Jefferson R. Heard

Founder & CEO, TerraHub • Senior Researcher, RENCI

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Goals

I bring 2 decades of software development and startup experience to all projects I work on. I differ from the traditional developer; beyond simply solving the problem, I try to personally understand my users and build and bring to market things they need-to-have in the way they need it presented to them.

Skillset

- **Entrepreneurship & Management:** Founded (with two others) a company, performed market research, built partnerships with industry, and developed market ready software based on continuous feedback
- **Programming Languages (used in the last 2 years):** Python (continuously used since 1.0), Java (continuously used since 1.0), Haskell (5 years exp, 3 years full-time), C/C++, Scala, Ruby.
- **Systems Programming Experience**: iPhone, Android, Linux, UNIX, Windows, Mac OS X
- **Database Experience**: MySQL, Postgres, PostGIS, Geoserver, SQL Server 2003, iRODS, MongoDB
- **Geospatial Tools**: RENCI Geoanalytics, GRASS, GDAL/OGR, OpenGeo Suite, GeoDjango.
- **Web Application Frameworks**: Django, GeoDjango, Rails (limited), jQuery, Bootstrap, BackboneJS, Marionette, OpenLayers, Leaflet

Selected Open Source Software

- **Sondra** - https://github.com/jeffersonheard/sondra. Innovative object persistence layer (ORM) and API designed for consistency, predictability, ease of use, and speed.
- **Terrapyn** - https://github.com/jeffersonheard/terrapyn - CMS for geospatial data, including OGC standard web service APIs for your datasets widely used internally at UNC.
- **Hydroshare** - https://github.com/hydroshare - Data and model sharing and persistent publishing for the hydrologic research community. **Lead architect and developer** on an 8 university consortium project.

Education

M.S. in Computer Science GPA: 3.9. Illinois Institute of Technology, 2012
Advisor: Ophir Frieder (ACM, AAAS, IEEE Fellow, Royden B. Davis Professor Georgetown University, Chair of CS, Georgetown)

Employment

Cofounder & CTO, 365 Pronto (2015-Present) • https://www.365pronto.com
A labor--on-demand service for the renewables industry. As in all startups, my role at 365 Pronto is fluid. However, from a technical point of view, I brought the website and product online, created the demo and product, handle software lifecycle, and keep the cloud running.

Founder & CEO, TerraHub (2013-2015)
Two partners and I commercialized my open source project, Terrapyn. We built partnerships in the solar-power industry to develop a TerraHub offering to project manage utility scale solar projects.

Senior Research Scientist, RENCI (2006-present) • http://www.renci.org/.
I have played many roles at RENCI, from data scientist to visualization researcher to project leader. My

roles included being lead technologist on two core projects involving the multi-university Water Science Software Institute (WSSI) and Hydroshare, a multi-year, multi-university project to develop the next generation hydrologic information system for a global research community.

CTO, Intranet Mediator, Inc (2004-2006)
Implemented patented research as commercial ready software, and partnered with several non-profit organizations to apply the Intranet Mediator technology towards dynamic, difficult search corpuses.

Acxiom Corporation. Senior Software Developer (2000-2004)
Overhauled the Infobase build process to go from requiring a dedicated, very expensive, custom built Compaq server to run on commodity hardware in 1/10th of the time (from 30 days to 2.8 days). Introduced declarative programming to data modeling, allowing product engineers to prototype new data elements and test them in situ in the build without going through an extra coding step.

Consulting Clients

International Executive Service Corps (2016) - Created a presentation-quality data map, "Financial Inclusion in Lebanon: MFI Branch Network and Nationwide Refugee Impact" that shows the distribution of refugees in Lebanon compared to the presence of microfinance institutions (MFIs). *[Information Visualization] Turnaround time: 8 days*

Project Experiences

Ongoing design and refinement of Renci's Geoanalytics Framework, cyberinfrastructure for geographic curation, analytics, and visualization. Geoanalytics is currently deployed at RENCI, NCSU (2 installations), and is being deployed as part of Hydroshare.
http://geoanalytics.renci.org .
http://geoanalytics.renci.org/dev/wp-content/uploads/2011/09/FOSS4G-poster-production.pdf

Technical and design lead on the WxEM project, a collaborative agreement between RENCI and the National Weather Service. Our mission was to prototype new tools and products for the NWS that would be tested in the field with emergency managers around NC with the ultimate vision of creating a testbed for Decision Support.

Technical and design lead on the R3ZAR sensor grant (NSF). The R3ZAR grant's mission is to create dynamically programmable sensor systems that can be used at a high level by people outside of computer science.

Technical and design lead on the Gillings Farmers Market Locator grant (Gillings Institute), a project to prototype and determine the requirements for a "commercial GIS"-type system to aid nonprofits interested in placing new farmers markets around North Carolina.

Technical and design lead on the CI-BER project, a collaborative agreement with the National Archives and Records Administration. The project is about scaling data and visualization systems to browse billions of online electronic archival records.
http://geoanalytics.renci.org/uncategorized/scalable-visualization-of-geographic-archival-records/

Conceived of and wrote The Big Board, a "teleconferencing system for maps" (now part of TerraHub) aimed at emergency managers and other professionals where being able to collaborate in real time on the same virtual surface is more important than face-to-face or PowerPoint contact available in traditional teleconferencing systems.
http://geoanalytics.renci.org/applications/the-big-board-teleconferencing-over-maps/

Design and implementation of the Geoanalytics-based backend for the IEI Commons space in the

Hunt Library. http://www.ncsu.edu/iei/index.php/about/hunt-library-emerging-issues-commons

Designed and wrote the UNC grants visualization and UNC giving visualizations, map based visualizations meant to show the broader impact of UNC spending and the geographic diversity of contributions to the university. http://www2.renci.org/~jeff/software/unc-giving/

Wrote and maintained AVL, a vehicle-tracking system with self-describing and configuring sensors (such as camera, audio, temperature, etc) for tracking emergency management vehicles and personnel and giving them the tools to collect data for situational awareness for an EOC. Currently depolyed on several vehicles at the Chapel Hill fire department and NC State Highway Patrol as part of an extended test.

Conceived and developed the Docuverse, a 3D interactive visual text mining system for large collections and the World Wide Web. http://vis.renci.org/jeff/2009/01/19/the-docuverse/

Consulting and Independent Pursuits

Developed It Hurts Here, a mobile application for the iPhone that aids patients and doctors in tracking chronic pain conditions, replacing cumbersome text-based logging with a touch-based pain-location system and controlled-vocabulary based characterization system on a device that patients generally carry.

Developed an hourly forecast app which displayed 72 hour graphical forecasts in a single page on the iPhone.

Publications

J. Heard, S. Thakur, J. Losego, K. Galluppi. "Big Board: Teleconferencing Over Maps for Shared Situational Awareness. Journal of Computer Supported Cooperative Work (JCSCW). Springer, July 2013.

Kenneth Galluppi, University of North Carolina, Chapel Hill, NC; and J. Heard, J. L. Losego, B. E. Montz, C. F. Smith, and S. S. Schotz "Weather Service and Emergency Management Collaboration Through An Interactive Web-Based Map Conferencing Infrastructure." AMS 2012.

Kenneth Galluppi, University of North Carolina, Chapel Hill, NC; and J. Heard, J. L. Losego, B. E. Montz, C. F. Smith, and S. S. Schotz Recorded Presentation See more of: 28th Conference. Mapping, Web 2.0, and Social Media Technologies for Improved Communication of Weather and Climate Data - Part I

J. Heard. "Geoanalytics." Tech Report TR-11-03. http://www.renci.org/publications/technical-reports

X. Guan, J. Heard. "A Novel Method for Large Tree Visualization," Journal of Bioinformatics, January 2009.

"Visualizing Large Binary Trees in Haskell," The International Conference on Functional Programming (ICFP). September 2008.

J. Heard. "Tutorial: Beautiful Code, Compelling Evidence: Functional Programming for Information Visualization and Visual Analytics," Functional Programming Developer Tracks (DEFUN2008), September 2008.

J. Heard, J. Wilberding, G. Frieder, O. Frieder, D. Grossman, L. Kane, "On Mediated Search of the United States Holocaust Memorial Museum Data," The 6th conference on Next Generation Information

Technologies and Systems (NGITS). July 2006.

D. Lewis, G. Agam, S. Argamon, O. Frieder, D. Grossman, J. Heard, "Building a Test Collection for Complex Document Information Processing," ACM-SIGIR'06. August 2006.

J. Heard, J. Prokop, D. Grossman, O. Frieder, "Scalability Assessment of Complex Boolean Queries," MITRE Conference on Information Architecture. April 2005.

J. Heard, O. Frieder, D. Grossman, "IIT at TREC 2004: Standard Retrieval Models Over Partitioned Indices for the Terabyte Track," NIST Text Retrieval Conference. November 2004.

J. Heard, "Large Tree Visualization of the Melanoma Genome," UNC Endeavors Magazine, Winter 2009.

J. Heard, "Visualizing all of iBiblio's historic weblogs." UNC Endeavors Magazine, Winter 2009.

J. Heard. R. Marciano. "A system for scalable visualization of archival records." LDAV 2011. Providence, RI.

J. Heard. "Geoanalytics at RENCI." FOSS4G 2011. Denver, CO.

Funding

"High productivity programming systems for sensor networks" NSF. Senior Staff.

"Weather for Emergency Management" National Weather Service (collaborative agreement). Senior Staff.

"Cyberinfrastructure for Billions of Electronic Records" National Archives and Records Administration (collaborative agreement). Senior Staff. $400,000

"Public Health Impact of Moving Toward a Sustainable Food System in North Carolina: Informing Policy" Gillings Institute. Other Staff. $400,000

"Scalable Systems for Complex Boolean Queries," Lockheed Martin. $100k, $60k followup with N-G.

"Complex Document Information Retrieval Systems," DOE, joint with PNNL, $680,000. Other staff.