Using Holonomicity.** Costa JT, Mark Y. *Proceedings of the 2017 IEEE International Conference of Robotics and Automation (ICRA)*, June 2017. DOI: 10.1109/ICRA.2017.7989285
- Stretch Injury of Human Induced Pluripotent Stem Cell Derived Neurons in a 96 Well Format.** Sherman SA, Phillips JK, Costa JT, Cho FS, Oungouljian SR, Finan JD. *Scientific Reports*, September 2016. DOI: 10.1038/srep34097