Jeffrey Peterson

https://jeffpeterson.dev

cv@jeffpeterson.dev
(508) 847-1808

31 Norris St, Apt 1
Cambridge, MA 02140

Professional Overview

Experienced and motivated Senior Software Engineer seeking an opportunity to contribute to the development and implementation of an impactful and compelling project in healthcare and patient safety. Independent, detail oriented, fast learner with the ability to quickly adapt to new technologies.

- Full-stack software development – e.g. I built an application for bedside clinical decision support in the ICU
- Clinical data science – e.g. I built a pipeline in MATLAB train, test, compare, and visualize CDS models
- Machine learning – completed 5-class deeplearning.ai certification and Stanford ML (Coursera) course

Experience

Senior Software Engineer – Clinical Decision Technology Laboratory (CDTL)   2018 – Present
Massachusetts General Hospital, Boston, MA

Software Engineer – Clinical Decision Technology Laboratory (CDTL)   2016 – 2018
Massachusetts General Hospital, Boston, MA

Research Affiliate – Integrative Neuromonitoring and Critical Care Informatics (INCCI)   2016 – Present
Massachusetts Institute of Technology, Cambridge, MA

Clinical Engineer – Medical Device Plug-and-Play Interoperability Research Lab (MDPnP)   2014 – 2016
Massachusetts General Hospital, Cambridge, MA

Clinical Engineer – Department of Biomedical Engineering   2011 – 2014
UMass Memorial Medical Center, Worcester, MA

Hospital Laboratory Support Technician I – Dept. of Biomedical Engineering   (Summers and Winters) 2007 – 2011
UMass Memorial Medical Center, Worcester, MA

Professional Projects

BPCi (VIGORIS) Blood Pressure Control Clinical Decision Support System (MGH CDTL)   2018 – Present

BPCi is an application for real-time, bedside clinical decision support. The system aims to provide automated guidance for reducing the duration of hypotension in ICU patients on vasopressors. As the sole developer on the project, I built both the server and UI. This project is awaiting IRB approval for testing in the ICU. More information can be found at http://mgh-cdtl.org.

- Developed the clinical data server (Python, PostgreSQL, Numpy/SciPy)
    - The server aggregates all clinical data and calculates several algorithms including the Clinical Decision Support messages (CDS) and the Blood Pressure Control Index (BPCi)
    - ZeroMQ used for communication between server processes and UI(s). Docker is leveraged for automating the build process.
- Developed the user interface (JS/HTML/CSS with React/Redux, D3 plots). UI is packaged as a native application (Electron.js).
- Created the 4th iteration of the BPCi algorithm (originally developed at U of Maryland)
    - Developed a modified autoregressive model to predict the likelihood of sustained hypotension
    - Developed a MATLAB data analysis pipeline to analyze timeseries vital signs from several hundred subjects, including from MIMIC II and MGH data repositories, then pre-process, fit, and compare different predictive models
- Designed, implemented, and tested a clinical study research cart for use in the MGH ICU

Jeffrey Peterson

https://jeffpeterson.dev

cv@jeffpeterson.dev

(508) 847-1808

31 Norris St, Apt 1

Cambridge, MA 02140

APPRAISE Hemorrhage Clinical Decision Support System (MGH CDTL)   2016 – 2018

APPRIASE is an application for real-time, bedside clinical decision support. The system provides automated guidance for clinicians during a trauma resuscitation by monitoring data from the bedside monitor and user controls. APPRAISE is IRB approved for use in the MGH ED and is awaiting study deployment.

- Built a prototype UI to view the patient's vital sign trends, the APPRAISE risk strata, and the clinical decision support notifications
  - The APPRAISE algorithm is a logistic regression model that outputs a hemorrhage injury risk strata, which is a critical input into the clinical decision support message algorithms
- Developed a new iteration of the model based on a larger dataset, TraumaDB that I assembled by meticulously reconciling all existing trauma project datasets and new expert adjudications into a standardized schema in PostgreSQL

OpenICE – Open-source Integrated Clinical Environment (MGH MDPnP)   2014 – 2016

OpenICE is a prototype clinical ecosystem for connecting medical devices and clinical applications. A multidisciplinary team worked to instantiate a standards-based distributed system and implement proprietary medical device communication protocol translation. More information can be found at https://openice.info and http://mdpnp.org.

- Designed and developed the project website (www.openice.info), implemented and managed the community site
- Tested and validated medical device integration
- Developed demonstration software and conference exhibits
- Wrote and maintained user facing documentation, user trainings, managed requirements

Master's Thesis: Investigation into the Efficacy of Alarm Fatigue Reduction Strategies (UMMC)   2012 – 2013

Modern hospitals are plagued by excessive alarms generated by patient monitoring technologies with very high sensitivity and low specificity. These excessive alarms create high rates of false and clinically irrelevant alarms. Multiple studies have shown that these false and clinically irrelevant alarm rates can negatively impact patient care and lead to "alarm fatigue". For my Master's thesis, I employed a quantitative, database driven approach to alarm management in the acute care and medical/surgical environment with the intent of identifying and implementing technological, clinical, educational, and workflow practice changes to curtail excessive alarming.

- I initiated and led a multidisciplinary committee to analyze the hospital's current state of clinical alarms, identified several key contributors to nuisance and false alarms through data analysis with R and Excel, developed countermeasures with nurses and physicians to safely reduce alarm fatigue, and worked with leadership to implement solutions
- Notable results: 24% decrease in alarm duration, established a system-wide 'Environment of Care' goal, and satisfied EP1 and EP2 of TJC NPSG 06.01.01

Education

Master of Science in Biomedical Engineering   May 2013

University of Connecticut, Storrs, CT   GPA: 4.1/4.3

    Concentration in Clinical Engineering
    Thesis: Investigation into the Efficacy of Alarm Fatigue Reduction Strategies

Bachelor of Science in Biomedical Engineering   May 2011

University of Connecticut, Storrs, CT   GPA: 3.5/4.0

    Minor in Electronics and Systems, Concentration in Bioinstrumentation
    Senior Design: Adaptive Equipment Designed and Constructed for a Child with Rett Syndrome

Jeffrey Peterson

https://jeffpeterson.dev

cv@jeffpeterson.dev
(508) 847-1808

31 Norris St, Apt 1
Cambridge, MA 02140

Technical Skills

Language Competencies – Python, JavaScript (es6+), SQL (pgSQL), MATLAB, HTML/CSS, Shell (Bash), LabView
Full Stack Application Dev – Responsive web design / GUI design, API design, database schemas, serial port comm
Clinical Decision Support Algorithms – Regression models, normalization techniques, timeseries analysis
Data Science – Data munging, annotation and adjudication tooling, classification, presentation, technical writing
Machine Learning – Python (Keras, TensorFlow), MATLAB, 5-part deeplearning.ai cert. and Coursera Stanford ML
Hospital Specific – Regulatory submissions (IRB, FDA IDE), medical device integration, integration testing

---

Honors

Excellence in Innovation Award at World Medical Innovation Forum – MGH `	2019
Awarded 1st Place Scientific Exhibit at ASA15 for Integrated Clinical Environments – MGH	2015
Pathfinder Innovation Award – UConn	2013

Publications

1. Peterson JT. An Investigation into the Efficacy of Alarm Fatigue Reduction Strategies. Master's Theses 2013. University of Connecticut. http://digitalcommons.uconn.edu/gs_theses/432

2. Peterson JT. Open Source Interoperability - Problems, Prototypes, and Potential. 2014 Northeastern Healthcare Technology Symposium. Mystic, CT. 6 November 2014. Conference Presentation.

3. Goldman JM, Arney D, Peterson JT, Alonso D, Feinberg M, Dain S, Engel T. Integrated Clinical Environments (ICE) to Improve Safety and Enable Rapid Innovation. American Society of Anesthesiologists. October 2015. Exhibit.

4. Fanelli A, Peterson JT, Heldt T. Challenges in Recording Multi-Parameter Waveform Signals in the NeuroICU. Intracranial Pressure and Neuromonitoring Conference. Massachusetts Institute of Technology, Cambridge, MA, USA. July 2016.

5. Shin S, Reisner A, Yapps B, Bighamian R, Rubin T, Goldstein J, Rosenthal E, Peterson JT, Hahn J-O. Forecasting Hypotension During Vasopressor Infusion Via Time Series Analysis. EMBC. Berlin, Germany. July 2019. Conference Presentation.