

# Empowering Novel Geometric Algebra for Graphics & Engineering Workshop @ CGI 2022 – 12<sup>th</sup> Sep. 2022

## 3<sup>rd</sup> Call for Papers

<http://www.cgs-network.org/cgi22>

The ACM Siggraph 2001 and 2003 saw Geometric Algebra (GA) featured in the form of a Keynote and a Course. Since then the GA community has highlighted the benefits of employing W. K. Clifford's GA, quaternions and octonions for computer graphics and vision problems. The advances were presented at the Workshops CGI'2016 on "Geometric Algebra in Computer Science and Engineering" and every year at CGI'2017-2021 on "Empowering Novel Geometric Algebra for Graphics & Engineering (ENGAGE)" and have underlined the power of GA for analysis and computation. The Siggraph 2019 course on PGA and GAME2020, further boost GA and associated algebras as a language for Graphics.

Under the auspices of CGI'22 (online, 12-16 Sep. 2022), ENGAGE 2022 on Sep. 12<sup>th</sup> in Geneva, Switzerland, with keynote by *Steven De Keninck*, will again provide a multi-disciplinary approach from mathematics applied to computer graphics, computer vision and general computer science fields, where GA has strong potential to answer existing mathematical problems.

Geometric algebra is particularly well suited to allow cross-disciplinary solutions in software engineering as it provides an intuitive and insightful common denominator across mathematical disciplines used in a variety of applications. Understanding GA enables us to relate distinct, seemingly incompatible paths by providing a common geometric and mathematical base.

We invite original contributors in the form of full and short papers, which advance the state-of-the-art in both the application of geometric algebra and its instantiation in software and hardware. **Topics will include, but are not limited to:**

- Feature detection & Data analysis
- LIDAR and point cloud algorithms
- Scientific & Information visualization
- Computer graphics rendering
- Computer animation and video processing
- Holographic optics & Holographic maps
- Geographic information systems GIS
- Soundscape & Electromagnetic landscape modelling
- Augmented and virtual reality
- Application of Clifford Fourier transforms and Clifford wavelets to 2D and 3D images/color images
- Higher dimensional geometric algebras, octonions
- GA computing and quantum computing
- GA hardware implementations
- GA for artificial intelligence
- GA for ubiquitous information processing
- GA for Big Data processing & visualization

- Other engineering/science applications using GA

Authors should submit *short and full papers* directly to the CGI conference LNCS proceedings, by June 5<sup>th</sup>. All authors of accepted ENGAGE related papers will be invited either to an oral or poster presentation. For Springer LNCS CGI proceedings author instructions please refer to <http://www.cgs-network.org/cgi22/#callforpapers>

Post workshop *extended* and more *advanced* ENGAGE papers can be published in a special issue of the journal *Mathematical Methods in the Applied Sciences* (MMA, Impact factor:2.321), published by Wiley, and should have been orally presented at the conference. Author guidelines: <https://onlinelibrary.wiley.com/page/journal/10991476/homepage/forauthors.html>. Online submission: <https://mc.manuscriptcentral.com/mma> has a deadline of Dec. 31, 2022. At the time of submission, authors must indicate the special issue "ENGAGE 2022 Geometric Algebra for Computing, Graphics and Engineering".

### IMPORTANT DATES

#### All participants:

- Abstract submission (~200 words): **June 10, 2022** to Petr.Vasik@vutbr.cz

**Full and Short ENGAGE Papers:** (to appear in Springer LNCS proceedings, full 8-12 pages and short 5-7 pages)

- **Paper submission new: 12 June 2022**

- Paper notification: *July 05, 2022*

- Camera ready papers due: *July 24, 2022*

**Full MMA Papers:** (Latex using ama-stix.zip)

- Paper submission: *Oct. 01, 2022 - Dec. 31, 2022*

For **further information**, please contact the organizers:

- Andreas Aristidou (Cyprus)
- Werner Benger (Innsbruck)
- Dietmar Hildenbrand (Darmstadt)
- Eckhard Hitzer<sup>#</sup> (hitzer@icu.ac.jp) (Tokyo)
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- Yu Zhaoyuan (Nanjing)

(<sup>#</sup> = local workshop organizers)

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