Job Description

Research Engineer – Reinforcement Learning and Control
Alcority is a global provider of shared business services to a set of internal customers. Alcority shared services are provided through a network of service delivery centers located in New York, Dallas, Houston, and London. One of the advisory services provided by Alcority is a Virtual Innovation Laboratory (VIL) that assists customers in incubating new product and service ideas ranging from technology research up to and including technology development and demonstration.

The VIL includes a machine-learning (ML) group with a reinforcement learning (RL) team responsible for:
- Developing dynamic programming and RL approaches to assist in design of physical systems and evaluation of mathematical constructs in close coordination with the Simulation and Optimization (SimOpt) and ML groups.
- Informing the generation of data and designs in the upstream design pipeline.
- Assisting the transition of RL models from development to deployment into the downstream design pipeline.
- Researching, recommending, and executing new ideas in the space of RL-assisted physics and mathematics.

Alcority is seeking candidates to join its machine-learning group at its Dallas, Texas location. The successful candidate will report directly to the Alcority VIL Program Director. Positions are full-time and include both on-site and hybrid positions. Travel to different Alcority and Customer locations to meet program requirements may also be required.

Interested candidates should apply by sending your resume to:
Nicole Rodi
VP, Human Resources, Alcority LLC
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Position Responsibilities
The Research Engineer will be responsible for developing and implementing RL products within the ML group. Responsibilities include the following:

- Contribute to the conception, development, and execution of RL program technical tasks and activities from start to finish, including identifying processes, deadlines, and milestones.
- Execute RL technical tasks for the development and deployment of RL models and algorithms as required to support overall program goals.
- Work and coordinate with other VIL technical organizations to develop RL models and tools as required to achieve program goals.
- Maintain effective communication with other members of the program technical team.
• Create technical progress reports and make presentations to VIL leadership and other stakeholders as required.
• Monitor and track performance to the technical plan and keep management informed of progress through performance measures of key metrics on a regular basis.
• Participate in and support VIL technical activities including the development of additional programs/projects and planning to support ongoing projects.

Position Requirements
Required and highly desired skills:
• Experience in fields of game theory, control theory, operations research, information theory, simulation-based optimization, multi-agent systems, swarm intelligence, and statistics.
• Experience building direct and/or indirect dynamic programming and reinforcement learning approaches to unsupervised learning problems; alternatively, a strong background in the physical sciences coupled with a strong background in computer science, control theory, machine learning, statistics, engineering, or related fields.
• Background or relevant work in Markov Decision Processes, Policy and Value Iteration approaches that may include Proximal Policy Optimization, Temporal-Difference Learning, Q-Learning, Least-Squares Policy Evaluation and/or actor-critic RL example architectures.
• Experience with Deep Reinforcement Learning, including knowledge of recent advances and experience implementing in modern ML environments.
• Proficiency in general-purpose machine learning platforms (Tensorflow, PyTorch), in domain-specific packages (e.g., Tensorflow-Agents, NVIDIA Modulus, etc.), and their underlying technology base (Python, NumPy, SymPy, etc.).
• Comfort developing software in a team setting (e.g., familiarity with standard GitHub practices).
• Demonstrated ability to reduce academic concepts (such as are published in the scientific literature) to practical application and relevant research publications in AI/ML venues or areas related to RL, Machine Learning, and Neural Networks.
• Ability to work independently and manage multiple tasks simultaneously while adhering to project deadlines.

Additional desired skills:
• Experience with the Julia, Rust, JAX/XLA, or MATLAB programming languages.
• Experience with TypeScript, React, or Angular.
• Experience with Triton or C++ CUDA.
• Familiarity with object-oriented programming (OOP) concepts and software engineering.
• Experience with version control systems like Git for collaborative software development.
• Knowledge of software development best practices, including unit testing, code reviews, and continuous integration and deployment (CI/CD).
• Experience with data-driven modeling, especially of physical systems and processes.
- Experience with machine learning algorithms, such as neural networks, decision trees, random forests, support vector machines, etc.
- Strong knowledge of machine learning algorithms, including supervised, unsupervised, and semi-supervised learning techniques.
- Expertise in deep learning architectures such as convolutional neural networks (CNNs), recurrent neural networks (RNNs), and autoencoders.
- Experience with regularization techniques, hyperparameter tuning, and model evaluation metrics.
- Understanding of Bayesian statistics and probabilistic graphical models for uncertainty quantification.
- Understanding of clustering algorithms such as k-means, hierarchical clustering, and Gaussian mixture models.
- Experience with nonlinear optimal control and Hamilton-Jacobi-Bellman optimization.
- Experience with modeling and simulation software development.
- Experience with numerical methods and optimization.
- Knowledge of numerical methods for solving partial differential equations (PDEs) and fluid dynamics simulations, such as finite difference, finite element, and spectral methods.
- Familiarity with optimization techniques such as gradient descent, stochastic gradient descent (SGD), and Adam optimization.

Educational requirements:
- Ph.D. or similar experience in relevant fields.