Staff Position in the Quantum Photonics Laboratory at MIT

Software Engineer for "Digital Twin" Virtual Models

Overview

The Quantum Photonics Group (QPG) in MIT's Research Laboratory of Electronics (RLE), Microsystems Technology Laboratory (MTL), and the Dept. of Electrical Engineering and Computer Science (EECS), is seeking a Software Engineer to collaborate on designing and building "digital twin" virtual models of devices and systems in optics and quantum technologies.

Skills

- Collaborate in a team of engineers and scientists in electrical engineering, physics, software & algorithms.
- Build virtual models of experimental systems by collaborating in a team on modeling systems in photonic machine learning systems [1–4] and quantum information processors [5–10]
- Support research collaborations with reliable software

Technical experience and knowledge

- Modeling and electronic design automation (EDA) tools like Cadence, Matlab Simulink, Synopsis, Zemax, Lumerical/Ansys
    - Beneficial but not required: quantum network simulation such as NetSquid; interest in working with our team to advance our simulation tools such as those listed here (https://github.com/qpg-mit)
- Databases (basic) such as mysql
- Languages: Python, Julia, Matlab

About the MIT Quantum Photonics Group:

Headed by Prof. Dirk Englund, Dr. Ryan Hamerly, and Dr. Matthew Trusheim, the Quantum Photonics Group at MIT pursues experimental and theoretical research in advanced photonics, quantum information science and engineering, and machine learning/AI (see publications here). Our team includes 40+ scientists and engineers, and much of our work is heavy in computing (see GitHub here). The work involves strong collaborations with other academic groups, government research, large industry, as well as entrepreneurship/startups. There are many opportunities for career development, including through possible involvement in teaching tools, etc.

Candidates qualifications:

1. A technical degree (PhD, Masters, BS+2 years min work experience) in technical fields including one more from (Computer Science, Data Science, Electrical Engineering, Physics, Optics, Robotics).
2. Experience in coding, including knowledge in scripting languages (Python), some experiences with databases, as well as experience in scientific programming (Julia, E&M simulations, constructing digital twin models, ..)
3. Interest to develop information technology to advance scientific research through greater rigor, reproducibility, reporting, and openness.

Responsibilities:

- Creating "digital twin" models of experiments
- Support teams through electronic design automation (EDA)
- Organizing environments and workspaces for scientific simulations
- Build virtual models of experimental systems
- Help us expand and maintain our computing systems

Contact: For more information, send an application email with CV to Prof. Dirk Englund (englund at mit.edu) of the MIT EECS Department and Dr. Ryan Hamerly (rhamerly at mit.edu) of the Research Laboratory of Electronics, copying Mr Andrew Birkel (ABirkel at mit.edu). Please include "[position_inquiry]" into the subject line.

References

[1] S. Bandyopadhyay, A. Sludds, S. Krastanov, R. Hamerly, N. Harris, D. Bunandar, M. Streshinsky, M. Hochberg, and D. Englund, *Single Chip Photonic Deep Neural Network with Accelerated Training*, http://arxiv.org/abs/2208.01623.

[2] R. Davis III, Z. Chen, R. Hamerly, and D. Englund, *Frequency-Encoded Deep Learning with Speed-of-Light Dominated Latency*, http://arxiv.org/abs/2207.06883.

[3] Z. Chen et al., *Deep Learning with Coherent VCSEL Neural Networks*, http://arxiv.org/abs/2207.05329.

[4] L. Bernstein, A. Sludds, C. Panuski, S. Trajtenberg-Mills, R. Hamerly, and D. Englund, *Single-Shot Optical Neural Network*, http://arxiv.org/abs/2205.09103.

[5] D. P. Fahey, K. Jacobs, M. J. Turner, H. Choi, J. E. Hoffman, D. Englund, and M. E. Trusheim, *Steady-State Microwave Mode Cooling with a Diamond NV Ensemble*, http://arxiv.org/abs/2203.03462.

[6] N. H. Wan et al., *Large-Scale Integration of Artificial Atoms in Hybrid Photonic Circuits*, Nature **583**, 226 (2020).

[7] M. Sutula et al., *Large-Scale Optical Characterization of Solid-State Quantum Emitters*, http://arxiv.org/abs/2210.13643.

[8] A. J. Menssen et al., *Scalable Photonic Integrated Circuits for Programmable Control of Atomic Systems*, http://arxiv.org/abs/2210.03100.

[9] I. Christen et al., *An Integrated Photonic Engine for Programmable Atomic Control*, http://arxiv.org/abs/2208.06732.

[10] C. L. Panuski et al., *A Full Degree-of-Freedom Photonic Crystal Spatial Light Modulator*, http://arxiv.org/abs/2204.10302.