Alberto Gomez, PhD

Ultrasound Imaging Scientist

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⑧ *Alberto Gomez (Google Scholar)*

Education

2009–2013 **PhD**, *King's College London*, UK, *Full 3D Blood Velocity Mapping and Flow Quantification from Doppler Echocardiographic Images.*
Part of the FP7 euHeart Project. Supervisor Dr Graeme Penney.

2008–2009 **MRes Signal and Image Processing**, *Université de Rennes I/ Télécom Bretagne*, France, *SISEA*.

2006–2009 **MSc Biomedical Engineering**, *Télécom Bretagne*, France.

2002–2007 **MSc Telecommunication Engineering**, *ETSIT, Technical University of Madrid*, Spain.

Experience

Since 2016 **Senior Research Fellow (2021–), Research Fellow (2016–2021)**, *King's College London*, UK, *Smart Ultrasound Imaging.*

- 2019 – 2022 (Expected) Smart Ultrasound imaging for resource limited clinical settings within the Wellcome Trust Innovations Flagships program ICU Innovations (**VITAL**)
  I am a **co-investigator** and lead the ultrasound theme of this grant, focusing on investigation and clinical translation of real-time 2D ultrasound guided examinations for patient monitoring in the Intensive Care Unit (Supervising a PhD student and a Research Associate). I lead a team of two post-docs and one PhD student.
- 2014 – 2021 (Expected) Ultrasound image acquisition and computing for fetal imaging within the Wellcome Trust/EPSRC funded project: "Intelligent Fetal Imaging aNd Diagnosis (**IFIND**)"
  From a central position in the project, my role involves linking image analysis, machine learning, image engineering and robotics. This includes interfacing between groups and also having in-depth understanding of system engineering, image analysis, machine learning, robotics and clinical applications.
- 2021 – 2023 BHF Translational Awards "**3D Heart 2**".
  I am a **co-investigator** and leader of the technical team of this follow on project to 3D Heart, to commence in August 2021.
- 2017 – 2021 (Ended) Advanced ultrasound image visualization and interrogation for cardiac surgery planning, with the NIHR-i4i funded project: "**3D Heart**".
  I am a **co-investigator** and leader of the technical team (managing a team of 2 researchers) in this project where we are investigating the use of emerging virtual/augmented/mixed reality technology to improve surgery planning.
- Oct 2018 – Mar 2019; Oct 2020 – Feb 2021: *Career break: parental leaves*

2014–2016 **Research Associate**, *King's College London*, UK, *Ultrasound Imaging and SW Development.*
Ultrasound image acquisition and processing for foetal imaging within the **IFIND** project (as above).
During this period I set up enabling tools for the iFIND project and contributed to extended field-of-view ultrasound imaging.

2013–2014 **Research Associate**, *King's College London*, UK, *Ultrasound Image Computing.*
Ultrasound image processing for anatomical and functional analysis of the heart, funded by the EPSRC Intelligent Imaging Programme Grant - in collaboration with University College London and Imperial College London.
In this project I developed a novel flow reconstruction method to incorporate wall motion to cardiac flow measurements.

2009 **Research Intern**, *Philips Research*, Hamburg (Germany), *Digital Imaging* (6 months).
Curvature features in model-based image segmentation for radiotherapy planning (Masters Thesis).

2007–2008 **Intern**, *GE Healthcare*, Paris Region (France), *Advanced Medical Applications* (13 months).
Integration of an electromagnetic navigation system into an interventional environment.

2005–2006 **Intern**, *Telefónica R&D*, Madrid (Spain), *Advanced Networks* (12 months).
Next Generation Networks: advanced routing algorithms. Participation in European FP6 Projects: MUSE, AGAVE, MRDV

Pre-PhD Academic Projects

2008–2009	**Cartilage-add simulation in the joints of the forearm**, *Télécom Bretagne*, (90 h).

Reformulation of morphological operators on triangulated meshes for biomedical applications.

2007 **Aerial navigation system on a IBM Cell processor**, *THALES*, (60 h).
Project Manager for feasibility study: performance gain of a navigation system ported into a multi-core architecture

2006 **"Sea Safety System" GPRS-GPS localization device**, *Télécom Bretagne*, (60 h).

Commercial & IP

Industry Links

2020–2021 **Member of Technical Advisory Board**, *Ultromics Ltd, Oxford, UK*.

Patent Applications

2019 **"Method and Apparatus for Navigation and Display of 3D Image Data"**.
Inventors: **Alberto Gomez**, John M. Simpson, Kuberan Pushparajah, Gavin Wheeler, Shujie Deng, Nicolas Toussaint, Julia Schnabel
Applicants: Guy's and St Thomas' NHS Foundation Trust, King's College London
Status: patent pending

2019 **"Method and Apparatus for Coherent Multi-Transducer Ultrasound"**.
Inventors: Robert Eckersley, Jo V. Hajnal, **Alberto Gomez**, Laura Peralta Pereira
Applicant: King's College London
Status: patent pending

Open source

2021 **PRETUS**, *Plug-in based, REal-Time Ultrasound*, A research software to enable quick prototyping and deploying of aquisition and processing methods.
`https://github.com/gomezalberto/pretus`

2019 **VTK-Unity**, *Integration of VTK into Unity for VR applications through native plug-ins*.
`https://gitlab.com/3dheart_public/vtktounity`

2012 **MATLAB**, *Medical Image Processing Toolbox (**13K+ downloads**)*.
Generic, basic tools for medical image processing. Open source, available at MATLAB File Exchange.

Academia

Successful Grant Applications (**£1.7M total awarded**)

2021 **BHF Translational Awards**, **£490K**, "Virtual Reality Imaging for Surgical and Catheter Interventions in Congenital Heart Disease".
Co-investigator to Prof. John Simpson (PI), Prof Julia Schnabel, and Dr Kuberan Pushparajah. Technical lead of the grant and main contributor the research plan. Co-defendant at final interview.

2019 **WT-Innovations Flagships**, **£748K**, "Innovative biomedical engineering and computational science to improve the management of critical illness in resource-limited settings".
Co-investigator. Technical lead of the ultrasound programme.

2017 **NIHR-i4i**, **£454K**, "Holographic interrogation of 3D live ultrasound".
Co-investigator to Prof. John Simpson (PI), Prof Julia Schnabel, Dr Nicolas Toussaint and Dr Kuberan Pushparajah. Technical lead of the grant and main contributor the original project, co-defendant in the final interview and main management of grant funds. This application was enabled by a prototype I developed with my student Albert Alises.

2014 **KCL Pump-Priming Grant**, **£15K**, "Right Ventricular Analysis from Echo Images".
Co-investigator to Prof. John Simpson, co-defendant in the final interview and main management of grant funds.

Teaching

2021 **Advanced Ultrasound Imaging: technical aspects - Cross-Cutting Techniques Module, MSc Cardiovascular Research**, *KCL*.

2017–2018 **Advanced topics in Medical Image Computing – Ultrasound imaging analysis - EPSRC Centre for Doctorali Training**, *KCL/ICL*.

2014–2016 **Image Guided Interventions - EPSRC Centre for Doctoral Training**, *KCL/ICL*.

Since 2016 **Computer Programming - BEng Biomedical Engineering**, *KCL*.

Since 2014   **Summer School in Biomedical Engineering**, *KCL*, Ultrasound Imaging.

2013–2014   **Image Processing - BEng Biomedical Engineering**, *KCL*.

Student Supervision - PhD

2020–2023 (Expected)   **Nhat Phung Tran Huy**, *King's College London & OUCRU (Vietnam)* , PhD supervisor.
Clinical translation of smart ultrasound methods for non-expert ultrasound monitoring of critical patients in a resource limited setting

2020–2023 (Expected)   **David Stojanovski**, *King's College London & Ultromics Ltd* , PhD co-supervisor.
3D reconstruction of volumetric ultrasound images from tracked 2D sequences

2019   **Jordina Torrents**, *Universitat Pompeu Fabra*, Co-supervisor during visiting stay at KCL.
Fetal cord segmentation from MRI and ultrasound images

PhD Examination

2021   **Lorenzo Venturini**, *University of Oxford*, External Examiner.
Improving deep-learning segmentation performance in 3D neuroimaging with minimal manual annotations

2021   **Alejandro Godino Moya**, *Universidad de Valladolid*, External Examiner.
Contributions on Groupwise Registration for Cardiac CINE Magnetic Resonance Reconstruction

2019   **Daniel Treceno**, *Universidad de Valladolid*, External Assessor to PhD Thesis.
A web based MRI simulator as an educational tool: design, immplementation and evaluation

2015   **Antonio Porras**, *Universitat Pompeu Fabra*, External Assessor to PhD Thesis.
Multi-cue image integration for cardiac tissue characterization

Student Supervision - MSc/Undergraduate

2020/2021   **Javad Hosseini**, *King's College London*, BEng, 2st supervisor.
Deep learning for muscle segmentation to monitor physical recovery in the ICU of a low and medium income country (ongoing)

2020/2021   **Evangeline Fernando**, *King's College London*, BEng, 3rd supervisor.
Optimal visualisation of 3D cardiac ultrasound images in virtual reality (ongoing)

2019/2020   **Cesare Magnetti**, *King's College London*, BEng, 1st supervisor.
Advanced deep generative models for real-time simulation of ultrasound imaging (completed)

2019/2020   **Suryava Bhattacharya, Ei Lin, Lindsay Munroe and Gina Sajit**, *King's College London*, Group project, 2nd supervisor.
Integration of Deep Learning methods into a VR surgery planning application (completed)

2018/2019   **Simona Treivase**, *King's College London*, BEng, 2nd supervisor.
Real-time screen tracking for Clinical Translation of Deep US Analysis Methods using Augmented Reality.

2018/2019   **David Wilson**, *King's College London*, BEng, 2nd supervisor.
Multi-view ultrasound image fusion.

2018   **Hannes Griffith**, *Imperial College London/King's College London*, MEng, 2nd supervisor.
Saliency Detection using Deep Learning Networks for Fast Ultrasound Image Registration.

2017/2018   **Cornelia Schmitz**, *King's College London*, BEng, 1st supervisor.
Design and Development of a Passive Mechanism for Motion Imaging Phantoms. (completed)

2017   **Begonia Manso**, *King's College London*, Visiting medical trainee, 1st supervisor.
Registration and fusion of ultrasound and MR images of the heart.

2016/2017   **Sarjana Tharin**, *King's College London*, BEng, 1st supervisor.
Whole-body fetal imaging by 3D ultrasound image fusion.

2016/2017   **Zsofia Hegedus**, *King's College London*, BEng, 1st supervisor.
Patient-specific ultrasound-compatible imaging models using novel 3D printing methods.

2015/2016   **Andrew Higginson**, *King's College London/ Imperial College London*, MSc, 1st supervisor.
Streaming platform for live foetal imaging.

2015/2016   **Elizabeth Cotton**, *King's College London/ Imperial College London*, MSc, 2nd supervisor.
Deferred multi-cue foetal examination.

| 2015/2016 | **Ivan Diaz-Rios**, *King's College London/ Imperial College London*, MSc, 2nd supervisor. Mosaicing of ultrasound images. |
| 2015 | **Albert Alises**, *King's College London/ Universitat Pompeu Fabra*, BEng, 1st supervisor. Holographic Display of Medical Images. |

Conference Organisation and Program Committee Membership

2022	**Area chair for MICCAI 2022.**.
2021	**Area chair for MICCAI 2021. Chair of one oral session (Image reconstruction)**.
2021	**Best Student Paper Award Jury for ISBI 2021**.
2020	**Area chair for MICCAI 2020. Chair of one oral session (Ultrasound and fetal imaging)**.
2019	**Lead Organiser - 1st MICCAI Workshop on Smart Ultrasound Imaging (SUSI)**.
2018	**Associate to Program Chair for MICCAI**.
2016-2018	**PC member for the MICCAI-RAMBO workshop**.
2016	**PC assistant for the CVPR-WBIR workshop**.
2011	**Associate to Programme Chair for MIUA 2011**.

Reviewer for International Grants and Fellowships

Since 2021	**Reviewer for FONDECYT-CHILE Grants**, *Chile*, `https://www.conicyt.cl/fondecyt/`.
Since 2020	**Reviewer for EPSRC Grants**, *UK*, `https://epsrc.ukri.org/`.
Since 2019	**Reviewer for NWO Domain Applied and Engineering Sciences Grant**, *The Netherlands*, `www.nwo.nl`.

Reviewer for International Journals and Conferences

Since 2021	**Reviewer for Neuroimaging**.
Since 2020	**Reviewer for Nature Communications**.
Since 2019	**Reviewer for Medical Image Analysis**.
Since 2015	**Reviewer for IEEE Transactions on Biomedical Engineering**.
Since 2014	**Reviewer for Medical Engineering & Physics**.
Since 2012	**Reviewer for IEEE Transactions on Medical Imaging**, *Distinguished Reviewer - Bronze*.
Since 2016	**Reviewer for IEEE Journal of Biomedical and Health Informatics**.
2017	**Reviewer for MICCAI conference**.
Since 2013	**Reviewer for various satellite events of the MICCAI conference**.
Since 2012	**Reviewer for IEEE International Symposium on Biomedical Imaging**.

Public and Patient Engagement and Involvement

Dec 2021	**Native Scientist**, Virtual event with primary school children.
Oct 2019	**New Scientist Live at ExCeL London**, Public engagement on one of the largest science exhibitions in the world, presenting iFIND and other School research..
Mar 2019	**Exhibition at Science Gallery**, Patient Involvement for the 3D Heart Project.
Jan 2019	**Training/workshop on PPI/E**, St Thomas' Hospital.
Jan 2018	**Meeting with Adult Imaging Advisory Group**, Presentation of the iFIND project.
Dec 2017	**Royal Opening of Medical Engineering Centre**, Presentation of the iFIND project to HRH The Princess Royal.
Dec 2017	**Native Scientists**, "Seeing through things with science".
May 2016	**International Clinical Trial Days**, "iFIND and fetal ultrasound".
Feb 2016	**Science Museum Lates**, "3D Printed Hearts".
Sep 2015	**Santander Red Box Event**, *BHF*, "Looking at the Heart with Ultrasound".
Aug 2015	**King's Health Partners Summer School**, *KCL*, "Engineering Ultrasound".
Since 2011	**Ultrasound hands-on demo**, *KCL*, (requested yearly).

Awards

2020 **Outstanding Paper Award**, *MICCAI AE-CAI workshop*, Lima, Peru-Virtual, *Winner (Senior co-author)*.

2018 **Outstanding Paper Award**, *MICCAI AE-CAI workshop*, Granada, Spain, *Winner (Senior author)*.

2015 **C Walton Lillehei Young Investigator's Award**, *European Association of Cardio Thoracic Surgery (EACTS) 2015*, Amsterdam, The Netherlands, *Winner (2nd author to P. Youssefi)*.

2015 **Best Paper Award**, *Functional Imaging and Modeling of the Heart (FIMH) 2015*, Maastrich, The Netherlands, *Winner (2nd author to O. Oktay)* .

2013 **Best Imaging Poster**, *Annual Wellcome Trust/EPSRC Medical Engineering Centres meeting*, Ascott (UK) .

2012 **Young Investigator Award**, *EuroEcho 2012*, Athens (Greece) .

Selected Technical Skills

Languages English (fluent), French (fluent), Spanish (mother tongue)

Software C++ (Expert – VTK/ITK, Qt), Matlab (Expert), Python (Advanced – PyTorch), bash, git

QMS QMS training – Agile management/development, Jira

Academic Memberships and Society Affiliations

Commitee Member **EPSRC Medical Image Analysis - Early Career Researchers Network (MedIAN)**.

Member **MICCAI Society, European Association of Cardiovascular Imaging (EACVI)**.

Invited talks

2021 **IoP Physical Acoustics Tutorial Day, Institute of Physics**, *London, UK*, Oct 8th.
Incorporating ultrasound physics into deep neural networks: why and how

2017 **2nd VPH Summer School, UPF**, *Barcelona, Spain*, May 22 – 26.
Flow imaging: from 1D Doppler measurements to 4D flow

2016 **EuroEcho**, *Leipzig, Germany*, Dec 7-10.
Invited talk: multimodal image fusion.

2015 **NTNU**, *Trondheim, Norway*, Feb 10 – 13.
3D Ultrasound Image Analysis: cardiac shape, flow and function

2014 **TransCardio**, *Barcelona, Spain*, Nov 12–23.
Podium oral presentation, invited

2014 **Universidad Catolica**, *Santiago de Chile, Chile*, May 23.
4D Intracardiac Flow with Ultrasound

2010 **ICV Summer School**, *University of Catania, Italy*, Jul 12 – 17, *Invited poster*.

Selected Participation in Conferences and Workshops

MICCAI, *I regularly submit to and attend this conference and over the past years have been actively taking organisational roles as area chair, workshop organiser and reviewer.*

ISBI, *I regularly review for this conference and have recently contributed as jury member for the best student paper award..*

EuroEcho / EACVI conference, *I regularly submit to and attend this conference and over the past years have been invited to deliver talks.*

MIUA, *I regularly submit to, attend, and review for this conference.*

Publications

*I have authored or co-authored over **70** publications (Google Scholar metrics: **h-index 16, i-10 index 26, 744 citations**), including over **20 articles** in high-profile international journals with high impact factor (IF) such as IEEE Transactions on Medical Imaging (**IEEE-TMI**)(IF=7.816), IEEE Transactions on Biomedical Engineering (**IEEE-TBME**)(IF=4.288), Medical Image Analysis (**MedIA**) (IF=11.148), **Progress in Biophysics and Molecular Biology** (IF=2.703) and **Hypertension** (IF=7.017); and **over 30 conference papers** in top technical conferences such as Medical Image Computing and Computer Assisted Interventions (**MICCAI**), Information Processing in Medical Imaging (**IPMI**), IEEE International Symposium on Biomedical Imaging (**ISBI**), IEEE Engineering in Medicine and Biology (**EMBC**), Functional Imaging and Modeling of the Heart (**FIMH**), Medical Image Understanding and Analysis (**MIUA**), IEEE International Ultrasonics Symposium (**IUS**), and other; and top clinical conferences such as **EuroEcho**, the meeting of the European Association of Cardio Thoracic Surgeons (**EACTS**), and the meeting of the Association for European Paediatric Cardiology (**AEPC**). The full publication list is submitted as a separate document, or can be checked in my Google Scholar profile.*