

Samuel Cubero *Ph.D, B.E. (Hons) Mech*

Australian Citizen

Born: 1972

AREAS OF EXPERTISE AND INTEREST (also see list of publications)

Machine design & Manufacturing

CAD: AutoCAD 2D (26 years) & 3D, SolidWorks (7 years), Inventor (5 years), ProEngineer WildFire (1 year)
Load & material failure analysis: 2D & 3D force analysis (Statics), Solid Mechanics (Von Mises, fatigue etc.)
Gearing & Power transmission design: Gear equations, power-train design (shafts, bearings), reflected inertia
Machine component selection & design: Beam analysis, shaft analysis, design against yield failure & fatigue
Actuators: Electric motors (DC brushed, brushless/stepper, AC, solenoid), hydraulic, pneumatic, PZT, SMA etc.
FEA stress & deflection analysis: Free Body Diagram analysis, ANSYS, SolidWorks Simulation, Inventor FEA
Structural analysis: 2D trusses & 3D space frames, design against failure (yielding, fatigue, buckling, vibration)
Kinematics, Dynamics and Control simulation: Trigonometry, 2D & 3D vector analysis, State Space modelling
Workshop skills (General fitting & turning / metalwork), plastics: forming / injection moulding, fibre-glass
Experience with arc welding (Stick & MIG), drilling, turning, milling, sheet-metal work, sheet bending, etc.
CAM (Computer Aided Manufacturing): MasterCAM for creating CNC machining code (for CNC mill / lathe)
3D printing, rapid prototyping: ABS plastics, elastomers; 3D scanning and model creation (for casting patterns)
Materials & manufacturing methods: Metals, plastics / elastomers, organics (woods), composites, casting, etc.

Mechatronics, Robotics, Motion Control and Electronics

Robotics / Automation / Motion control / Mobile robots / Manipulator arms / Walking vehicles / Exoskeletons
PLCs (Programmable Logic Controllers): FESTO STL & Ladder PLC programming, Allen-Bradley PLC, etc.
Low-cost Microcontrollers / Embedded systems: Atmel AVR chips, HC11 (assembly coding), 6809, Arduino
High-level microcontroller programming: BASCOM-AVR (BASIC with optional inline ASM), CodeVision C
Mobile robot design and testing: Design of mobile field robots; e.g. Remote Operated Vehicles (ROVs),
Unmanned Underwater Vehicles (UUVs), UAVs (Unmanned Aerial Vehicles), hybrid robots, walking robots...
Machine Vision (1D, 2D), Object recognition and identification: Software development, edge tracing, etc.
Laser range-finding and 3D surface scanning (with custom-written 3D graphics display software for Windows)
Sensors: Inductive, capacitive, optical; load cells, position, speed, flow, force, temperature, pressure, GPS, etc.
Circuit design: Analogue & Digital electronics; Noise reduction; Schematic circuit design using CAD software
Power supply and opto-isolated circuit design: Voltage regulation, rechargeable batteries, opto-isolators, etc.
PCB (Printed Circuit Board) design and manufacturing (using Protel / Altium and/or Eagle CAD), acid etching
Serial & data communications: RS-232, WinSock, USB, Zigbee (XBee Pro) wireless, LAN, WiFi and Ethernet

Software development, Design tools & Software skills

PC & Windows software development: Software development for MS-DOS & Windows (C/C++, Visual Basic)
Serial communications programming: RS-232 COM port, USB/HID, WinSock, TCP/IP, network protocols
Simulation & game programming: Visual Studio C++, VB, 3D game coding (Unreal Engine 4, DarkBasic Pro)
3D Studio Max (1 year): 3D Object editing, modifiers, UV texture mapping, animation, lighting, camera control
3D and VR game development: Unreal Engine 4, UnrealED map editor, HTC Vive, full body motion capture
Video & Sound editing: Pinnacle, Nero Vision, Camtasia (screen-recorder), Audacity, Roxio PC Game Capture
Website design & creation: HTML, FrontPage, Website X5 Evolution 9/10, IIS, ASP VBS, relational databases
Microsoft Office & related tools: Word 2.0-2016, EndNote, Excel, PowerPoint, Access, Outlook, Project, etc.

Essential 'soft skills', values and philosophies

Time management: Goal setting, prioritizing objectives, planning & scheduling, monitoring progress / feedback

People skills: Communication & negotiation / persuasion skills, Overcoming disagreements and conflicts

Teamwork: Aim for win-win / consensus outcomes, avoid 'internal competition'; find out what each person wants and doesn't want (ask questions & listen well); grow the 'pool of knowledge'; the 'best idea' should win!

Leadership: Motivate & inspire people to perform at their best; Set up a rewarding & productive environment; promote a culture of creativity, productivity & innovation; remove obstacles to productivity & progress.

Use QUICKER ACTION to get the best possible results: (How to achieve the best performance as an engineer)

QUICKER: Questions should guide all goals (good questions lead to good answers), Understand all variables / objects, Imagine relationships/connections & test them, Choose the simplest solution, Keep an open mind, Examine advantages and disadvantages of each of your options, Results only come from ACTION, not excuses.

ACTION: Ask the experts for advice, Collect all necessary information / skills / parts / resources, Test all ideas & assumptions, Improve your ideas (plans & designs), Organise all activities and tasks, Never give up (Nothing builds credibility like finishing ability); Show positive emotions: Passion, Enthusiasm, Excitement & Optimism.

ACADEMIC QUALIFICATIONS (Educated entirely in Australia, since pre-school)

1998 Ph.D, Doctor of Philosophy (Mechatronic Engineering), University of Southern Queensland, Australia
 1993 B.E. (Hons) Mech, Bachelor of Engineering Degree (Honours) Mechanical, University of Queensland
 Wynnum State High & Coorparoo State High School; Wynnum West Primary School, QLD, Australia

UNIVERSITY TEACHING EXPERIENCE (since 1998, approx. 19 years)

Curtin University (Australia) EA accredited	308824 (E)	Mechatronic Project 234 (microcontrollers, mobile robotics) **	
	308828 (E)	Mechanical Design 321 (beam failure analysis, machine design) **	
	308809 (E)	Engineering Graphics 232 (AS1100 drawing, AutoCAD 2D/3D) **	
	(E)	Engineering Communications 321 (Excel, AutoCAD 2D/3D) **	
	308827 (E)	Mechatronic Automation 331 (Pneumatic circuits, PLCs, PID) **	
USQ (Australia) EA accredited	12906 (E)	Mechatronic Systems Design 431 (robotics, PC control, sensors) *	
	ENG4104	Engineering Problem Solving 4 (MATLAB simulation, control) *	
	MEC2304	Solid Modelling (ProEngineer WildFire, 3D parts & assemblies)	
	ENG4406	Robotics & Machine Vision (controller design, simulation, motor selection, forward & inverse kinematics, image filters & analysis) *	
	MEC2402 (E)	Stress Analysis (beam design, combined loading, failure analysis) *	
	ENG2102	Problem Solving 2 (PBL design/analysis of a real-world project) *	
	MEC2902	Mechanical Practice 2 (Warman contest, mobile robot design) *	
	ENG1101	Engineering Problem Solving 1 (teamwork, 1 st year PBL project)	
	Petroleum Institute	STPS201	STEPS 1 (PBL eng. design team project, SolidWorks 3D CAD) *
		STPS251	STEPS 2 (MS-Project, FEA, design & build mobile robot contest)*
PI (UAE) ABET accredited (all courses are taught in English)	MEEG201 (E)	Statics (force / moment equilibrium, 2D/3D load analysis, beams) *	
	MEEG345 (E)	Intro to Manufacturing (machining, CNC G-code, workshop tools)	
	MEEG490/491	Senior Design 1 & 2 (2 semester) Final year engineering projects	
	ENGR293	Eng. Design in Community Service (design & build hardware) **	
PI is now merged with Khalifa University	ENGR110 (E)	Introduction to Engineering (calculations, design & build projects)	
	ENGR150 (E)	Intro to Eng. in the Petroleum Industry (seismic surveying, drilling)	
	ENGR111 (E)	Engineering Design (Design process, 3 design & build projects) *	

** Created the original teaching materials (lecture notes, labs, assignments and tutorials) for these *new* subjects

* New labs, tutorials, lectures, projects, or assignments & solutions were developed for these *existing* subjects
 (E) means Examiner / sole lecturer / coordinator; No (E) means 2 or more teachers or a teaching team

MAIN FIELDS OF INTEREST & AREAS OF EXPERTISE (see www.samcubero.com)

Product design & development, Project management, supervising PBL team-based design & build projects

Mechanical design, 2D & 3D CAD (SolidWorks, AutoCAD, Inventor, Protel), 3D simulation & animation

Mechatronics, robotics, mobile robots (remote controlled & autonomous wheeled and walking vehicles, UAVs)

Manufacturing, metalwork, plastics, composites, welding, CNC machining, MasterCAM, 3D scanning/printing

PRINCIPAL APPOINTMENTS

1998-2007 (9 years, tenured): *Lecturer in Mechanical & Mechatronic Engineering*, Curtin University of Technology, Perth, WA, Australia

2007-2010 (3 year contract): *Lecturer in Mechanical & Mechatronic Engineering*, University of Southern Queensland (USQ), Toowoomba, Australia

2010-present (current): *Assistant Professor in General Studies Department (August 2010-August 2017), Assistant Professor in Mechanical Engineering (starting August 2017), Petroleum Institute (PI), Abu Dhabi, UAE (United Arab Emirates)*

PUBLICATIONS & CONFERENCE PAPERS (all peer reviewed and published)

- (40) S. N. Cubero, "Essential communication skills for engineers, scientists and multi-disciplinary teams", in Proc. Int. Conf. on Society, Education and Psychology (ICSEP 2016), Paper No. PS10017, IEDRC.org, Dubai, UAE, 2016.
- (39) S. N. Cubero, "Over-speeding Warning System using Wireless Communications for Road Signs and Vehicles," in Proc. 13th Int. Conf. on Engineering & Technology, Computer, Basic & Applied Sciences, (ECBA 2016), 10-11 June, Dubai, UAE, 2016. (ISBN No. 978-969-670-549-9)
- (38) S. N. Cubero, "A fun and effective self-learning approach to teaching microcontrollers and mobile robotics", in IJEEE (International Journal of Electrical Engineering Education); vol. 52, 4: pp. 298-319, October, 2015 <http://ije.sagepub.com/content/52/4/298.abstract>
- (37) N. Pasha-Zaidi, E. Afari, J. Mohammed, S. N. Cubero, A. M. Shoukry, and W. El-Sokkary, "Gender -Based teams: Perceptions of team satisfaction and effectiveness among engineering students in the United Arab Emirates" in International Journal of Engineering Education. Vol. 31, No.4, pp.953-966, 2015.
- (36) Cubero, S. N. 2015. "A Mobile Manipulator Arm for Assisting the Frail Elderly and Infirm," Machine Vision and Mechatronics in Practice, Springer-Verlag Berlin Heidelberg, Print ISBN 978-3-662-45513-5, Online ISBN 978-3-662-45514-2 (eBook), pp 135-147, <http://www.springer.com/engineering/robotics/book/978-3-662-45513-5>
- (35) S. N. Cubero, J. Billingsley, "Game Development Tools for Simulating Robots and Creating Interactive Learning Experiences," Machine Vision and Mechatronics in Practice, Springer-Verlag Berlin Heidelberg, Print ISBN 978-3-662-45513-5, Online ISBN 978-3-662-45514-2 (eBook), pp 113-134, 2015. <http://www.springer.com/engineering/robotics/book/978-3-662-45513-5>
- (34) S. N. Cubero, J. Billingsley, "Design Concepts for an Energy-Efficient Amphibious Unmanned Underwater Vehicle," Machine Vision and Mechatronics in Practice, Springer-Verlag Berlin Heidelberg, Print ISBN 978-3-662-45513-5, Online ISBN 978-3-662-45514-2 (eBook), pp 209-223, 2015, <http://www.springer.com/engineering/robotics/book/978-3-662-45513-5>
- (33) S. N. Cubero, "Developing the Creativity and Design Skills of Mechatronic Engineering Students with Labs and Robot Competitions," Machine Vision and Mechatronics in Practice, Springer-Verlag Berlin Heidelberg, Print ISBN 978-3-662-45513-5, Online ISBN 978-3-662-45514-2 (eBook), pp 287-307, 2015, <http://www.springer.com/engineering/robotics/book/978-3-662-45513-5>
- (32) S. N. Cubero, "A Mechatronic Spotting System that mimics Human Weight-training Assistance Behavior," In International Journal of Embedded Systems (IJES), IJNNGT, Journal ISSN Online: 2356-5942, Journal ISSN Print: 2382-2562, Vol. 1, July 30, 2014, <http://www.ijnngt.org/upload/journal9/p7.pdf>
- (31) S. Sorby, S. N. Cubero, N. Pasha-Zaidi, H. Karki, "Spatial Skills of Students in the United Arab Emirates," In Proceedings for the Engineering Leaders Conference on Engineering Education, Doha, Qatar, 2014.
- (30) S. Scott, J. Ahmad, S. N. Cubero, K. Alhammadi, J. Mohammed, "Multidisciplinary panel critiques design performance," In Conference proceedings for the 121st American Society of Engineering Education annual conference and Exposition Indianapolis, IN, USA, 2014.
- (29) S. N. Cubero, J. Billingsley, "Simulating the kinematics and motions of robotic manipulators using 3D game development tools," In Proc. 20th Int. Conf. on Mechatronics and Machine Vision in Practice (M2VIP 2013), Sep. 19, Ankara, Turkey, pp. 143-155, 2013.
- (28) S. N. Cubero, "Simulation and Control of Robot Arms and Manipulators using Blind Adaptive Search Inverse Kinematics," International Journal of Simulation, Systems, Science and Technology (IJSSST), vol. 13, no. 2, pp. 35-50, 2012. ISSN 1473-8031 print, 1473-804x online. UK.
- (27) S. N. Cubero, "Design concepts for a hybrid swimming and walking vehicle", Journal Procedia Engineering, vol. 41, no. 39, pp. 271-280. ISSN 1877-7058, 10.1016/j.proeng.2012.07.303. Also in Proc. International Symposium on Robotics and Intelligent Sensors (IRIS 2012), Paper No. 4, Session A42 (CD-ROM disc), Kuching, Malaysia, 2012.

- (26) S. N. Cubero, "Robotic horse-training technologies for cutting and campdrafting competitions", *Journal Procedia Engineering*, vol. 41, no. 169, pp. 1211-1220, 2012. ISSN 1877-7058, 10.1016/j.proeng.2012.07.303. Also in *Proc. International Symposium on Robotics and Intelligent Sensors (IRIS 2012)*, Paper No. 5, Session D23 (CD-ROM disc), Kuching, Malaysia.
- (25) S. N. Cubero, "Automatic shape recognition of hand gestures using an edge-tracing vision system", *International Journal of Image Processing and Visual Communication*, vol. 1, no. 3, pp. 1-6, 2012. ISSN (Online) 2319-1724.
- (24) S. N. Cubero, "A robotic arm for electric scooters," *Intelligent Technologies for Bridging the Grey Digital Divide*, J. Soar, R. Swindell, Rick, P. Tsang, (Eds.), Abu Dhabi, UAE, IGI Global, pp. 94-109, 2011.
- (23) S. N. Cubero, J. Billingsley, and J. Mohammed, "Mechanical design of an amphibious walking and swimming robot," *Proc. 18th International Conference on Mechatronics & Machine Vision in Practice (M2VIP)*, Brisbane, Australia, 2011.
- (22) J. Mohammed, S. N. Cubero, J. and Ahmad, "Developing alloys using metal deposition", in *Proceedings of the Arab school for science and technology – new frontiers in material science and technology*, Kuwait, 2010.
- (21) S. N. Cubero, "ESRA – Electric Scooter Robot Arm," for M2VIP 2010 IEEE conference proceedings on CD-ROM. Editors: Robin Bradbeer & John Billingsley. Australia, 2010.
- (20) S. N. Cubero, "Designing competitions to enhance mechatronic engineering education", for M2VIP 2010 IEEE conference proceedings on CD-ROM, 2010. Editors: Robin Bradbeer & John Billingsley. Australia, 2010.
- (19) J. Worden, S. Goh, L. Brodie, H. Zhou, S. N. Cubero, "A case study on the revitalisation of a 2nd level year engineering and spatial science PBL course", *Proc. AaeE 2009 conference*, Adelaide, Australia, 2009.
- (18) S. N. Cubero, "Blind Search Inverse Kinematics for controlling all types of Serial-link robot arms," *Mechatronics and Machine Vision in Practice – Editors: Billingsley, J and Bradbeer, R.* ISBN: 978-3-540-74026-1. pp 229-246, Australia, 2008.
- (17) J. Portlock, S. N. Cubero, "Dynamics and Control of a VTOL Quad-Thrust Aerial Robot," *Mechatronics and Machine Vision in Practice – Editors: Billingsley, J and Bradbeer, R.* ISBN: 978-3-540-74026-1. pp 27-40, 2008.
- (16) S. N. Cubero (Editor). "Industrial Robotics: Theory, Modelling & Control". pIV literature, Verlag Robert Mayer-Scholz. *Advanced Robotics Systems (ARS) International* ISBN: 3-86611-285-8 (952 pages), Germany, 2007.
- (15) K. Sanathkumara, S. N. Cubero, "Automated Soil Hardness Testing Machine". *Proceedings of M2VIP 2006 14th International IEEE Conference on Mechatronics & Machine Vision in Practice*, Xiamen, China. ISSN: 1908-1162. 2006.
- (14) J. Portlock, S. N. Cubero, "QTAR: Quad Thrust Aerial Robot". *Proceedings of M2VIP 2006 13th International IEEE Conference on Mechatronics & Machine Vision in Practice*, Toowoomba QLD, Australia. ISSN: 1908-1162. 2006.
- (13) B. Frost, S. N. Cubero, "Development of a 3D laser scanner for guiding a six-legged walking robot". *Proceedings of M2VIP 2005 12th International IEEE Conference on Mechatronics & Machine Vision in Practice*, De La Salle University, Manila, Philippines. ISSN: 1908-1162. pp 26-36, 2005.
- (12) D. Tjoe, S. N. Cubero, "A low-cost vision guided car for autonomous racing car competitions,". *Proceedings of M2VIP 2005 12th International IEEE Conference on Mechatronics & Machine Vision in Practice*, De La Salle University, Manila, Philippines. ISSN: 1908-1162. pp 1-14, 2005.
- (11) S. N. Cubero, "Teaching Mechatronic Engineers how to build intelligent machines", Invited 3 hour presentation, *Proceedings of M2VIP 2005 12th International IEEE Conference on Mechatronics & Machine Vision in Practice*, De La Salle University, Manila, Philippines (CD-ROM), 2005.

- (10) S. N. Cubero, "A general purpose inverse kinematics algorithm for all manipulators". Proceedings of M2VIP 2004 11th Int'l IEEE Conference on Mechatronics & Machine Vision in Practice, Macau, China, 2004.
- (9) S. N. Cubero, J. Layanto, M. Goode, "Autonomous Racing Car Competition for Mechatronic Engineering Education". Mechatronics and Machine Vision 2003: Future Trends. Research Studies Press. ISBN: 0-86380-290-7. pp 9-16, 2003. (Also published on the M2VIP 2003 10th IEEE International Conference on Mechatronics and Machine Vision In Practice Conference Proceedings CD-ROM ISBN 962-442-246-X.)
- (8) S. N. Cubero, "A 6-legged Hybrid Walking and Wheeled Vehicle". Proc 7th International Conference on Mechatronics and Machine Vision in Practice (M2VIP), Hervey Bay, QLD, Australia, September 19 – 21, 2000, pp. 293-302 "Mechatronics and Machine Vision", Research Studies Press, ISBN: 0 86380 261 3.
- (7) S. N. Cubero, "Design of a six-legged passenger carrying hybrid walking vehicle with four-wheel-drive capability". Proc 2nd International Conference on CLimbing And Walking Robots (CLAWAR), pp. 361-372, September, 1999, Portsmouth, UK, "CLAWAR: CLimbing And Walking Robots", ISBN 186058 207 9.
- (6) S. N. Cubero, "Force, compliance and position control for a pneumatic quadruped robot". PhD dissertation, Submitted Nov. 1997 - University of Southern Queensland, Toowoomba. Australia. 2 Volumes (approximately 1,500 pages). Doctoral PhD was awarded in September 1998 by the Vice-Chancellor of USQ. 1998.
- (5) S. N. Cubero, J. Billingsley, J., "Force, compliance and position control for a space frame manipulator," in Proc 4th International Conference on Mechatronics and Machine Vision in Practice (M2VIP), 22-24th Sep., pp. 124-130, 1997.
- (4) S. N. Cubero, J. Billingsley, "Automatic control of a surface adapting, four-legged wall climbing robot", Mechatronics '96 With Mechatronics & Machine Vision in Practice '96, University of Minho, Geuimaraes Portugal, September 1996, pp 1.135-1.142.
- (3) S. N. Cubero, J. Billingsley J., "A novel proportional gas valve for mechatronics applications". Proc 2nd International Conference on Mechatronics and Machine Vision in Practice (M2VIP), Kowloon, Hong Kong, 1995, ISBN 962-442-076-9 (Patent filed in 1995 by National Centre for Engineering in Agriculture or NCEA, QLD)
- (2) J. Billingsley, S. N. Cubero, "High speed manipulators for agricultural applications", Proc. 1995 National Conference of the Australian Robot Association, Melbourne, July 1995, pp 54-58.
- (1) S. N. Cubero, J. Billingsley, "Automatic surface transition adaptation for a quadrupedal space frame robot", Proc. Second International Conference on Mechatronics and Machine Vision in Practice, Hong Kong, September 12-14, 1995, pp 113-118.

NOTE: There are a few more papers - not listed above – that were not published or are now in the process of being reviewed and considered for publication. On average, about 2 papers were published per year since 1998. These peer-reviewed papers cover topics in robotics, sensors, machine-vision and education.

Google Scholar citations: (click on "29 ARTICLES" to view PDF papers or abstracts)

https://scholar.google.com/citations?view_op=new_articles&hl=en&imgq=Samuel+Cubero

Example paper: (PDF format) <http://ijssst.info/Vol-13/No-2/paper5.pdf>

Research Gate.net citations: (click to view many indexed PDF papers or abstracts)

https://www.researchgate.net/scientific-contributions/2067206054_Samuel_N_Cubero?claimPup=true

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NOTE: To read actual student testimonials and comments about many of the subjects I have taught, please read the 'Long CV' (PDF).

REFERENCES

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<p>Paul Deuchar - ex CEO Argon Robotics Senior Consultant, Chairman</p> <p>paul@deuchar.com.au</p>	<p>Former CEO of Argon Robotics (Western Australia) Former final-year student of Dr Sam Cubero, Curtin University of Technology, Perth</p> <p>(See his profile on www.linkedin.com)</p>