

Fred Paul Marj Jjunju, PhD, MSc, FHEA

Email: jjunjufred@gmail.com

Tel: +256774176482

a. Research Profile

Professor Jjunju is a professor of Computer Science at UTAMU and a Fellow of the UK higher Academy, active member of the Royal Society of Chemistry, the IEEE and IET with 10+ years' experience of Software engineering, AI-IoT and chemical sensor design, instrumentation and application to environmental monitoring and personal hygiene; with a BSc in IT from Makerere University, MSc in Electrical Engineering (Analytical Instrumentation) from King Abdullah University of Science and Technology; PhD degree in Electrical and Electronic Engineering from the University of Liverpool. His research interests include; Software Engineering, Virtual/Immersive Reality, Artificial intelligence (Machine Learning and Deep learning theory); Data analytics and Big Data, Bioinformatics (Mass Spectrometry biomarker analysis), Internet of Things (IoT) and Cloud Computing (Google cloud, Amazon Web Services, Microsoft Azure platforms), Cyber Security, Sensors and Actuators, and In-situ Mass Spectrometry for in field analysis.

b. Professional Preparation

1. Makerere University, Kampala Uganda, Data Communication Networks (Major), Bachelor of Information Technology, 2009.
2. King Abdullah University of Science and Technology (KAUST), Saudi Arabia, "Solid State Electronics and Chemical Sensors (Major)", M.Sc, Electrical Engineering, 2010.
3. University of Liverpool, UK, "Analytical Instrumentation/Mass Spectrometry (Major)", Ph.D. Electrical Engineering and Electronics 2017.
4. University of Liverpool, UK, "Certificate in professional Studies in Learning and Teaching in Higher Education" Fellow of the Higher Education Academy (FHEA) Teaching Qualification, UK 2017-2019.

c. Appointments

1. 2007-2009 Network Engineer, Commonwealth Business Council, Uganda office.
2. 2009 - 2013 Discovery Scholar King Abdullah University of Science and Technology, Jeddah Saudi Arabia.
3. 2010-2021 Visiting Scholar, Department of Physical Science and Engineering, University of Oxford, UK.
4. 2011-2013 Visiting Scholar, Department of Chemistry Purdue University, West Lafayette, Indiana, USA.
5. 2014 – 2016 Visiting Scholar, FOM Institute for Atomic and Molecular Physics, University of Amsterdam, the Netherlands.
6. 2015 – 2016 Visiting Scholar, M4I, the Maastricht Multi Modal Molecular Imaging Institute, University of Maastricht Universiteitssingel 50 6229 ER Maastricht, the Netherlands.
7. July 2014-July 2021 Technology Innovation Manager, Q-Technologies Ltd, UK.
8. Nov, 2016 – Jun, 2021 Postdoctoral Research Fellow/Lecturer, School Electrical Engineering and Electronics, and Computer Science, University of Liverpool, UK.
9. Aug, 2021- Date; Senior Lecturer (Assistant Professor), Department of Electrical Engineering, Mbarara University of Science and Technology Technology, Uganda.

10. May 2021 – Date; Professor of Computer Science, Uganda Technology and Management University (UTAMU), Uganda.
11. 2016 – Date , Visiting Scholar Appointment, Department of Chemistry and Biochemistry, Ohio State University, Ohio Columbus, USA.

d. Publications

1. **Jjunju P. M. Fred**, Badu-Tawiah, A. K., Li, Anyin, Roqan. Iman and Cooks, R. G; “Hydrocarbon Analysis using Desorption Atmospheric Pressure Chemical Ionization”, *Int. J. Mass Spectrom.* 345–347, 80-88 (2013).
2. **Jjunju P. M. Fred**, Maher S, Li A, Syed SU, Smith B, Heeren RM, Taylor S, Cooks RG. Hand-Held Portable Desorption Atmospheric Pressure Chemical Ionization Ion Source for in Situ Analysis of Nitroaromatic Explosives. *Analytical Chemistry* 2015 Sep 9; 87(19):10047-55.
3. Badu-Tawiah, A. K., Li, A., **Jjunju P. M. Fred** and Cooks. R. G; “Peptide Cross-Linking at Ambient Surfaces by Reactions of Nanosprayed Molecular Cations”, *Angew. Chem. Int. Ed.*, 51: 9417–9421 (2012).
4. **Jjunju P. M. Fred**, Abraham.K.Badu-Tawiah, Anyin Li, Iman. Roqan and R. Graham. Cooks; “Hydrocarbon Analysis by Desorption Atmospheric Pressure Chemical Ionization”, *Prepr.Pap.-Am. Chem. Soc., Div. Energy Fuels Chem.* 2012, 57(2).
5. **Jjunju P. M. Fred**, Badu-Tawiah, A. K., Li, Anyin, Roqan. Iman and Cooks. R. G; “In-situ Analysis of Corrosion Inhibitors using a Portable Mass Spectrometer with Paper Spray Ionization”, *RCS Analyst*, 2013, 138, 3740-3748.
6. Li, Anyin, **Jjunju P. M. Fred** and Cooks. R. G, “Nucleophilic Addition of Nitrogen to Aryl Cations: Mimicking Titan Chemistry”, *J. Am. Soc. Mass Spectrom.* (2013) 24(11), 1745-1754.
7. S. Maher, **Jjunju P. M. Fred**, I. S. Young, B. Brkić and S. Taylor; “Membrane inlet mass spectrometry for in situ environmental monitoring”, *Spectrosc. Europe* 26, (2), pp. 6-8 (2014).
8. **Jjunju P. M. Fred**, S. Maher, A. Li, H. C. Hsub, P. Wei, S. Taylor and R. G. Cooks; “Ambient analysis of nitrogen compounds in petroleum oil using desorption atmospheric pressure chemical ionization”, *Prepr. Pap.-Am. Chem. Soc., Div. Energy Fuels.* 59, (2), pp. 753-755 (2014).
9. **Jjunju P. M. Fred**, S. Maher, A. Li, A. Badu, S. Taylor and R. G. Cooks; “Analysis of polycyclic aromatic hydrocarbons using desorption atmospheric pressure chemical ionization coupled to a portable mass spectrometer”, *J. Am. Soc. Mass Spectrom.* 26, 271-280 (2015).
10. S. Maher, **Jjunju P. M. Fred**, and S. Taylor; “Colloquium: 100 years of mass spectrometry: Perspectives and future trends” *Review. Modern. Physics.* 87, 113-135 (2015).
11. Syed. Sarfaraz, Maher, Simon, Eijkel. Gert; **Jjunju P. M. Fred**, Taylor. Stephen, Heeren. Ron; "A Direct Ion Imaging Approach for the Investigation of Ion Dynamics in Multipole Ion Guides", *Analytical Chemistry* 2015, 87.7: 3714-3720.
12. Smith, Ray T, **Jjunju P. M. Fred**, and Simon Maher. "Evaluation of Electron Beam Deflections across a Solenoid Using Weber-Ritz and Maxwell-Lorentz Electrodynamics." *Progress In Electromagnetics Research* 151 (2015): 83-93.
13. **Jjunju P. M. Fred**, S. Maher, S. U. Syed, R. M. A. Heeren, S. Taylor and Badu-Tawiah, A. K; “Screening and Quantification of Aliphatic Primary Alkyl Corrosion Inhibitor Amines in Water Samples by Paper Spray Mass Spectrometry, *Analytical Chemistry* 2016 88 (2), 1391-1400.
14. Damon, Deidre D., Yosef S. Maher, Mengzhen Yin, **Jjunju P. M. Fred**, Iain S. Young, Stephen Taylor, Simon Maher, and Abraham K. Badu-Tawiah. "2D Wax-printed paper substrates with extended solvent supply

capabilities allow enhanced ion signal in paper spray ionization." *Analyst* 141, no. 12 (2016): 3866-3873. DOI: 10.1039/C6AN00168H.

15. Simon. Maher, **Jjunju P. M. Fred**, S. Maher, S. U. Syed, R. M. A. Heeren, S. Taylor and Badu-Tawiah, A. K, "Direct Analysis and Quantification of Metaldehyde in Water using Reactive Paper Spray Mass Spectrometry", *Nature Scientific reports*, vol. 6, pp.35643, 2016, DOI: 10.1038/srep35643.
16. Smith, Ray T., **Jjunju P. M. Fred**, Iain S. Young, Stephen Taylor, and Simon Maher. "A physical model for low-frequency electromagnetic induction in the near field based on direct interaction between transmitter and receiver electrons." In *Proc. R. Soc. A*, vol. 472, no. 2191, p. 20160338. The Royal Society, 2016.
17. Smith B.L, **Jjunju P. M. Fred**, Taylor, S, Young. I.S and Maher, S, "Development of a portable, low cost, plasma ionization source coupled to a mass spectrometer for surface analysis", In *SENSORS*, 2016 IEEE (pp. 1-3), DOI: 10.1109/ICSENS.2016.7808673.
18. Maher Simon, Bastani. B, Smith. B, **Jjunju P. M. Fred**, Stephen Taylor, and Iain S. Young. "Portable fluorescent sensing array for monitoring heavy metals in water." In *SENSORS*, 2016 IEEE, pp. 1-3, 2016. DOI: 10.1109/ICSENS.2016.7808690.
19. Smith, B. L., Smith, N. A., Jjunju, F. P. M., Young, I. S., Vossebeld, J., Casse, G., , Stephen Taylor, and S. Maher. (2017). 50-Channel charge integrating faraday detector for characterization of ambient ions. In *2017 IEEE SENSORS* (pp. 1-3). IEEE.
20. Jjunju, F. P. M., Giannoukos, S., Marshall, A., & Taylor, S. (2019). In-Situ Analysis of Essential Fragrant Oils Using a Portable Mass Spectrometer. *International journal of analytical chemistry*, Vol 2019, Article ID: 1780190 pg 11, <https://doi.org/10.1155/2019/1780190>.
21. Cooks, Robert Graham, Fred Paul Mark Jjunju, Anyin Li, and Iman S. Roqan. "Methods of analyzing crude oil." U.S. Patent 10,197,547, issued February 5, 2019.
22. **Fred. P. M. Jjunju**, Deidre E. Damon, David Romero-Perez, Iain S. Young, Ryan J. Ward, Alan Marshall, Simon Maher, Abraham K. Badu-Tawiah; Analysis of Non-Conjugated Steroids in Water using Paper Spray Mass Spectrometry; *Nature Scientific Reports*, Accepted May 2020.
23. Ward, Ryan Joseph, **Fred P M Jjunju**, Elias J. Griffith, Sophie M. Wuerger, and Alan Marshall. "Artificial Odour-Vision Synesthesia via Olfactory Sensory Argumentation." *IEEE Sensors Journal* 21, no. 5 (2020): 6784-6792.
24. Lucky, Godswill, **Fred Jjunju**, and Alan Marshall. "A Lightweight Decision-Tree Algorithm for detecting DDoS flooding attacks." In *2020 IEEE 20th International Conference on Software Quality, Reliability and Security Companion (QRS-C)*, pp. 382-389. IEEE, 2020.
25. Sebastian John, Elias Griffith, David Swapp, Simon Julier, Iheanyi Caleb Irondi, **Fred P M Jjunju**, Ryan Ward, Alan Marshall, and Anthony Steed. "Consensus Based Networking of Distributed Virtual Environments." *IEEE Transactions on Visualization and Computer Graphics* (2021).
26. Friston, Sebastian, Sebastian, Elias Griffith, David Swapp, Caleb Lrondi, **Fred P. M Jjunju**, Ryan Ward, Alan Marshall, and Anthony Steed. "Quality of Service Impact on Edge Physics Simulations for VR." *IEEE Transactions on Visualization and Computer Graphics* 27, no. 5 (2021): 2691-2701.
27. Marrinan, Thomas, and Michael E. Papka. "Real-Time Omnidirectional Stereo Rendering: Generating 360° Surround-View Panoramic Images for Comfortable Immersive Viewing." *IEEE Transactions on Visualization and Computer Graphics* 27, no. 5 (2021): 2587-2596.
28. Ward, R. J., **Jjunju, F. P. M.**, Kabenge, I., Wanyenze, R., Griffith, E. J., Banadda, N., Taylor, S., & Marshall, A. (2021). FluNet: An AI-Enabled Influenza-like Warning System. *IEEE Sensors Journal*.

29. **Jjunju P. M. Fred**, Ryan Ward, Elias Griffith, A. Marshall, “Wearable Portable Olfactory Display for Immersive Reality” (*Under Review, IEEE Sensors*) 2021.
30. **Jjunju P. M. Fred**, Badu-Tawiah, A. K., Li, Anyin, Roqan Iman and Cooks, R. G., Hydrocarbon Analysis using Desorption Atmospheric Pressure Chemical Ionization, 60th American Society of Mass Spectrometry (ASMS) Conference on Mass Spectrometry and Applied Topics, Vancouver, Canada (June 2012).
31. **Jjunju P. M. Fred**, Badu-Tawiah, A. K., Li, Anyin, Roqan Iman and Cooks, R. G., Hydrocarbon Analysis using Desorption Atmospheric Pressure Chemical Ionization, 244th American Chemical Society (ACS) National Meeting, Philadelphia, Pennsylvania (August 2012).
32. **Jjunju P. M. Fred**, Badu-Tawiah, A. K., Li, Anyin, Roqan Iman and Cooks, R. G., Hydrocarbon Analysis using Desorption Atmospheric Pressure Chemical Ionization, 19th International Mass Spectrometry Conference (IMSC), Kyoto, Japan (September 15 - 21 2012).
33. **Jjunju P. M. Fred**, Badu-Tawiah, A. K., Li, Anyin, Roqan Iman and Cooks, R. G., Hydrocarbon Analysis using Desorption Atmospheric Pressure Chemical Ionization, 3rd Asian and Oceanic Mass Spectrometry Conference (AOMSC-3), Kyoto, Japan (September 2012).
34. **Jjunju P. M. Fred**, Badu-Tawiah, A. K., Li, Anyin, Roqan Iman and Cooks, R. G., Hydrocarbon Analysis using Desorption Atmospheric Pressure Chemical Ionization, IET/IOP annual meeting University of Liverpool, UK (February 20 2012).
35. **Jjunju P. M. Fred**, Badu-Tawiah, A. K., Li, Anyin, Roqan Iman and Cooks, R. G., Analysis of Corrosion Inhibitors using a Portable Mass spectrometer with Paper Spray Ionization, 61th American Society of Mass Spectrometry (ASMS) Conference on Mass Spectrometry and Applied Topics, Minneapolis Minnesota, USA (June 9-13 2013).
36. **Jjunju P. M. Fred**, Badu-Tawiah, A. K., Li, Anyin, Roqan Iman and Cooks, R. G., Analysis non-basic nitrogen compounds in petroleum oil using desorption atmospheric pressure chemical ionization, 245th American Chemical Society (ACS) National Meeting, Indianapolis, USA (September, 2013).
37. Li, Anyin, **Jjunju P. M. Fred**, and Cooks, R. G., Nucleophilic Addition of Nitrogen to Aryl Cations: Mimicking Titan Chemistry, 61th American Society of Mass Spectrometry (ASMS) Conference on Mass Spectrometry and Applied Topics, Minneapolis Minnesota, USA. (June 9-13 2013).
38. **Jjunju P. M. Fred**, S. Maher, A. Li, H. C. Hsu, P. Wei, S. Taylor and R. G. Cooks, Ambient analysis of nitrogen compounds in petroleum oil using desorption atmospheric pressure chemical ionization, RSC Chemistry in the Oil Industry XIII Symposium, Manchester, UK (November 2013).
39. Li, Anyin, **Jjunju P. M. Fred**, S. Taylor and R. G. Cooks, In-situ analysis of oil matrices using paper spray ionization and portable mass spectrometer: toward chemical analysis in the oil field of corrosion inhibitors and so on, RSC Chemistry in the Oil Industry XIII Symposium, Manchester, UK (November 2013).
40. S. Maher, **Jjunju P. M. Fred**, M. S. U. Syed and S. Taylor, Performance of a quadrupole gas analyzer operating in stability zones 1 and 3, VS4: 4th Vacuum Symposium UK, Coventry UK (October 2013).
41. Anyin Li, **Jjunju P. M. Fred**, Eric Boone, Robert Shellie, Michael Wleklinski, Kerri A. Pratt, R. Graham Cooks, Paper Spray Ionization under Harsh Environment and Gas Phase Ion Molecule Reaction under Titan Simulate Environment, 9th HEMS Workshop 15–18, St. Pete Beach, Florida, USA (September 2013).
42. M. J. Antony Joseph, S. Maher, **Jjunju P. M. Fred**, S. U. Syed, I. S. Young, R. Heeren and S. Taylor, Ion transmission factors affecting sensitivity for a miniature QMS, The 34th BMSS Annual Meeting, Cheshire, UK (April 2014).
43. M. J. Antony Joseph, S. U. Syed, S. Maher, **Jjunju P. M. Fred**, R. Heeren and S. Taylor, Quadrupole mass filter design and performance for operation in stability zone 1, NVMS 50th Anniversary Congress in Rolduc, Netherlands (April 2014).

44. Simon Maher; Sarfaraz U. A. Syed; John R.Gibson, **Jjunju P. M. Fred**, Barry L. Smith; David Taylor; Iain S. Young; Ron M. A. Heeren; and Stephen Taylor; Dog, New Tricks: Enhanced Quadrupole Performance by Addition of a Magnetic Field, 63rd American Society of Mass Spectrometry (ASMS) Conference on Mass Spectrometry and Applied Topics, America's Center, St. Louis, Missouri (May 2015).
45. Simon Maher, Barry L. Smith, Mariya A. Juno, **Jjunju P. M. Fred**, Behnam Bastani, Lei Su, Urszula Salaj-Kosla, Liam Lewis, Jean-Michel Mortz, Dag Hammer, Gyda Cristophersen, Pat O'Leary, Allan MacMaster, Stephen Taylor, Iain S. Young; Making Sense of Water Quality: A Portable MS-UV Sensing Platform for Real-Time Monitoring in Aquaculture, 63rd American Society of Mass Spectrometry (ASMS) Conference on Mass Spectrometry and Applied Topics, America's Center, St. Louis, Missouri (May 2015).
46. Mariya J. Antony Joseph; Simon Maher; **Jjunju P. M. Fred**, S. U. A. H. Syed; John R. Gibson; Iain S. Young; Ron M. A. Heeren; Stephen Taylor; Every Ion Counts: Optimization of the Quadrupole Mass Spectrometer for Improved Ion Transmission and Flat-Top Peaks", 63rd American Society of Mass Spectrometry (ASMS) Conference on Mass Spectrometry and Applied Topics, America's Center, St. Louis, Missouri (May 2015).
47. S.U.A.H Syed; Gert B. Eijkel; Simon Maher; **Jjunju P. M. Fred**, Hans R. Poolman; Stephen Taylor; Ron M.A. Heeren; "There's Plenty of Room at the Bottom: a Micro-Pixelated Position Sensitive Detector for Performance Improvement of a QMS Instrument", 63rd American Society of Mass Spectrometry (ASMS) Conference on Mass Spectrometry and Applied Topics, America's Center, St. Louis, Missouri (May 2015).
48. **Jjunju P. M. Fred**, S. Maher, A. Li, M. J. Lynch, B. Smith, S. U. Syed, R. M. A. Heeren, S. Taylor and R. Graham Cooks; "Handheld Portable DAPCI Ion Source for in-situ Analysis of Nitroaromatic Explosives" BMSS Annual Conference (14-17 September 2015) Birmingham UK.
49. **Jjunju P. M. Fred**, S. Maher, Stephen Taylor and R. G. Cooks; "Handheld and Portable DAPCI source for Point and Shoot Applications: Towards Onsite In-Situ Explosives Analysis" 64th American Society of Mass Spectrometry (ASMS) Conference on Mass Spectrometry and Applied Topics, (June 5-9 2016) San Antonio, Texas, USA.
50. Simon Maher; Simon Maskell; Sarfaraz Syed; **Jjunju P. M. Fred**, Stephen Taylor; "Finding the Peaks: Performance Enhancement of Portable MS using a Bayesian Approach" 64th American Society of Mass Spectrometry (ASMS) Conference on Mass Spectrometry and Applied Topics, (June 5-9 2016), San Antonio, Texas, USA.
51. **Jjunju P. M. Fred**, S. Giannoukos, D. T. McGuinness, A. Marshall, V. Selis, J. Smith, S. Maher, S. Taylor, "Scent Transmission over the Internet using Mass Spectrometry" 65th ASMS Conference (June 4-8, 2017) Indianapolis, Indiana, USA.
52. S. Giannoukos, D. T. McGuinness, **Jjunju P. M. Fred**, S. Giannoukos, D. T. McGuinness, A. Marshall, V. Selis; J. Smith, S. Maher, S. Taylor, "Investigating mass spectrometric communication approaches for odor transmission over data networks" 65th ASMS Conference (June 4-8, 2017) Indianapolis, Indiana, USA
53. **Fred P. M Jjunju**, Stamatios G. A. Marshall, "In-situ Analysis of Food Flavors using Portable Mass Spectrometry", 66th ASMS Conference on Mass Spectrometry and Allied Topics, June 3 - 7, 2018 San Diego, California, USA.

e. Synergistic Activities

- Reviewer Sensors and Actuators, 2020 -date,
- Guest Editor (Sensors special issue) Hawadawi Publishing, 2018- date,
- Reviewer IEEE Sensors, 2016 – Date
- Reviewer "Analyst Journal" Royal Chemical Society, 2016 – Date,
- Member of the Royal Society of Chemistry (membership number 573877), 2015 – Date

- Fellow of the UK Higher Education Authority (AFHEA), 2018 – Date,
- Member of the Institute of Engineering and Technology (IET), 2016-Date
- Member of the Royal Society of Chemistry (membership number 573877), 2015 – Date
- Module Coordinator and Course Designer, Department of Electrical Engineering and Electronics, University of Liverpool, UK.

f. Collaborators & Other Affiliations

Prof Dominic O'Brien, Department of Engineering Science, Oxford University, UK, Prof S. Taylor; Prof Simon Maher, and Prof A. Marshall, Department of Electrical Engineering and Electronics, University of Liverpool; R. G Cooks, Department of Chemistry Purdue University Indiana, USA; Abraham Badu-K-Taiwah, Department of Chemistry and Biochemistry, Ohio State University Ohio Columbus USA, Prof I. Roqan, Department of Material Science, King Abdullah University of Science and Technology (KAUST) Jeddah Saudi Arabia, I. Kabenge, Noble Babanadda, Department of Agriculture and BioSystem Engineering, Makerere University, Uganda; R. J Ward, University of Liverpool, Computer and Electronics; Prof. R. M. Heeren, Maastricht Universiteitssingel 50 6229 ER Maastricht, The Netherlands.

(ii) Graduate and Postdoctoral Advisors

- Prof A. Marshall, (Postdoctorate Advisor), Department of Electrical Engineering and Electronics, University of Liverpool.
- Prof S. Taylor, (PhD Advisor), Department of Electrical Engineering and Electronics, University of Liverpool
- Prof M. Alouini, Distinguished Professor (MSc EE Advisor), Department of Electrical Engineering and Computer Engineering King Abdullah University of Science and Technology, Saudi Arabia.
- Prof R. G Cooks, Henry Bohn Hass Distinguished Professor of Chemistry (Visiting Scholar Advisor), Purdue, University, West Lafayette Indiana, USA.

(iii) Thesis Advisor and Postgraduate Sponsor

- Supervised 4 PhD (Co-Advisor), Students University of Liverpool, 2018-2020.
- Supervised 3 Msc (Msc Advisor) 2014-2015, Department of Electrical Engineering and Electronics, University of Liverpool, UK.
- Advised a total of 20 Final Year Projects and second year projects (Under graduates 2014-2021), Department of Electrical Engineering and Electronics, University of Liverpool, UK.

f. Research Impacts

- Module designer and delivery for non-experts (non-STEM) to get involved in sensor technology development; “Making Sense of Sensors”. More than 50 non-STEM community members attended and 40 of them were inspired to join STEM the following year.
- Coauthored and Developed a patent that led to the analysis of oil component under ambient conditions with little to no sample preparation (**US Patent 9,733,228**)
- Developed a portable handheld ion source for the detection of explosives in the open air (*Patent Pending*)