Storing electricity in metal

Job Description – Firmware/Software Developer

About e-Zinc

e-Zinc is an energy storage startup based in Toronto with a breakthrough technology poised to disrupt the market. As the global energy grid moves to higher levels of penetration of renewable energy, there will be an exponential increase in demand for low-cost, flexible, long-duration energy storage. This is the market targeted by e-Zinc, the first in the world to "metalize" electricity. e-Zinc technology is also fire resistant, made of fully recyclable materials, does not rely on precious metals, and has a fast response time.

e-Zinc has recently won a number of awards for its technology and business plan including:

- Raised $3.5M in an oversubscribed round and was featured in Greentech Media
- Won a $1.6M grant through Breakthrough Energy Solutions Canada
- Won a $2M grant from SDTC
- Won a USD $1.3M grant through California Energy Commission
- Named to Cleantech Group's Top 50 companies to watch
- Won a $700k grant as a finalist in NRCan's Charging the Future Challenge
- Raised $2.3M in a private round funded by BDC Capital

This promising cleantech venture is now looking to expand its talented team to bring its technology to market to support the renewable energy transformation.

Opportunity

e-Zinc is searching for an exceptionally talented Firmware/Software Developer to work with the engineering team developing the next generation version of our electro-chemical energy storage system. This is an opportunity for a talented developer to help shape a young company's technology and product strategy and contribute meaningfully to its success. The ideal candidate will appreciate the entrepreneurial environment, intelligent and technically savvy colleagues, has a passion for success, and will work diligently to ensure we achieve our goals collaboratively and collectively.

Accountability

Reporting to the VP Engineering, the Firmware/Software Developer will be the architect of the remote monitoring, control, and data archiving software of the e-Zinc Energy Storage System (ESS). The e-Zinc cell is at the heart of the e-Zinc ESS. The cell is a mechatronics device with internal electrodes, pumps, motors, sensors, and air supply. The e-Zinc ESS is comprised of multiple cells in various series parallel strings with multiple levels of embedded control software with an operator GUI that allows the operator to monitor and control the string through the string management hardware. This existing software system is slated for a ground-up re-write to improve reliability and efficiency as well as to integrate with commercial AC/DC Power Conversion System (inverters and charge controllers) and laboratory battery testers.

The candidate should be "hands-on" with systems engineering methods, troubleshooting, and debugging and ability to identify software defects root cause. The ideal candidate has experience designing software

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for battery energy storage systems. Candidates with experience with remote monitoring and control software from other industries will be considered as well. The candidate should be able to demonstrate experience with software architecture, UX/UI design, programming control logic and I/O timing, communication protocols (serial, CAN, TCPIP), data capture, archiving and analysis.

Extraordinary attention to detail is required to measure and monitor performance of the cells and trending behavior in the fleet performance. The Firmware/Software Developer should generate practical solutions to enable easy access to raw historical data and analytics to assess the performance of the e-Zinc ESS. In addition, the successful candidate is expected to play dynamic roles in participating or leading specific projects as assigned by the supervisor, such ability to provide "hotfix" versions of code to test various operating parameters. The ideal candidate should be able to support product development and manage version control of the software, and as the product evolves, add new functionality.

Position scope and responsibilities

- The primary responsibility is to lead the software development for the e-Zinc ESS:
  - Understand the existing e-Zinc code and propose code updates and/or new architectures to improve system reliability.
  - Develop remote monitoring and control capability for the e-Zinc ESS.
  - Work with the engineering team to deploy new prototyped features into the e-Zinc embedded software.
  - Design, develop and implement automated code testing.
  - Identify candidate commercial data historian software and maintain a growing database of cell operational data.
- The secondary responsibility is to provide data processing tools to maximize test lab throughput:
  - Work with the test engineers to develop automated tools for data visualization, analysis and reporting.
- Other responsibilities to be assigned on case-by-case basis:
  - Optimize e-Zinc's energy storage technology by bringing forward new ideas to improve performance, reliability, and cost by applying best-in-class engineering principles and methods.
  - Assist with Failure Modes and Effects Analysis (FMEA)
  - Provide timely updates to your supervisor identifying project risks and issues. Proactively propose solutions and swiftly implement new strategies, initiatives, and measures as requested.

Qualifications

- Bachelor's degree or better in computer science or computer engineering.
- 7+ years of relevant industry experience developing embedded software, ideally from energy industry.
- Strong knowledge of software design patterns applicable in remote monitoring & control software, driver design, and Hardware Abstraction Layer (HAL) design.
- Strong programming skills with C/C++, or C#, embedded software toolkits (e.g. ESP32CubeIDE)
- Strong experience architecting and programming microcontroller firmware (STM32, PIC24, FreeRTOS)
- Experience with scalable cloud infrastructures (AWS, GCP, Azure) would be a nice to have

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- Experience with IoT frameworks for data acquisition and visualization (ThingsBoard, Grafana, etc)
- Experience with wireless mesh networks (e.g. Analog Devices SmartMesh) would be nice to have
- Strong working knowledge of CAN bus (Experience with CANOpen is preferred).
- Knowledge of other communications protocols such Modbus, RS232, and TCPIP are additional assets.
- Knowledge of software version control and lifecycle management for a mass production product.
- Experience with developing software for multiple product variants.
- Industry experience with battery energy storage systems, AC/DC power conversion systems, battery management systems, microgrid controls, solar PV/battery integration is a plus.
- Experience with laboratory controls software such as LABVIEW and various sensors such as air flow and pressure meters, temperature, and humidity sensors is a plus.
- Wide range of interest and knowledge in multiple engineering disciplines; ability to quickly grasp and develop the subject matter expertise required to develop engineering solutions.
- Demonstrated strong systems thinker having personal interest in how programming complements a mechatronic system – A portfolio demonstrating past projects is useful.
- A self-starter and adaptive learner.
- Must be legally eligible to work in Canada and willing to relocate to Toronto.

Other Attributes

- Passionate about bringing new cleantech energy innovation to market.
- Experience in the battery, energy storage or the renewable power industry is considered an asset.
- Motivated to strive and succeed in a start-up environment.
- Superior time management and organizational skills.
- Disciplined and hard working.
- Exceptional communications skills – oral, written, and presentation skills.
- High level of maturity, integrity and personal effectiveness.
- Personal accountability and commitment to achieving and exceeding goals and objectives.

Application

Please submit your application with resume, cover letter, and/or portfolio of past projects using "**Firmware/Software Developer**" in the subject line to careers@e-zinc.ca and address your cover letter to Pieter de Koning, VP Engineering.

Due to a high volume of applicants, please make our job easy to identify you as a match for this role. We are especially interested in your cover letter explaining how this position fits your interests and skills.

Interviews will be scheduled on a rolling basis as we receive applications. We thank all applicants for their submission but due to a high volume of applicants, only those selected for an interview will be contacted.

Please apply ASAP if you are a strong fit to the requirements of this role.

Key words

Renewable Energy, Zinc Energy Storage, Battery Energy Storage System, Zinc-Air, Battery, Software Architecture and Development, Embedded Software, Firmware Remote Monitoring and Control