Matthew Harper

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EXECUTIVE SUMMARY

Innovative engineering leader experienced leading cross-functional teams delivering scalable optimization, reliability, and autonomous solutions. Proven track record leading teams, implementing transformative solutions, and applying novel practices to improve reliability, scalability, and feature delivery. Strong background in AI/ML, decision science, and large-scale system integration within enterprise in end-to-end project execution, operations, maintenance, and team development. Experienced in research, development, and exploration of new artificial intelligence techniques and applications which bridge the gap between theoretical ideas into real-world solutions.

CORE CAPABILITIES

- Decision Science & Advanced Analytics
- AI / ML & Computer Vision Systems
- Data Pipelines, Experimentation & Analytics Platforms
- Engineering Frameworks, Governance & Standards
- Strategic Roadmaps & Stakeholder Alignment
- Team Leadership, Mentorship & Knowledge Transfer

INNOVATION LEADERSHIP & STRATEGIC COMPETENCIES

- Developed Autonomous Production & Smart Field Systems delivering 5% production improvement, 7% availability gains, and $10MM cost savings across multi-site operations.
- AI-Driven Reliability & Predictive Maintenance increasing asset MTTF greater than 40–50-year horizons and reducing failure rates enterprise-wide.
- Led Mission-Critical Systems Innovations improving network reliability from 70 year to 858-year MTTF for aerospace launch reliability, safety, and operations.
- Developed Analytics & Decision Platforms enabling real-time situational awareness and faster executive decision-making featuring production and operations dashboards for real-time situational awareness.
- Real-Time Computer Vision & DSP Video Watermarking System (IP owner) adopted by Texas A&M University, University of Toronto, and Texas Instruments/MATLAB industry partners.
- Novel AI-based artificial lift (IP owner) gas injection system utilizing gradient descent for injection and production optimization.

PROFESSIONAL EXPERIENCE

Technical Engineering Leader | Automation & Decision Systems | Surge Energy (2021–2024)

- Developed Autonomous Production & Smart Field Systems delivering 5% production improvement, 7% availability gains, and $10MM cost savings across multi-site operations.
- Implemented AI-Driven Reliability & Predictive Maintenance methodologies increasing asset MTTF greater than 40–50-year horizons and reducing failure rates enterprise-wide.
- Performed complex online hardware-in-the-loop (HITL) testing and commissioning for rapid enterprise integration and system verification.
- Led the development and implementation of data-driven solutions to optimize production and reduce process alarms, improve facility performance, and enhance operational decision-making.
- Led a reliability team of 15+ implementing ML-based optimization projects for real-time dashboards, predictive analytics, and alarm reduction, improving decision-making and efficiency.
- Directed CI/CD PLC/DCS/HMI software projects for autonomous instrument-based control systems (Smart Lift, Smart Tank, Smart Level) increasing production efficiency while reducing downtime.
- Governance and knowledge management provided for teams in the transfer of tacit and explicit knowledge. Developed reliability procedures for development, facilities operation, and design.

- Led implementation of reliability centered maintenance techniques for technical & quality assurance based on NASA RCM featuring AI/ML based proactive and predictive maintenance.
- Mentored engineering teams and analysts through structured knowledge transfer, design reviews, and technical leadership.
- Successful scaled research development pilots into production platforms supporting operations, reliability, and optimization.

I&C Engineering Consultant Lead | Vandenberg, CA AFB/SFB | Firefly Aerospace (2021)

- Led design and commissioning of mission-critical automation, instrumentation, and control systems for launch operations.
- Managed development Mission-Critical systems innovations improving alarm warning system availability from 70 year to 858-year MTTF for aerospace launch reliability, safety, and operations.
- Developed Analytics & Decision Platforms enabling real-time situational awareness and faster executive decision-making featuring production and operations dashboards for real-time situational awareness
- Architected high-availability networking and timing systems supporting safety-critical operations.
- Established engineering documentation, testing, and governance practices aligned with launch-range standards.
- Led the design and implementation of mission-critical area warning systems and control systems for ground support and space vehicle launch operations at Vandenberg AFB.
- Developed predictive analytics dashboards integrating ML algorithms for real-time launch insights and resource optimization.
- Managed strategic alignment of resources with cross-functional teams ensuring designs met project scheduling, costs, safety, reliability, maintenance, and operational requirements.
- Provided technical guidance for projects involving instrumentation, controls, and automation systems, ensuring compliance with safety standards and operational requirements.
- Successfully developed and implemented data network systems, including a triple redundant PTP satellite timing network.
- Utilized machine learning techniques to predict launch anomalies and enhance system reliability.

Sr. Automation Engineer | Automation & Analytics | Occidental Oil & Gas (2018–2020)

- Developed predictive analytics and optimization solutions generating ~$50M in enterprise value.
- Built data foundations integrating operational systems with analytics and decision-support workflows.
- Improved productivity by ~5% YoY through data-driven alarm rationalization, optimization and monitoring.
- Developed novel AI-based artificial lift (IP owner) gas injection system utilizing gradient descent and back propagation for injection control and production optimization.
- Provided technical mentorship and knowledge transfer across engineering and operations teams.
- Designed embedded autonomous PLC-based artificial lift and well production systems leveraging stochastic optimization and ML-based decision-making.
- Led the development and implementation of advanced automation systems to optimize well production, improve facility reliability, and enhance safety.
- Electrical UPS battery design and specification with on-demand time calculator for evaluation, testing, and validation.
- Electrical design specifications for well site locations including one lines, electrical switch rack designs, underground, cable schedules, arc flash studies and equipment labeling.
- Electrical, Instrument, and Software FAT/SAT testing procedures and reports developed for quality assurance to reduce cost and installation time while increasing reliability and operability.
- Utilized data science and machine learning techniques to analyze operational data, identify trends, and optimize processes, resulting in increased process availability and production, reduced alarm rates, and improved safety.

- Provided technical leadership for electrical engineering and instrumentation projects, ensuring compliance with safety standards and operational requirements with consideration for maintenance and operation.
- Developed autonomous control systems to detect and safely react to process deviations extending operation time and reducing inherent hazardous operations created by initiating and intermediate events.
- Safety systems analysis, design and specification of safety functions, IPLs and ITP development, and Toxic and flammable gas monitoring systems in hazardous areas including H_2S and high LEL gas concentrations.
- Managed project life cycles, from requirements to FAT/SAT testing, commissioning, mechanical integrity, and operational handover.

Electrical Engineer | $7B Cedar Bayou Expansion Project | CPChem (2016–2018)
- Designed and supported instrumentation, electrical, and control systems for large-scale chemical operations.
- Led commissioning, troubleshooting, and lifecycle support for automation and safety systems.
- Applied reliability engineering and standards-based design to improve system availability and safety.
- Collaborated with operations and maintenance teams to align engineering solutions with plant objectives.
- Lead project engineer for electrical, instrumentation, and control system design, operational readiness, SOPs, and training development on USGC 1594 Ethane Cracker $7B project.
- Project management provided for contract exhibit interpretation and assurance. Design of real-time monitoring, condition-based maintenance systems for reliability centered maintenance implementation.
- Electrical power load flow, short circuit, arc flash, and motor trip characteristic studies performed with ETAP.
- Rotating equipment, motor and power relay setting and programming scheme development with acSELerator software for SEL relays for zones of protection, motor start protection schemes, Power Management System remote monitoring (TCP/Modbus over Fiber optic mediums), and reporting. Electrical switchgear testing (ANSI/NETA), maintenance, and switching procedures.
- Lead participant for ID and FD fan operational safety requirements and interlock requirements in SRS and control and interlock narratives based on NFPA 85/ANSI/ISA77.
- Led the Mechanical Integrity Program (MIP) implementation for instrumentation and electrical functional areas and enhanced the evaluation process and increased process reliability. Developed and created an enhanced Reliability Centered Maintenance (RCM) program complete with selective-adaptive maintenance strategy selection matrices based on conditions including criticality, FMEA, RCA, and input from a predictive data collection asset database.
- SME in alarm management, SIS systems & diagnostics, IPL/SIF identification, and compliance with NFPA 85/ANSI/ISA77 for boiler, furnace, and burner safety systems.
- Delivered advanced reliability solutions through real-time monitoring, condition-based maintenance, and intelligent device management.
- Testing and commissioning of major DCS/PLC platforms (ControlLogix, Yokogawa Centum VP, Triconex, SEL, Honeywell, Foundation Fieldbus) with proven success in QA, loop checks, and unit operational readiness.

Electrical Engineer | Launch & Test Infrastructure | SpaceX (2014–2015)
- Designed and commissioned mission-critical electrical power and control systems supporting test and compute facilities.
- Supported high-availability power distribution, UPS, generators, and monitoring systems.
- Performed onsite troubleshooting and root-cause analysis in high-reliability environments.
- Collaborated with multidisciplinary teams to deliver complex infrastructure projects on aggressive schedules.

- Developed novel autonomous automation systems for rocket test stands, including cryogenic rocket fuel conditioning systems, test stand architecture and control, reactor pressure and level, and dynamic autonomous safety systems.
- Led the development, operations, and maintenance of automation, power distribution, and control systems at the McGregor Rocket Test Facility.
- Ensured compliance with NASA and Space Launch range standards for strategic alignment.
- Developed and integrated safety instrumentation and control systems for mission-critical applications, enhancing system performance and safety, including PLC programming and development.
- Designed and installed mission critical electrical power distribution systems, including motors, generators, automatic transfer switching, UPS, and dynamic load analysis.
- Managed capital projects for Falcon Heavy, Raptor, Crew Dragon, and Merlin S1/S2 test stands.
- Developed software for SCADA systems including PLC programming, and HMI/GUI interfaces and specified, selected, and integrated instrumentation and control systems for various applications.
- Championed implementation of reliability techniques for mechanical/electrical integrity and engineering design based on NASA RCM quality and reliability requirements.

Adjunct Faculty | Electrical, Instrument & Automation | San Jacinto College (2012–2016)
- Developed course instruction and labs materials in electrical theory and controls, principles of instrumentation, PID control theory and tuning, DCS/PLC programming, and automation theory & systems to technology students.
- Developed curriculum integrating theory with hands-on industrial applications.
- Mentored students on applied engineering problem-solving and professional development.
- Maintained alignment with industry standards and workforce needs.

EDUCATION
- **MS, Data Science** – *Texas A&M University - Victoria*
- **MS, Computer Science** – *University of Houston*
- **BS, Electrical Engineering** – *Texas A&M University*
- **AS, Mathematics** – *San Jacinto College*
- **AAS, Instrumentation Technology** – *San Jacinto College*

CERTIFICATIONS & TRAINING
UH Data Analytics & Machine Learning Certificate
ISA 84 SIS Expert
*Texas Master Electrical License (**TMEL**)*
*NFPA Certified Electrical Safety Expert (**CESP**)*
*NCCER Certified Instrument Technician (**NCIT**)*
*Certified Fieldbus Technical Specialist (**CFTS**)*
Certified Honeywell Field Device Manager Programming Associate
*DHS Industrial Cyber Emergency Response Team (**CERT**) Certificate*

HONORS & AWARDS
Top Graduate Award *- University of Houston-Victoria*
Technical Innovation Award *– Surge Energy, Smart Systems*
Thanx Award *– Innovation and Dedication – Oxy, New Mexico*
Kick Ass Award *- SpaceX, McGregor Test Site*
Electrical Design Project *– Texas A&M University*
Phi Theta Kappa *- Honor Society*
Phi Kappa Phi *- Honor Society*

HIGHLIGHTS & IMPACT

- Experienced delivering **SCADA-PLC-Edge Device integration, high-reliability systems** in energy, aerospace, and AI research.
- Led teams of engineers and developers, **mentoring junior engineers into technical leaders**.
- Successfully executed projects improving **automation reliability, CI/CD processes, and system performance**.
- Deep expertise applied **AI/ML**, and large-scale engineering systems aligned with a focus on innovation in AI computing.
- **Hands-on** domain level experience in electrical, instrumentation, automation, and programming.

PROJECTS
- **Electrical** Aerospace, Data Center, Industrial, Chemical, Oil & Gas, Manufacturing
- **Aerospace** Rocket Launch and Testing design, Instrumentation, Engineering and Operations
- **Automation** CI/CD Development Testing, Commissioning, Maintenance, Operations
- **Petrochemicals** Cedar Bayou $7B US Gulf Coast (**USGC**) polyethylene
- **Multimodal** based AI vision transformer models used for process optimization and rationalization using CLIP with image and text encoders.
- **Embedded AI based** autonomous well monitoring Smart Lift gas injection optimization project.
- **Agentic AI** Smart Tank project in which autonomous monitoring and control utilized for dynamic PVT monitoring and dynamic set point and control adjusting in real-time to increase production and increase safety and reliability.
- **Intelligent Agent** development project deployed to identify product bottlenecks, abnormalities, material balancing, and self-generated or generative rule generation for pattern recognition.

CORE SKILLS
- **Automation**: Yokogawa, Rockwell RSLogix 500, Controllogix 5000, Modicon, Siemens S5, GE Fanuc, Triconex TS32, Texas Instruments C2000 Piccolo, Arduino Uno w/Ethernet card, Emerson DeltaV, Honeywell Experion & Safety Manager, OSI PI, IP21, Smartphone Google Android application programming, real-time digital watermarking.
- **Network**: TCP/UDP, APIs, Ethernet, Fieldbus, HART, Profibus, Modbus, fiber optics, Device net, DH+, DH485, RS232/422/485, Network Address Translators (NATs), MOXA NPort serial device servers, Ethernet-to-fiber converters (single/multi modes), Wireshark, Cisco Switches/Routers.
- **VFD**: Allen Bradley Power Flex, Omron, Siemens, Baker Hughes, Schneider, Toshiba, Texas Instruments Piccolo.
- **DAQ**: National Instruments SCXI, PXI, PCI, Fieldpoint modules DSP Texas Instruments C6748.
- **HMI**: Rockwell FactoryTalk, Allen Bradley PanelView, Invensys Wonderware, Modicon, DeltaV, Honeywell, National Instruments Labview, Yokogawa, PyQT, C++.
- **Programming**: C, C++, C#, R, Python, Java, Visual BASIC, VB.NET, DOS, Linux, SQL, Ladder Logic, Function Blocks, Sequential Function Chart, and Structured Text. Web Interpreters Jupyter Notebook, Colab, Visualization – Tableau, Spotfire, Matplot.
- **AI/ML Engineering**: Deep Learning Models (CNN,RNN,LSTM), Data Mining, Data Analytics, NLP and LLMs, Computer Vision, Image Recognition, Classification, Regression, Time-Series Models, ANNs, Decision Trees, Random Forest, Logistic Regression, Clustering, Predictive Analytics, Semantic Analysis, Artificial Process Control and Artificial Alarm Analysis
- **Libraries**: TensorFlow, PyTorch, Keras, Pandas, NumPy, Scikit-learn, MLflow, MLOps, AIOps, LLMs, BERT, GPT, CLIP, RAG, Nvidia NeMo toolkit for automatic speech recognition (ASR), Matplot, PySpark, Seaborn, Beautiful Soup, OpenCV, SciPy, Theano, MLflow, and Streamlit data visualization.
- **Compilers**: Texas Instruments TMS320C55x Optimizing C/C++ Compiler, NI LabView, Microsoft VisualStudio, Android Studio for Android Development. Additional Modeling and simulation experience with PSpice, Matlab Simulink. Code Composer Studio for TMS320C6748 DSP (Texas Instrument C6748), Jupyter Notebook.
- **Engineering**: exSILentia, AutoCAD, MathWorks MATLAB, SmartPlant, ETAP, SKM, PHAWorks/Pro, Altium PCB designer, CMMS, AMS.
- **Software & Cloud:** SCADA, PLC, RTU, DCS, Python, Linux, Bash, C++, SQL, cloud infrastructure (GCP, AWS, Azure), CI/CD, API design, ML/AI workflows such as Databricks MLflow, Docker, Tableau.
- **Pipelines:** Apache Spark, Hadoop, Pandas, Kafka, Streamlit, Colab, Jupyter