

EIRINI KONSTANTINO

B E n g , M E n g , M S c , P h D

Profile

My research lies at the development of digitally enabled solutions for managing working environments as it has a huge role to play in improving health & wellbeing, and building a more sustainable world.

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Keywords

Automation, Machine learning, Image Processing, Computer Vision, Digital Twins, `Sustainability, Smart Cities, Internet of Things, Productivity, Manufacturing, Construction Project Management, Maintenance Management, Health & Safety.

EDUCATION

University of Cambridge (UK) | Department of Engineering, Construction Information Technology laboratory

Doctor of Philosophy (PhD) in Engineering | 2013 – 2018

(Supervisors: Dr. Ioannis Brilakis, Dr. Joan Lasenby)

Research Areas: Information technology, computer vision, productivity, digital twins, image processing, machine learning, and automation in construction.

Thesis: "Vision-Based Construction Worker Task Productivity Monitoring"

Research achievements:

- *A novel computer vision-based 2D tracking method of construction workers*
- *A novel computer vision-based matching method of construction workers*
- *A novel trajectory analysis-based method for monitoring labour input.*

University of Patras (Greece) | Department of Civil Engineering

Master of Science (MSc) in Transportation, Project Management & Spatial Planning | 2008 – 2011

(Supervisor: Dr Stiros Stathis)

Research focus: Transportation Management, Satellites, signal processing.

Thesis: "Optimization of Measurements with GNSS in Conditions of Limited Visibility of Satellites in Urban Canyons".

University of Patras (Greece) | Department of Civil Engineering

Master of Engineering (MEng) in Civil Engineering | 2006 – 2007

Thesis: "Static and Anti Seismic Design of a House with Multi-level Sloping Roofs. Implementation of Alternative Anti Seismic Systems, Using Structural Steel and Reinforced Concrete, and Calculation of Construction Cost".

University of Patras (Greece) | Department of Civil Engineering

Bachelor of Engineering (BEng) in Civil Engineering | 2001 – 2006

Public School (Greece) | 1995 - 2001 High School Diploma

RESEARCH POSITIONS

University of the Basque Country (UPV/EHU) | Aeronautics Advanced Manufacturing Center (CFAA)
Marie Curie ADAGIO Fellow | 03/2023 - present
Research project: Development of a deep learning-based health and safety risk assessment framework.

Career Break (Maternity Leave) | 08/2020 - 02/2023

University of Cambridge (UK) | Laing O' Rourke Centre for Construction Engineering & Technology
Postdoctoral Research Associate | 2019 - 2020
Research project: Analysis of performance measurement frameworks of the construction building sector.

University of Cambridge (UK) | Manufacturing and Management Division (IfM)
Postdoctoral Research Associate | 2018 - 2019
Research project: Development of a Machine Learning-based Digital Twin tool for automating building asset maintenance management.

University of Cambridge (UK) | Laing O' Rourke Centre for Construction Engineering & Technology
Postdoctoral Research Associate | 2018
Research project: Development of evidence-based policies for the construction sector.

University of Patras (Greece) | Department of Civil Engineering
Postdoctoral Research Assistant | 2011 - 2013
Research project: Digital Twins of road infrastructure for optimizing the impact of pavement maintenance decisions.

RESEARCH GRANTS

Project title: Digital twins for occupational health risk assessment of advanced aerospace manufacturing processes | 2023
Funding body: Marie Skłodowska-Curie Actions COFUND (ADAGIO), supported by the University of the Basque Country (UPV/EHU) and the University of Bordeaux (UBx)
Academic Supervisor: Professor Luis Norberto López de Lacalle

Project title: Methodology for quantifying the benefits of offsite construction | 2020
Funding body: Laing O' Rourke Centre for Construction Engineering & Technology, CIRIA
Project manager: Professor Camden Middleton

Project title: Construction sector performance measurement - Learning lessons & finding opportunities | 2020
Funding body: The Building Levy (New Zealand)
Project manager: Charlotte Brown
Academic Supervisor: Professor Cam Middleton

Project title: Developing a Digital Twin at Building and City Levels | 2019
Funding body: Innovative UK, Engineering and Physical Sciences Research Council (EPSRC), Centre for Digital Built Britain (CDBB)
Project leader: Professor Ajith Kumar Parlikad

Project title: Highways England Smart Motorways Program/ Embedded Asset Sensors for Deterioration Detection | 2019
Funding body: Highways England
Project manager: Dr Jennifer Schooling

Project title: Social Networked Smart Infrastructure Assets | 2018 – 2019

Funding body: Innovate UK (part of UK Research and Innovation)

Project manager: Dr Alex Wong

Academic Supervisor: Professor Ajith Kumar Parlikad

Project title: Off-site manufacture for construction: Building for change | 2018

Funding body: Laing O' Rourke Centre for Construction Engineering & Technology

Project manager: Professor Camden Middleton

Project title: Computer vision automated productivity measurement | 2013 – 2018

Funding body: EPSRC and Laing O' Rourke Ltd

Project manager: Professor Ioannis Brilakis

A W A R D S

Marie Skłodowska-Curie Actions COFUND Postdoctoral Fellowship (ADAGIO), supported by the University of the Basque Country UPV/EHU and the University of Bordeaux (UBx)

Industrial Cooperative Award in Science & Technology (iCASE) studentship, supported by Engineering and Physical Sciences Research Council (EPSRC) and Laing O' Rourke Ltd. under Grant No. 13440016 | 2013 – 2018

Travel Research Grant supported by Wolfson College, University of Cambridge | 2016

P U B L I C A T I O N S I N P E E R - R E V I E W E D J O U R N A L S

Assadzadeh, A., Arashpour, M., Brilakis, I., Ngo, T., & **Konstantinou, E.** (2022) "Vision-based excavator pose estimation using synthetically generated datasets with domain randomization". *Journal of Automation in Construction*, 134. (Q1) <https://doi.org/10.1016/j.autcon.2021.104089>

Konstantinou, E., & Brilakis, I. (2020) "Monitoring Construction Labour Productivity via A Smart Technology Approach". *Proceedings of the Institution of Civil Engineers - Smart Infrastructure and Construction* 172, 70-82 <https://doi.org/10.1680/jsmic.20.00014> (metrics still under calculation)

Lu, Q., Xie, X., Parlikad, A. K., Schooling, J. M., & **Konstantinou, E.** (2020). "Moving from building information models to digital twins for operation and maintenance". *Proceedings of the Institution of Civil Engineers - Smart Infrastructure and Construction*. <https://doi.org/10.1680/jsmic.19.00011> (metrics still under calculation)

Lu, Q., Parlikad, A. K., Woodall, P., Don, Ranasinghe, G., Liang, Z., Xie, X., Liang, Z., **Konstantinou, E.**, Heaton, J., & Schooling, J. (2020). "Developing a Dynamic Digital Twin at Building and City Levels: Case Study of West Cambridge Campus". *Journal of Management in Engineering*. 36 (3). ASCE. (Q1) [10.1061/\(ASCE\)ME.1943-5479.0000763](https://doi.org/10.1061/(ASCE)ME.1943-5479.0000763)

Konstantinou, E., Lasenby, J., & Brilakis, I. (2019). "Adaptive computer vision-based 2D tracking of workers in complex environments". *Journal of Automation in Construction*, 103 (April 2018): 168-184. Elsevier. (Q1) <https://doi.org/10.1016/j.autcon.2019.01.018>

Konstantinou, E., & Brilakis, I. (2018) "Matching Construction Workers across Views for Automated 3D Vision Tracking On-Site". *Journal of Construction Engineering and Management*. 144 (7): 1-12. ASCE. (Q1). [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0001508](https://doi.org/10.1061/(ASCE)CO.1943-7862.0001508)

PUBLICATIONS - INTERNATIONAL CONFERENCES

- Konstantinou, E., Parlikad, A.K., Wong, A., & Broom, C.** (2019). "Prioritization of Responsive Maintenance Tasks via Machine Learning-based Inference". International Conference on Smart Infrastructure and Construction (ICSIC 2019). July 2019, Cambridge, United Kingdom. <https://doi.org/10.1680/icsic.64669.061>
- Konstantinou, E., & Brilakis, I.** (2018) "Trajectory-Based Worker Task Productivity Monitoring". International Symposium on Automation and Robotics in Construction (ISARC 2018). July 2018, Berlin, Germany. <https://doi.org/10.22260/ISARC2018/0159>
- Konstantinou, E., & Brilakis, I.** (2016) "3D Matching of resource vision tracking trajectories", International conference in the area of construction engineering and management: Construction Research Congress (CRC2016). June 2016, San Juan, Puerto Rico. American Society of Civil Engineers (ASCE). <https://doi.org/10.1061/9780784479827.174>
- Chassiakos, A.P., **Konstantinou, E., & Moschonas, N.** (2013) "Optimizing the impact of pavement maintenance decisions on road network sustainability". 3rd International Conference on Soft Computing Technology in Civil, Structural and Environmental Engineering. Cagliari, Italy. <http://dx.doi.org/10.4203/csets.32.4>

OTHER ACADEMIC PUBLICATIONS

- Konstantinou, E.** (2018). "*Vision-Based Construction Worker Task Productivity Monitoring*". Doctoral thesis. <https://doi.org/10.17863/CAM.20613>
- Konstantinou, E., Lu, Q., Xie, X., Parlikad, A. K., Schooling, J., & Pitt, M.** (2022). "*Integrating digital twins with other digital technologies*". In Digital Twins in the Built Environment. Institution of Civil Engineers. ISBN: 978-0-7277-6580-2. <https://doi.org/10.1680/dtbe.65802.217>
- Konstantinou, E., MacAskill, K.** (2020) "Case study UK construction sector". In Construction sector performance measurement: Learning lessons and finding opportunities. Resilient Organisations. BRANZ. ISSN: 2423-0839
- Middleton, C., **Konstantinou, E.** (2018) "University of Cambridge - Written evidence (OMC0064)". Submission of evidence for the House of Lords Science and Technology Select Committee: Inquiry into Off-site manufacture for construction. <https://www.parliament.uk/documents/lords-committees/science-technology/off-site-manufacture-for-construction/off-site-manufacture-construction-ev.pdf>
- Article in Laing O'Rourke Centre for Construction Engineering and Technology (2020) "10 year anniversary report University of Cambridge - Mind the Productivity Gap - Case Study". <https://www.construction.cam.ac.uk/about/10-year-anniversary-report>

CONFERENCE & WORKSHOP PRESENTATIONS

Selected Invited Talks

- Churchill College, University of Cambridge, UK (International Conference) | 2019
"*Prioritization of Responsive Maintenance Tasks via Machine Learning-based Inference*"
- Laing O' Rourke Ltd, UK (Industrial Workshop) | 2019
"*Solving the productivity puzzle*"
- Germany (International Conference) | 2018
"*Trajectory-Based Worker Task Productivity Monitoring*"
- Laing O' Rourke Ltd, UK (Industrial Workshop) | 2018
"*Trajectory-based productivity monitoring*"

Highways England, UK (Industrial Workshop) | 2018
"Highways England Smart Motorways Program Embedded Asset Sensors for Deterioration Detection"

Laing O' Rourke Ltd, UK (Industrial Workshop) | 2017
"Computer vision-based task tracking"

American Society of Civil Engineers, San Juan, Puerto Rico (International Conference) | 2016
"3D Matching of resource vision tracking trajectories"

Bouygues S.A., UK (Industrial Workshop) | 2016
"Semantic-based activity analysis"

Laing O' Rourke Ltd, UK (Industrial Workshop) | 2016
"Mind the productivity gap/The digital revolution has yet to come?"

Trimble Inc, UK (Industrial Workshop) | 2015
"4D trajectory paths for measuring productivity"

W O R K S H O P O R G A N I S A T I O N

University of Cambridge Science Festival, UK | 2019
Co-organiser of one workshop session on Augmented Reality infrastructure structural inspection

University of Cambridge Division D Graduate Conference "Expanding Skills" | 2016
Co-organiser of four workshop sessions on transferable skills

J O U R N A L R E V I E W E R

Construction Engineering and Management; Smart Infrastructure and Construction.

R E S E A R C H G R O U P S

BRANZ, New Zealand | 2019 - 2020
Resilient Organisations

Civil Engineering Division, University of Cambridge, UK | 2019 - 2020
Construction Engineering Group

Institute of Manufacturing (IfM), University of Cambridge, UK | 2018 - 2019
Distributed Information and Technology Laboratory (DIAL)

Institute of Manufacturing (IfM), University of Cambridge, UK | 2018 - 2019
Asset Management Group

Civil Engineering Division, University of Cambridge, UK | 2018
Cambridge Centre for Smart Infrastructure and Construction (CSIC)

Civil Engineering Division, University of Cambridge, UK | 2018
Construction Engineering Group

Laing O' Rourke Ltd., London, UK | 2013 - 2018
Engineering Excellence Group

Civil Engineering Division, University of Cambridge, UK | 2013 - 2018
Construction Information Technology lab (CIT)

Department of Engineering, University of Patras, Greece | 2011 - 2013
Construction Project Management Group

TEACHING EXPERIENCE

University of Cambridge (UK) | Department of Engineering,
4th Year Project Supervisor Assistant | 2019

University of Cambridge (UK) | Department of Engineering, Civil Engineering Division
4th Year Project Supervisor Assistant | 2018

University of Cambridge (UK) | Department of Engineering, Civil Engineering Division
Teaching Assistant | 2015 – 2016
Module: Constructionarium – GD1 (Part IIA – Undergraduate Studies)

University of Cambridge (UK) | Department of Engineering, Civil Engineering Division
Laboratory Teaching Assistant | 2014 – 2015
Module: Plastic Collapse Lab – S1 (Part IB-Undergraduate Studies)
Module: Surveying – EAA (Part IIA-Undergraduate Studies)

University of Patras (Greece) | Department of Civil Engineering, Civil Engineering Division
Teaching assistant | 2011 – 2013
Module: Construction Project Management (Undergraduate & Postgraduate Studies)

INDUSTRY EXPERIENCE

Chartered Civil Engineer (Greece) | 2008 – 2013

Tasks undertaken:

- *Structural analysis of steel and reinforced concrete structures*
- *Cost and construction management*
- *Architectural design*
- *3D visualization*

LANGUAGE & IT SKILLS

- *Greek (native)*
- *English (fluent)*
- *Spanish (advanced)*
- *Proficient in C# programming language*
- *Proficient in Python programming language*
- *Advanced knowledge of MATLAB software*
- *Advanced knowledge of structural analysis software (SAP2000, FESPA, StereoSTATIKA, INSTANT)*
- *Advanced knowledge of AutoCAD*