Todd R. McCollough

Biomedical Engineer | Medical Diagnostics

todd@toddmccollough.com

www.linkedin.com/in/toddmccollough

PROFILE

Biomedical engineer with over ten years of experience with eight years in research and product development in an emerging medical imaging modality. Strong record of learning new techniques quickly and adapting knowledge to create novel product concepts. Co-inventor of seven issued U.S. patents, coauthor of five peer-reviewed scientific journal articles, and presented at two international conferences.

PROFESSIONAL EXPERIENCE

Ellumen Inc. (formerly CPS Healthcare Inc.), Silver Spring, MD / Arlington, VA **Software Engineer**

- Programmed using C#/.NET Framework for VistA Imaging used by Department of Veterans Affairs.
- Troubleshot issues and made improvements to the Image Exchange Service and Image Viewer.
- Updated documents for software releases including technical manuals, and user and installation guides.
- Co-Host of the AI Innovation Space Podcast focused on applications of artificial intelligence (AI).

Biomedical Engineer – Researcher

Conducted research and product development (R&D) to produce healthcare diagnostic images using electromagnetics (microwave imaging) while minimizing the risk of harm to patients. Performed data collection, data analysis, and image reconstruction using custom written software programs. Prepared grants, patents, publications, technical reports, conducted prior art searches, and gave presentations.

• Created human computational phantoms for use in frequency dependent electromagnetic simulations.

• Derived and programmed computational electromagnetics equations including Method of Moments (MoM) and the Finite-Difference Time-Domain (FDTD) method and verified results with CST MWS. • Collaborated on development of a program and graphical user interface (GUI) using VB.NET, MATLAB, and a dynamic-link library (DLL) to remotely control and automatically acquire data from a robotic microwave imaging device communicating with an arbitrary waveform generator, infrared sensor, oscilloscope, and network analyzer that reduced data collection time by 80% and led to an issued patent.

• Coded qualitative (radar based) and quantitative (tomography) image reconstruction algorithms incorporating knowledge from many domains including computer vision and signal/image processing. • Optimized algorithms for computational speed and extended programs for parallel use on graphical processing units (GPUs) and high-performance computing platforms including Amazon Web Services. · Compared different optimization algorithms to train feedforward artificial neural networks on classification datasets using statistical tests across performance metrics and found the best algorithm.

Biomedical Engineer – Consultant

• Invented an algorithm to convert between dielectric values both Hounsfield units and MRI intensity values using MATLAB to allow for doctors and radiologists to readily read microwave images as the first team member on a R&D project with the CEO which led to two issued patents.

United States Patent and Trademark Office (USPTO), Alexandria, VA

Patent Examiner – Biomedical Engineering

• Performed scientific and legal evaluations of patent applications directed to diagnostic imaging systems and methods by applying U.S. statutes of eligible subject matter, novelty, obviousness, and usefulness.

- Conducted research and prior art searches to identity relevant existing technologies for comparison.
- Communicated findings and rationale of patentability decisions via written office actions.

Northwestern University, Evanston, IL

Teaching Assistant (TA) – Biomedical Engineering

Jun. 2018 - May 2019

Mar. 2010 – Dec. 2017

Jun. 2009 - Sep. 2009, Dec. 2009 - Mar. 2010

Oct. 2019 – Present

Todd R. McCollough

Biomedical Research Technologist

• Researched lung cancer screening detection using an optical imaging technique sensitive to a single cell.

• Gathered and transferred biopsy specimens on to microscope slides, stained microscope slides, collected images of different cell types using PWS, and analyzed images using Excel and MATLAB.

Information Technology Support Consultant

Self-employed Professional

Internet Consultant – Technical and Marketing

• Designed, developed, and maintained internet properties including websites, blogs, and forums.

• Researched, wrote, and published articles on healthcare topics receiving several journal citations.

EDUCATION

M.S., Biomedical Engineering	GPA: 3.61	Jun. 2010
Northwestern University, Evanston, IL		
B.S., Biomedical Engineering and Economics	GPA: 3.33	Jun. 2009
Northwestern University, Evanston, IL		

• Signals and Images Concentration, Double Major, Chick Evans Caddie Scholarship

AWARDS AND ACTIVITIES

• Barrington High School Alumni Association Board & Social Media Administrator Jul. 2006 - Present Jun. 2009

• Northwestern Undergraduate Leadership Program Certificate

SELECTED COMPUTER SKILLS

.NET Framework, Adobe Creative Cloud, C#, C++, CSS, CST Microwave Studio, Computer Building/Repair, HTML, Google Analytics, Google Search Console, Java, JavaScript, Maple, MATLAB, Microsoft Office, Minitab, PHP, SPSS, Windows, Web Design/Development, WordPress.

SELECTED PATENTS AND PUBLICATIONS

1. W. McCollough, A. Edalati, and T. McCollough, "Directable Antenna System and Method for Improved Communications Quality," U.S. Patent No. 11,355,857 issued on Jun. 07, 2022. 2. W. Shao, W. McCollough, and T. McCollough, "Accurate Signal Compensations for UWB Radar Imaging in Dispersive Medium," U.S. Patent No. 10,983,209 issued on Apr. 20, 2021. 3. W. Shao and T. McCollough, "Advances in Microwave Near-Field Imaging: Prototypes, Systems, and Applications," IEEE Microwave Magazine, vol. 21, no. 5, pp. 94-119, May 2020. 4. W. Shao, T. R. McCollough, W. J. McCollough, A. Edalati, "Phase confocal method for near-field microwave imaging," U.S. Patent No. 10,436,895, issued on Oct. 8, 2019. 5. W. J. McCollough, T. R. McCollough, W. Shao, A. Edalati, and J. R. Leslie, "Microwave Imaging Device," U.S. Patent No. 9,869,641, issued on Jan. 16, 2018. 6. T. R. McCollough and W. J. McCollough, "Dielectric Encoding of Medical Images," U.S. Patent Nos. 9,111,334, and 9,704,275, issued on Aug. 18, 2015, and Jul. 11, 2017. 7. W. J. McCollough and T. R. McCollough, "Distributed Microwave Image Processing System and Method," U. S. Patent No. 9,386,936, issued on Jul. 12, 2016. 8. W. Shao, T. McCollough, and W. McCollough, "A Phase Shift & Sum Method for UWB Radar Imag. in Dispersive Media," IEEE Trans. Microw. Theory Tech., vol. 67, no. 5, pp. 2018-2027, May 2019. 9. W. Shao, A. Edalati, T. McCollough, and W. McCollough, "A Time-Domain Measurement System for UWB Microw. Imaging," IEEE Trans. Microw. Theory Tech., vol. 66, no. 5, pp. 2265-2275, May 2018. 10. T. McCollough and W. Shao, "Microwave Detection of an Osteophyte in a Knee," 6th International Workshop on Computational Human Phantoms, Annapolis, MD, Aug. 2017.

todd@toddmccollough.com | Page 2 of 2

Jun. 2008 – Dec. 2008, Mar. 2009 – Jun. 2009

Jul. 2007 – Present

Jan. 2006 - Jun. 2007