Wael Darwich

Why cannot engineers and designers focus on innovation and creativity and let computers handle the rest! Working towards the next simulation generation to accomplish this mission.

Personal Details:

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Main skills:

Computational modelling, software development management, R&D, and more than 20 years' experience in cross-platform C++

Additional skills:

- Wide range of programming languages and tools such as: C/C++, C#, Python, React, JavaScript, MATLAB, VBA, MFC, Qt, Coin3D, VTK, OpenGL, STL, MPL solvers, Infragistics, Eyeshot and Jenkins CI.
  o Good experience of LaTeX, SAP2000, STAAD pro, Robot Millennium, PLS Tower, AutoCAD 2D & 3D, Dynamo, SpaceClaim, ANSYS.
  o FLL Robotics national and regional jury (2012)

Employment:

Since 2020: **Software Development Manager** at CPP team Ltd, Sheffield. A software services company, specialized in developing simulation applications. Some accomplished projects:
  o 3D printer controller and file preparation tools, Qt/C++
  o Tekla Structures, and Dynamo Revit plugins in C#, used in steel fabrication and construction.
  o Web dashboard to control machinery.
  o C# simulation tool using devDept CAD and OOFEM & Salome C++ FEA libraries, with scripting capability using Python.Net
  o Maintain MFC legacy code used in business intelligence tools.
  o Filling solid with optimized hollow lattice for advanced AM

2019–2020: **Senior Software Engineer** at FEA Ltd, lusas.com, Kingston upon Thames. A member of C++ Modeller team, developing MFC GUI using Stingray library, adding new features to support new CoPs and perform major refactoring.

2018–2019: **Senior Software Developer** at MachineWorks Ltd, machineworks.com, Sheffield. Working on auto mesh healing, editing and analysis.
   o   adding new features to marketing demo built in C++ MFC;
   o   develop new demo in Qt that supports Python scripting;
   o   develop prototype for 3D printing support structure.

2016–2018: **Software Consultant** at Mobica Ltd, www.mobica.com, Wilmslow. Working for JLR QA and planning as software supplier monitor.

2012–2016: **Principal Software Developer** at LimitState Ltd, www.limitstate.com, An engineering software company spun-out from the University of Sheffield. Duties included:
   o   planning and managing software development and company's software codebase (~800K lines mostly C++/C# code);
   o   R&D in the manufacturing engineering sector, for both 3D printing and subtractive manufacturing;
   o   building Jenkins continuous integration (CI) system.

  Launched two applications:

   o   FORM https://limitstate3d.com/, an optimization design tool for structural engineers;
   o   SLAB https://www.limitstate.com/slab, the only commercially available software to automate yield-line analysis for RC slabs.

  Previously between 2004 – 2008: **Co-Founder** and **Chief Software Architect** of LimitState Ltd. Building C++ cross-platforms (Windows/ Linux/ Mac) applications to launch every other year:

   o   RING http://www.masonryarch.com/, a program to estimate the ultimate load carrying capacities of masonry arch bridges;
   o   GEO http://www.limitstate.com/geo, a general-purpose ultimate limit state analysis tool for geotechnical stability problems.

2006 – 2012: **Managing Director** of MasahTec, an offshore software development company:

- outsourced development of several civil engineering applications used worldwide, such as CellBeam (an application to design steel cellular beams) and ComFlor (an application to design composite floors) both for SCI;
- developed both desktop and web application, especially for civil and structural engineers, and nesting optimization tools.

2004: **Graduate engineer** at BuroHappold Ltd head office in Bath.

2001 – 2002: **Site engineer** in construction sites.

Education and Qualification:

2003 – 2010: **PhD** in Civil and Structural Engineering, University of Sheffield:

- Thesis title *'Novel Computational Implementations for Ultimate Limit State Analysis and Design'*.
- Proved that a parabolic arch is not the most optimal form to carry a uniform load, a belief dating back to the 17th century.
- Developed computational algorithms and tools for design synthesis of optimum spatial trusses, analysis of masonry arch bridges, and soil stability analysis.
- Designed an object-oriented software framework for combined limit analysis and design.

2002 – 2003: **MSc** in Steel Construction, University of Sheffield, **distinction**:

- Dissertation title *'Examination of Advanced Solution Strategies for Non-linear FE Analysis'*.
- Implemented 'Arc-length' algorithm for non-linear FE package.

1995 – 2000: **BSc** in Civil and Structural Engineering, Damascus University:

- Awarded Excellence study award.
- Developed several software applications for RC beams and slabs, pre-stressed concrete beams, site surveying, and hydraulic structures.

Publications:

- W. Darwich, M. Gilbert, and A. Tyas. Optimum structure to carry a uniform load between pinned supports. *Structural and Multidisciplinary Optimization*, 42(1), 33-42. [34 citations, Google Scholar]

- W. Darwich, M. Gilbert, and A. Tyas. Form: A practical layout optimization tool for civil and structural engineers. In *proceedings of IACM/EC-COMAS conference*, Venice, 2008.

- W. Darwich, M. Gilbert, and A. Tyas. Optimum structure to carry a uniform load between two pinned supports. In *proceedings of 7th world congress in structural and multidisciplinary optimization*, Seoul, 2007.

- W. Darwich. Design synthesis of structural frames. *IStructE Young Researchers Conference*, London, 2006.

- M. Gilbert, W. Darwich, A. Tyas, and P. Shepherd. Application of large-scale layout optimization techniques in structural engineering practice. In *6th world congresses of structural and multidisciplinary optimization*, Rio de Janeiro, 2005.

- W. Darwich. Examination of Advanced Solution Strategies for Non-linear FE Analysis. In *9th Postgraduate Student Conference on MSc Dissertations*, University of Sheffield, 2003.