

EIDORS v3.13

Andy Adler¹

¹Systems and Computer Engineering, Carleton University, Ottawa, Canada, adler@sce.carleton.ca

Abstract: This paper announces the release of version 3.13 of the EIDORS software suite. We review its new features, and make available suitable EIT illustrations.

1 Introduction

We proudly announce the release of EIDORS version 3.13, for the 26th Int. Conf. on Biomedical Applications of EIT, in July 2026. The software is available at eidors.org and licensed under the GNU GPLv2 or GPLv3. Archived versions are available on Zenodo [1–7], and all versions available on sourceforge.net [8–10].

EIDORS provides free software algorithms for forward modelling and inverse solutions of Electrical Impedance and (to some extent) Diffusion-based Optical Tomography, in medical, industrial and geophysical settings. EIDORS also aims to share data and promote collaboration.

2 Features and Growth

Release 3.13 of EIDORS builds upon a strong foundation in reconstruction algorithms, adding and improving a number of aspects.

- improved / less fragile netgen interface
- refactored extruded mesh shapes
- support for acousto-electric tomography
- improved documentation
- graphics improvements and bug work-arounds
- support for new vendor file formats
- better octave support
- (As always) speed-ups and bug fixes

EIDORS-related citations continue to grow (table 1).

In conclusion, EIDORS version 3.13 (hopefully) continues to be useful.

Tab. 1: EIDORS Citations (Apr 2026, scholar.google.com).

Paper	Date	Citations
[14] A MATLAB package for the EIDORS project ...	2001	370
[12] Image reconstruction algorithms for ...	2002	211
[13] A Matlab toolkit for three-dimensional ...	2002	613
[9] EIDORS: Towards a community-based ...	2005	53
[10] Uses and abuses of EIDORS: An extensible ...	2006	1109
[8] Simple FEMs aren't as good as we thought ...	2008	26
[6] EIDORS version 3.9	2017	40
[4] EIDORS version 3.10	2019	9

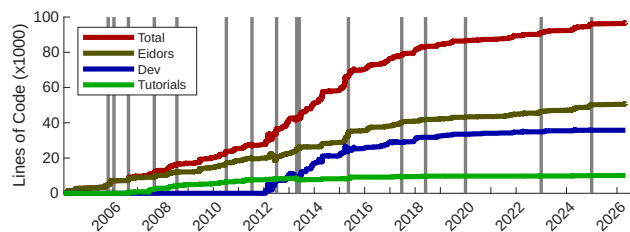


Fig. 1: Lines of Code (LoC) in Matlab files in the EIDORS code-base vs. time; Total (red), EIDORS (i.e. release branch, brown), Tutorials (green), development code (blue). Releases are indicated by gray bars (The 3.12 release is at the right).

3 EIT Illustrations

We make available software and illustrations of the basic concepts of EIT. Software is available in `eidors/examples/eit_intro` and figures at DOI:10.5281/zenodo.19702540, under an creative commons license for use in papers and presentations (fig 2).

Illustrations of equipotential backprojection are often used to illustrate “how EIT works”, even though this is no longer used in any clinical or research EIT systems.

However, it is possible to illustrate linearized time-difference EIT image reconstruction in this way (Fig 2C). From a solution $\hat{\mathbf{x}}$ which minimizes: $\|\hat{\mathbf{x}} - \mathbf{J}\mathbf{y}\|$ for sensitivity matrix $\mathbf{J}$ and difference data $\mathbf{y}$, $\hat{\mathbf{x}} = (\mathbf{J}^T \mathbf{J}^T + \mathbf{R})^{-1} \mathbf{J}^T \mathbf{y} = (\text{Filter})(\text{Backprojection})\mathbf{y}$

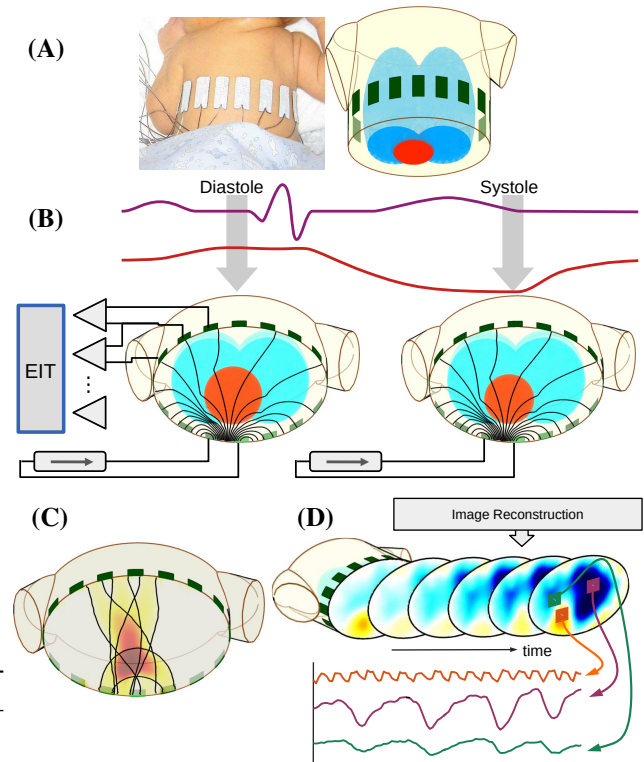


Fig. 2: EIT Illustrations (Images and data from [11]): (A) Subject and FEM; (B) adjacent-drive measurement and the equipotential lines associated with a change in heart blood volume; (C) EIT image from four most sensitive measurements of the heart region; (D) EIT images and waveforms of breathing and heart activity.

References

- [1] Adler, “EIDORS v3.13”, *Conf EIT 2026*, Sheffield, UK.
- [2] Adler, Grychtol, “EIDORS v3.12”, *Conf EIT 2024*, Hangzhou, China.
- [3] Adler, “EIDORS v3.11”, *Conf EIT 2022*, Seoul, S Korea.
- [4] Adler, “EIDORS v3.10”, *Conf EIT 2019*, London, UK.
- [5] Adler *et al.*, “EIDORS v3.9.1”, DOI:zenodo.1257670, 2018.
- [6] Adler *et al.*, “EIDORS v3.9”, *Conf EIT 2017*, Neuchâtel, Suisse.
- [7] Adler *et al.*, “EIDORS v3.8”, *Conf EIT 2015*, Dartmouth, NH, USA.
- [8] Adler, Borsic *et al.*, *Proc EIT2008*, Hannover, NH, USA, 2008.
- [9] Adler, Lionheart, *Proc EIT2005*, London, UK, 2005.
- [10] Adler, Lionheart, *Physiol Meas* 27:S25–S42, 2006.
- [11] Heinrich *et al* *Int Car Med*, 32:1392–1398, 2006.
- [12] Polydorides, *Ph.D. thesis*, U Manchester, UK, 2002.
- [13] Polydorides N, Lionheart, *Meas Sci Tech*, 13:1871–1883, 2002.
- [14] Vauhkonen *et al.*, *Physiol Meas*, 22:107–111, 2001.