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Date of birth: 21 Jan 1987

I am an Associate Research Scientist at ETH Zurich in the CGL group (Prof. Markus Gross's research group) working on Encoding, Streaming, and Quality of Experience of Immersive Multimedia. I hold a Ph.D. (2015) and M.Sc. (2010) degrees in Informatics from PUC-Rio, and the degree of Computer Scientist from the Federal University of Maranhão (UFMA) (2008). From 2008 to 2018, I worked as an associate researcher in the TeleMídia Laboratory, where I have actively contributed to the specifications and reference implementation for the standards of the Brazilian Digital TV System and ITU-T Recommendations for IPTV middleware. From 2018 to 2020, I worked as a post-doctoral research at LTS4/EPFL (Prof. Pascal Frossard's research group) in projects related to 360 videos quality assessment and compression (funded by Google/Youtube) and 3D point clouds compression (funded by Google/Daydream). My main research interests are on *immersive* and *interactive* media, with roots on the intersection of the broad areas of: *multimedia systems*, *human-computer interaction*, and *computer graphics*. My current and past research activities can be (roughly) divided into *geometric deep learning for immersive multimedia*, *networked multimedia*, *quality of experience*, *multimedia authoring & scene representation*, *multimodal & multi-user interactions*, *web & interactive TV*, and *networked multimedia*.

Education

PUC-Rio (Pontifical Catholic University of Rio de Janeiro) — **Rio de Janeiro, Brazil**
Doctor of Philosophy (Ph.D.), Department of Informatics — *2010-2015*
GPA: 9.8 out of 10.
Advisor: Luiz Fernando Gomes Soares (*in memoriam*)

PUC-Rio (Pontifical Catholic University of Rio de Janeiro) — **Rio de Janeiro, Brazil**
Master, Department of Informatics — *2008–2010*
GPA: 9.5 out of 10.
Advisor: Luiz Fernando Gomes Soares

UFMA (Federal University of Maranhão) — **São Luís, Brazil**
Graduation, Computer Science — *2004–2008*
GPA: 8.6 out of 10.
Advisor: Mário Antônio Meireles

Professional experience

Research

ETH Zurich — **Zurich, Switzerland**
Associate Research Scientist — *Nov. 2020–today*

EPFL (École Polytechnique Fédérale de Lausanne) — **Lausanne, Switzerland**
Postdoctoral researcher — *Apr. 2018–Oct. 2020*

TeleMídia Lab / PUC-Rio — **Rio de Janeiro, Brazil**
Researcher and Project Coordinator — *Jan. 2016–Mar. 2018*

TeleMídia Lab / PUC-Rio — **Rio de Janeiro, Brazil**
Research Assistant (Ph.D.) — *Aug. 2010–Dec. 2015*

Teaching

PUC-Rio — **Rio de Janeiro, Brazil**
Professor, Programming I (C language). — *Jan.–Aug. 2016*

PUC-Rio **Rio de Janeiro, Brazil**
Teaching Assistant, Computer Networks *Feb.–Jul., 2013*

Technical skills

- **Programming languages**: C/C++ (6yrs+), Lua, Python, OpenGL, OpenCL, Java (6yrs+), PHP, JavaScript, and Matlab. Also basic ability with: Cuda and Octave.
- **Other**: HTML/CSS (6yrs+), LaTeX, XML, NCL, X3D, SMIL.

Languages

- Portuguese (*native language*)
- English (*professional proficiency*)
- Spanish (*intermediate*)

Some notable projects

- **GRAPE – 3D Point Cloud Compression**, in partnership with Google DayDream (2019–2020).
- **Deep-learning-based Omnidirectional Image Compression**, in partnership with INRIA (2020).
- **Visual Distortion Metric in Omnidirectional Imaging**, in partnership with Youtube/Google. (2019)
- **Visual distortion analysis in 360 videos**, in partnership with Youtube/Google. (2018–2019)
- **Quality of Experience of 360-degree Video augmented with Sensory effects** (2018–2019) The design of effective immersive 360-degree video experiences is still a challenge today. Indeed, designers are still learning on how to use the different features supported by this new medium, such as increased field of view, visual immersion and immersive audio. In this context, the use of additional effects, such as wind, heat, vibration, etc. might also contribute to improve the users' sense of presence and the overall quality of experience. This project aims at better understanding the integration of sensory effects (sometimes called mulsemedia applications) with immersive 360-degree video, when consumed on head-mounted displays. In the scope of this project, we aim to provide an easy-to-use and customizable sensory effect platform for 360-degree multimedia applications and to run subjective experiments to measure the users' QoE with/without additional sensory effects.
- **DTV standards and ITU-T Ginga reference implementation** During my years at TeleMídia Lab I have been actively working in the ITU-T Ginga reference implementation for both Terrestrial DTV and IPTV, and helping in the specification of the standard ABNT NBR 15606 and in the Recommendation ITU-T H.761. `http://ginga.org.br` and `http://github.com/telemidia/ginga`
- **Supporting Multimedia Applications in Stereoscopic and Depth-based 3D Video Systems** (*Ph.D. Dissertation*) In my Ph.D. dissertation I proposed an end-to-end system for interactive multimedia applications based on Layered-depth-image. The proposed system supports the composition of different depth-based media objects (including authoring customization) and supports multi-view generation for (auto-)stereoscopic 3D displays. For achieving real-time performance, the client architecture is implemented in OpenCL. It was also integrated with the ITU-T Ginga-NCL reference implementation.
- **NCL Composer** During my work at TeleMídia Lab I was the main architect and developer of NCL Composer. NCL Composer is a flexible authoring tool for interactive multimedia applications providing textual and graphical facilities and easily extended through plug-ins. Its main features include: advanced textual editing, e.g. code coloring, contextual autocomplete, and error marking; structure viewing/editing of NCL documents; and what you see is what you get definition of the application layout. `http://composer.telemidia.puc-rio.br` and `http://github.com/telemidia/nclcomposer`
- **Control and presentation of three-dimensional media objects in NCL** (*M.Sc. Thesis*) In my master thesis I studied how to integrate 3D media objects, in special, eXtensible 3D (X3D) media objects in interactive digital TV applications. I extended the Ginga middleware reference implementation to support X3D media objects and defined how those objects could be related to others in interactive multimedia applications. Some of the features proposed in my master thesis were integrated into the Brazilian standard ABNT-NBR 15606-2 and in the ITU-T Recommendation H.761.
- **NCL Eclipse: textual editor for developing hypermedia applications** (*Undergraduate final project*)
In my undergraduate final project I developed NCL Eclipse, an Eclipse-based software with many facilities to help programmers to develop interactive multimedia applications for interactive digital TV using Ginga. Ginga is the Brazilian middleware for interactive Digital Television, which is now adopted by others 13 countries. Until today, NCL Eclipse is *the most used tool* by Latin American developers of interactive programs for Digital TV. `http://www.telemidia.puc-rio.br/~roberto/ncleclipse`

Distinctions

- Member of the editorial board of *MMTC Communications – Review*.
- Member of the technical program committee:
  - ACM Multimedia 2019, 2020.
  - ACM Multimedia Asia 2019.
  - Brazilian Symposium on Multimedia and the Web (WebMedia) 2016, 2017, 2018, 2019, 2020.
  - ACM Multimedia Systems Conference (Open datasets and software track) 2018.
  - Packet Video (PV) Workshop 2020.
  - International Worshop on Immersive Mixed and Virtual Environment Systems (MMVE), 2021.
  - Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV) 2020.
  - Packet Video Workshop 2020.
  - Workshop on 3D Point Cloud Processing, Analysis, Compression, and Communication (PC-PACC), 2020 (ICME 2020).
  - ACM IMX, 2021.
  - ACM IMX Demo, 2020.
  - ACM TVX, 2017.
  - International Workshop on Synchronism of Things (WSoT) 2016, 2017.
  - QoMEX 2020, 2021.
- Area chair (QoE and Immersive Media) of QoMEX 2020.
- Program chair of the XIII Workshop on Undergraduate Research Work (WTIC) 2016 (together with WebMedia 2016)
- General co-chair of 1st International Workshop on Bridging the Gap between Semantics and Multimedia Processing (SeMP 2019) (Collocated with IEEE ISM 2019)
- Act (or has acted) as a reviewer of:
  - IEEE Computer Graphics, 2021.
  - ACM Transactions on Multimedia Computing Communications and Applications (TOMM), 2020.
  - IEEE Transactions on Image Processing, 2020.
  - IEEE Transaction on Multimedia, 2019, 2020.
  - IEEE Transactions on Circuits and Systems for Video Technology (TCSVT), 2019, 2020.
  - IEEE Signal Processing Letters, 2019.
  - IEEE Consumer Electronics Magazine, 2018, 2019.
- Acted as an additional reviewer of:
  - ACM Symposium on Document Engineering (DocEng) from 2010 to 2015
  - Brazilian Symposium on Multimedia and the Web (WebMedia) from 2010 to 2015
  - International Symposium on Multimedia (ISM) from 2014 to 2015
  - IEEE Multimedia
  - Symposium on Virtual and Augmented Reality (SVR) 2014
- Painelist
  - "Immersive Multimedia Experiences - immediate challenges and future research directions", MMVE 2019

Committees member

- Daniel Bruno Costa Silva and Gabriel Lima de Souza., "Guaraná - 360-degree Interactive videos in Ginga-NCL using Head-mounted Displays as second screen." (*In Portuguese: Guaraná - Vídeos 360 graus Interativos em Ginga-NCL usando Head-Mounted Displays como Dispositivos de Segunda Tela.*), Master Thesis, CEFT-RJ, December, 2020. (*Externally invited, non-official member.*)
- Lucas Felipe Kunze, "SIRA—Anaglyph Reversion Using Time Series Analysis Techniques" (*In Portuguese: SIRA - reversão anaglífica utilizando técnicas de análise de séries temporais*), Master Thesis, USP-São Carlos, October, 2019.
- Thacyla de Sousa Lima, "Good practices of Reuse in Authoring Learning Objects" (*In Portuguese: "Boas Práticas de Reúso na Autoria de Objetos de Aprendizagem"*, Master Thesis, UFMA-São Luís, Brazil, April 18, 2019.
- Juliano Yugoshi, "Anaglyph reversion based on fast local search" (*In Portuguese: "Reversão anaglífica baseada em busca local rápida"*, Master Thesis, USP-São Carlos, Brazil, August 04, 2018.
- Pamela Torres Maia Beckman da Cruz, "Interaction Patterns in Authoring Tools for Children Storytelling" (*In Portuguese: "Padrões de Interação para Ferramentas de Autoria de Storytellings Infantis"*, Master Thesis, UFMA-São Luís, Brazil, May 27, 2016.

- Pablo Robert Pereira Alves, "creaTiVe: An Authoring Tool for Digital TV targetting End-users" (*In Portuguese: "creaTiVe: Proposta de Ferramenta de Autoria para TV Digital voltada ao usuário final"*), Undergraduate final project, UFMA-São Luís, Brazil, June 25, 2012.

Semester/Master projects supervision

- Yamin. Deep-learning-based Omnidirectional Image Compression. Sept 2019-Jan. 2020 (Master Thesis/EPFL)
- Virgile Hernicot. Omnidirectional Image Compression using Graph Wavelets. May, 2019. (Semester Project/EPFL)
- Sohyeong Kim. Detecting Visible Seams in Omnidirectional Images using the Graph Fourier Transform. June, 2018. (Semester Project/EPFL).

References

- Prof. Dr. Pascal Frossard (pascal.frossard@epfl.ch) / EPFL, Lausanne, Switzerland
- Prof. Dr. Carlos de Salles Soares Neto (csalles@deinf.ufma.br) / UFMA, Brazil
- Prof. Dr. Sérgio Colcher (colcher@inf.puc-rio.br) / PUC-Rio, Brazil
- Prof. Dr. Simone Diniz Junqueira Barbosa (simone@inf.puc-rio.br) / PUC-Rio, Brazil
- Prof. Dr. Marcelo Ferreira Moreno (moreno@ufjf.br) / UFJF, Brazil
- Prof. Dr. Mario Antonio Meireles (mario@deinf.ufma.br) / UFMA, Brazil

Selected publications

- *Roberto Gerson de Albuquerque Azevedo*, Neil Birkbeck, Francesca De Simone, Ivan Janatra, Balu Adsumilli, and Pascal Frossard. **Visual Distortions in 360 Videos**. In: *IEEE Transactions on Circuits and Systems for Video Technology* 30.8 (Aug. 2020), pp. 2524–2537. ISSN: 1558-2205. DOI: 10.1109/TCSVT.2019.2927344
- Roberto Gerson de Albuquerque Azevedo, Neil Birkbeck, Ivan Janatra, Balu Adsumilli, and Pascal Frossard. **A Viewport-Driven Multi-Metric Fusion Approach for 360-Degree Video Quality Assessment**. In: *2020 IEEE International Conference on Multimedia and Expo (ICME)*. July 2020, pp. 1–6. DOI: 10.1109/ICME46284.2020.9102936
- Francesca de Simone*, Roberto Gerson de Albuquerque Azevedo*, Kim Sohyeong, and Pascal Frossard. **Graph-based detection of seams in 360-degree images**. In: *2019 IEEE International Conference on Image Processing (ICIP)*. ICIP'19. *Equal contributions. Taipei, Taiwan, Sept. 2019, pp. 3776–3780. DOI: 10.1109/ICIP.2019.8803578
- *Roberto Gerson de Albuquerque Azevedo* and Guilherme Ferreira Lima. **A graphics composition architecture for multimedia applications based on layered-depth-image**. In: *2016 3DTV-Conference: The True Vision - Capture, Transmission and Display of 3D Video (3DTV-CON)*. Hamburg, Germany, July 2016, pp. 1–4. DOI: 10.1109/3DTV.2016.7548882
- *Roberto Gerson de Albuquerque Azevedo*, Guilherme F. Lima, and Luiz Fernando Gomes Soares. **An Approach to Convert NCL Applications into Stereoscopic 3D**. in: *Proceedings of the 2015 Symposium on Document Engineering*. DocEng '15. Acceptance ratio: 35%. Lausanne, Switzerland: ACM, 2015, pp. 177–186. ISBN: 978-1-4503-3307-8. DOI: 10.1145/2682571.2797064
- Álan Lívio Vasconcelos Guedes, *Roberto Gerson de Albuquerque Azevedo*, and Simone Diniz Junqueira Barbosa. **Extending multimedia languages to support multimodal user interactions**. In: *Multimedia Tools and Applications* 76.4 (2017), pp. 5691–5720. ISSN: 1573-7721. DOI: 10.1007/s11042-016-3846-8
- *Roberto Gerson de Albuquerque Azevedo*, Fernando Ismério, Alberto Barbosa Raposo, and Luiz Fernando Gomes Soares. **Real-Time Depth-Image-Based Rendering for 3DTV Using OpenCL**. in: *Advances in Visual Computing*. Ed. by George Bebis, Richard Boyle, Bahram Parvin, Darko Koracin, Ryan McMahan, Jason Jerald, Hui Zhang, StevenM. Drucker, Chandra Kambhamettu, Maha El Choubassi, Zhigang Deng, and Mark Carlson. Vol. 8887. Lecture Notes in Computer Science. Acceptance ratio: 26.4%. Springer International Publishing, July 2014, pp. 97–106. ISBN: 978-3-319-14248-7. DOI: 10.1007/978-3-319-14249-4_10
- *Roberto Gerson de Albuquerque Azevedo*, Eduardo Cruz Araújo, Bruno Lima, Luiz Fernando Gomes Soares, and Marcelo Ferreira Moreno. **Composer: meeting non-functional aspects of hypermedia authoring environment**. In: *Multimedia Tools and Applications* (July 2014), pp. 1–30. ISSN: 1380-7501. DOI: 10.1007/s11042-012-1216-8
- *Roberto Gerson de Albuquerque Azevedo* and Luiz Fernando Gomes Soares. **Embedding 3D objects into**

NCL multimedia presentations. In: *Proceedings of the 17th International Conference on 3D Web Technology*. Web3D '12. Los Angeles, California: ACM, 2012, pp. 143–151. ISBN: 978-1-4503-1432-9. DOI: 10.1145/2338714.2338739

- *Roberto Gerson de Albuquerque Azevedo*, Carlos de Salles Soares Neto, Mário Meireles Teixeira, Rodrigo Costa Mesquita Santos, and Thiago Alencar Gomes. **Textual authoring of interactive digital TV applications**. In: *Proceedings of the 9th international interactive conference on Interactive television*. EuroITV '11. Lisbon, Portugal: ACM, 2011, pp. 235–244. ISBN: 978-1-4503-0602-7. DOI: 10.1145/2000119.2000169

Complete list of publications

Theses

[1] *Roberto Gerson de Albuquerque Azevedo*. **Supporting multimedia applications in stereoscopic and depth-based 3D video systems**. Ph.D. thesis. Rio de Janeiro, RJ: Department of Informatics, PUC-Rio, Dec. 2015. URL: http://www2.dbd.puc-rio.br/pergamum/tesesabertas/1021805_2015_completo.pdf.

[2] *Roberto Gerson de Albuquerque Azevedo*. **Control and presentation of three-dimensional media objects in NCL**. Portuguese. Masters thesis. Rio de Janeiro: PUC-Rio, Aug. 2010. URL: http://www.maxwell.vrac.puc-rio.br/Busca_etds.php?strSecao=resultado&nrSeq=16864%201.

Book chapters

[3] *Roberto Gerson de Albuquerque Azevedo*, Renata Khasanova, and Pascal Frossard. **Omnidirectional Imaging and Deep Learning**. In: *Omnidirectional vision*. To appear. 2021.

[4] Sérgio Colcher, Álan Lívio Vasconcelos Guedes, *Roberto Gerson de Albuquerque Azevedo*, Guilherme F. Lima, Rodrigo Costa Mesquita Santos, and Antônio José Grandson Busson. **Projetos Atuais e Visão de Futuro do Laboratório TeleMídia/PUC-Rio em Videocolaboração**. Portuguese. In: *O Futuro da Videocolaboração: perspectivas*. Ed. by Leandro Ciuffo and Valter Roesler. Anais do IV CT-Vídeo. WebMedia '17. Gramado, RS, Brazil: Sociedade Brasileira de Computação, 2017, pp. 207–232. ISBN: 978-85-7669-381-9.

[5] Guilherme Ferreira Lima, Rodrigo Costa Mesquita, and *Roberto Gerson de Albuquerque Azevedo*. **Programando Aplicacões Multimídia no GStreamer**. Portuguese. In: *Anais do XXII Simpósio Brasileiro de Sistemas Multimídia e Web (Vol. 3): Minicursos*. Teresina, PI, Brazil: SBC, Nov. 2016. ISBN: 978-85-7669-333-8.

[6] *Roberto Gerson de Albuquerque Azevedo*, Fernando Ismério, Alberto Barbosa Raposo, and Luiz Fernando Gomes Soares. **Real-Time Depth-Image-Based Rendering for 3DTV Using OpenCL**. In: *Advances in Visual Computing*. Ed. by George Bebis, Richard Boyle, Bahram Parvin, Darko Koracin, Ryan McMahan, Jason Jerald, Hui Zhang, StevenM. Drucker, Chandra Kambhamettu, Maha El Choubassi, Zhigang Deng, and Mark Carlson. Vol. 8887. Lecture Notes in Computer Science. Acceptance ratio: 26.4%. Springer International Publishing, July 2014, pp. 97–106. ISBN: 978-3-319-14248-7. DOI: 10.1007/978-3-319-14249-4_10.

[7] Francisco Santa'Anna, Carlos de Salles Soares Neto, *Roberto Gerson de Albuquerque Azevedo*, and Simone Diniz Junqueira Barbosa. **Desenvolvimento de Aplicações Declarativas para TV Digital no Middleware Ginga com Objetos Imperativos Lua**. Portuguese. In: Fortaleza, CE, Brazil, 2009. URL: http://www.telemidia.puc-rio.br/files/biblio/2009_10_santanna.pdf.

Articles

[0] *Roberto Gerson de Albuquerque Azevedo*, Neil Birkbeck, Ivan Janatra, Balu Adsumilli, and Pascal Frossard. **Multi-feature 360 Video Quality Estimation**. In: *IEEE Open Journal of Circuits and Systems* (2021). Accepted for publication.

[8] *Roberto Gerson de Albuquerque Azevedo*, Neil Birkbeck, Francesca De Simone, Ivan Janatra, Balu Adsumilli, and Pascal Frossard. **Visual Distortions in 360 Videos**. In: *IEEE Transactions on Circuits and Systems for Video Technology* 30.8 (Aug. 2020), pp. 2524–2537. ISSN: 1558-2205. DOI: 10.1109/TCSVT.2019.2927344.

[10] Álan Lívio Vasconcelos Guedes, *Roberto Gerson de Albuquerque Azevedo*, and Simone Diniz Junqueira Barbosa. **Extending multimedia languages to support multimodal user interactions**. In: *Multimedia Tools and Applications* 76.4 (2017), pp. 5691–5720. ISSN: 1573-7721. DOI: 10.1007/s11042-016-3846-8.

[11] *Roberto Gerson de Albuquerque Azevedo*, Eduardo Cruz Araújo, Bruno Lima, Luiz Fernando Gomes Soares, and Marcelo Ferreira Moreno. **Composer: meeting non-functional aspects of hypermedia authoring environment**. In: *Multimedia Tools and Applications* (July 2014), pp. 1–30. ISSN: 1380-7501. DOI: 10.1007/s11042-012-1216-8.

[12] Alan César Belo Angeluci, *Roberto Gerson de Albuquerque Azevedo*, and Luiz Fernando Gomes Soares. **A Comunicação Digital e a Interdisciplinaridade na Produção de Conteúdo Interativo**. Portuguese. In: *Revista Comunicação Midiática* 6.1 (Jan. 2011). ISSN: 2236-8000. URL: http://www.mundodigital.unesp.br/revista/index.php/comunicacaomidiatica/article/view/58/43.

[13] Luiz Fernando Gomes Soares, *Roberto Gerson de Albuquerque Azevedo*, and Marcio Ferreira Moreno. **TeleMídia and 3D Hypermedia Research**. In: *SBC Journal on 3D Interactive Systems* 2.2 (2011). ISSN: 2236-3297. URL: http://www.telemidia.puc-rio.br/files/biblio/2011_12_soares.pdf.

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Conference papers

[15] Roberto Gerson de Albuquerque Azevedo, Neil Birkbeck, Ivan Janatra, Balu Adsumilli, and Pascal Frossard. **A Viewport-Driven Multi-Metric Fusion Approach for 360-Degree Video Quality Assessment**. In: *2020 IEEE International Conference on Multimedia and Expo (ICME)*. July 2020, pp. 1–6. DOI: 10.1109/ICME46284.2020.9102936.

[16] *Roberto Gerson de Albuquerque Azevedo*, Neil Birkbeck, Ivan Janatra, Balu Adsumilli, and Pascal Frossard. **Subjective and Viewport-based Objective Quality Assessment of 360-degree Videos**. In: *Proceedings of Image Quality and System Performance XVII, Electronic Imaging 2020*. Burlingame, California, USA, Jan. 2020, p. 6. URL: http://infoscience.epfl.ch/record/271755.

[17] Paulo Mendes, Álan Guedes, Daniel Moraes, Roberto Gerson De Albuquerque Azevedo, and Sérgio Colcher. **An Authoring Model for Interactive 360 videos**. In: *Proceedings of ICME 2020 Workshop: Tools for Creating XR Media Experiences*. Accepted for publication. London, UK, Mar. 28, 2020.

[18] *Roberto Gerson de Albuquerque Azevedo*, Neil Birkbeck, Ivan Janatra, Balu Adsumilli, and Pascal Frossard. **On the First JND and Break in Presence of 360-degree Content: An Exploratory Study**. In: *Proceedings of the 11th ACM Workshop on Immersive Mixed and Virtual Environment Systems*. MMVE '19. Amherst, Massachusetts: ACM, 2019, pp. 1–3. ISBN: 978-1-4503-6299-3. DOI: 10.1145/3304113.3326115.

[19] Álan Lívio Vasconcelos Guedes, *Roberto Gerson de Albuquerque Azevedo*, Sérgio Colcher, and Simone D.J. Barbosa. **Modeling Multimodal-Multiuser Interactions in Declarative Multimedia Languages**. In: *Proceedings of the 19th ACM Symposium on Document Engineering*. DocEng'19. Accepted for publication. Berlin, Germany, Sept. 2019, p. 9.

[20] Álan Lívio Vasconcelos Guedes, *Roberto Gerson de Albuquerque Azevedo*, Pascal Frossard, Simone D.J. Barbosa, and Sérgio Colcher. **Subjective Evaluation of 360-degree Sensory Experiences**. In: *IEEE 21st International Workshop on Multimedia Signal Processing*. MMSP'19. Kuala Lumpur, Malaysia, Sept. 2019, p. 6.

[21] Thacyla Lima, *Roberto Gerson de Albuquerque Azevedo*, and Carlos de Salles Soares Neto. **Improving the reuse support in learning objects authoring tools: a case study with Cacuriá**. In: *WebMedia 2019*. Rio de Janeiro-RJ, Oct. 2019.

[22] M. F. Moreno, G. Lima, R. Santos, R. Azevedo, and M. Endler. **Bridging the Gap between Semantics and Multimedia Processing**. In: *2019 IEEE International Symposium on Multimedia (ISM)*. 2019, pp. 315–3153.

[23] Alfredo Silva, Welton de Souza, Daniel Moraes, Roberto Azevedo, and Carlos Soares Neto. **Improving the Authoring of Web-based Interactive E-books with FableJS**. In: *Anais da VII Escola Regional de Computação do Ceará, Maranhão e Piauí*. São Luís: SBC, 2019, pp. 182–189. URL: https://sol.sbc.org.br/index.php/ercemapi/article/view/8861.

[24] Francesca de Simone*, Roberto Gerson de Albuquerque Azevedo*, Kim Sohyeong, and Pascal Frossard. **Graph-based detection of seams in 360-degree images**. In: *2019 IEEE International Conference on Image Processing (ICIP)*. ICIP'19. *Equal contributions. Taipei, Taiwan, Sept. 2019, pp. 3776–3780. DOI: 10.1109/ICIP.2019.8803578.

[25] Paulo Renato Conceição Mendes, *Roberto Gerson de Albuquerque Azevedo*, Ruy Guilherme Silva de Oliveira, and Carlos de Salles Soares Neto. **Exploring an AR-based User Interface for Authoring Multimedia Presentations**. In: *DocEng 2018*. Halifax, CA, Aug. 2018.

[26] Antonio José G. Busson, André Luiz de B. Damasceno, *Roberto Gerson de Albuquerque Azevedo*, Carlos de Salles Soares Neto, Thacyla de Sousa Lima, and Sérgio Colcher. **A Hypervideo Model for Learning Objects**. In: *Proceedings of the 28th ACM Conference on Hypertext and Social Media*. HT '17. Prague, Czech Republic: ACM, 2017, pp. 245–253. ISBN: 978-1-4503-4708-2. DOI: 10.1145/3078714.3078739.

[27] Guilherme Lima, *Roberto Gerson de Albuquerque Azevedo*, Sérgio Colcher, and Edward Hermann Haeusler. **Converting NCL documents to Smix and fixing their semantics and interpretation in the process**. In: *WebMedia 2017*. Gramado, RS, Oct. 2017.

[28] Hedvan Fernandes Pinto, Carlos De Salles Soares Neto, Sérgio Colcher, and *Roberto Gerson de Albuquerque Azevedo*. **The Fábulas Model for Authoring Web-based Children's eBooks**. In: *Proceedings of the 2017 ACM Symposium on Document Engineering*. DocEng '17. Valletta, Malta: ACM, 2017, pp. 19–28. ISBN: 978-1-4503-4689-4. DOI: 10.1145/3103010.3103016.

[29] *Roberto Gerson de Albuquerque Azevedo* and Guilherme Ferreira Lima. **A graphics composition architecture for multimedia applications based on layered-depth-image**. In: *2016 3DTV-Conference: The True Vision - Capture, Transmission and Display of 3D Video (3DTV-CON)*. Hamburg, Germany, July 2016, pp. 1–4. DOI: 10.1109/3DTV.2016.7548882.

[30] Lucas Gomes, Rodrigo Costa Mesquita, and *Roberto Gerson de Albuquerque Azevedo*. **SXMLua: Definindo estilos de documentos XML em Lua**. Portuguese. In: *Proceedings of the 13rd Workshop on Undergratuate Work on the Brazilian Symposium on Multimedia and the Web*. WebMedia '16. Teresina, PI, Brazil: SBC, Nov. 2016.

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