MA Dong
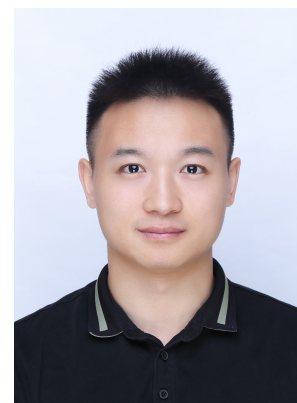
School of Computing and Information Systems
Singapore Management University (SMU)
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Education

PhD, University of New South Wales, Australia, 2020

Bachelor of Engineering, Central South University, China, 2014

Academic Appointments

Assistant Professor of Computer Science, School of Computing and Information Systems, SMU, Jan 2022 - Present

RESEARCH

Research and Project Areas

My research interests lie broadly in the areas of Cyber-Physical Systems (CPS) with a special focus on ubiquitous computing and mobile systems. The goal of my research is to explore and design practical, efficient, and intelligent Internet of Things (IoTs) systems, and develop customized prototypes and testbeds to evaluate their performance. The methodologies and tools used in my research include theoretical modelling, machine learning, in-the-wild measurement and experimentation, as well as system design, instrumentation, and optimization. Recently, I am particularly centred on robust health monitoring with wearable technology and tiny machining learning on embedded devices.

Publications

Journal Articles [Refereed]

Exploring key factors influencing depressive symptoms among middle-aged and elderly adult population: A machine learning-based method, by TRAN, Thu; TAN, Yi Zhen; LIN, Sapphire; ZHAO, Fang; NG, Yee Sien; MA, Dong; KO, Jeonggil; BALAN, Rajesh. (2025). *Archives of Gerontology and Geriatrics, 129* 1-9. https://doi.org/10.1016/j.archger.2024.105647 (Published)

LR-Auth: Towards practical implementation of implicit user authentication on earbuds, by HU, Changshuo; MA, Xiao; HUANG, Xinger; SHEN, Yiran; MA, Dong. (2024). *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, 8* (4), 1-27. https://doi.org/10.1145/3699793 (Published)

BreathPro: Monitoring breathing mode during running with earables, by HU, Changshuo; KANDAPPU, Thivya; LIU, Yang; MASCOLO, Cecilia; MA, Dong. (2024). *Proceedings of the ACM on Interactive, Mobile,*

Wearable and Ubiquitous Technologies, 8 (2), 1-25. https://doi.org/10.1145/3659607 (Published)

An evaluation of heart rate monitoring with in-ear microphones under motion, by BUTKOW, Kayla-Jade; DANG, Ting; FERLINI, Andrea; MA, Dong; LIU, Yang; MASCOLO, Cecilia. (2024). *Pervasive and Mobile Computing, 100* 1-15. https://doi.org/10.1016/j.pmcj.2024.101913 (Published)

VibMilk: Non-intrusive milk spoilage detection via smartphone vibration, by WU, Yuezhong; SONG, Wei; WANG, Yanxiang; MA, Dong; XU, Weitao; HASSAN, Mahbub; HU, Wen. (2024). *IEEE Internet of Things Journal, 11* (10), 1-14. https://doi.org/10.1109/JIOT.2024.3359049 (Advance Online)

ClearSpeech: Improving voice quality of earbuds using both in-ear and out-ear microphones, by MA, Dong; DANG, Ting; DING, Ming; BALAN, Rajesh K.. (2024). *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, 7* (4), (Published)

Remote multi-person heart rate monitoring with smart speakers: Overcoming separation constraint, by TRAN, Thu; MA, Dong; BALAN, Rajesh. (2024). *Sensors, 24* (2), 1-19. https://doi.org/10.3390/s24020382 (Published)

Recognizing hand gestures using solar cells, by MA, Dong; LAN, Guohao; HASSAN, Mahbub; HU, Wen; UPAMA, B. Mushfika; UDDIN, Ashraf; YOUSEEF; Moustafa. (2023). *IEEE Transactions on Mobile Computing, 22* (7), 4223 -4235. https://doi.org/10.1109/TMC.2022.3148143 (Published)

Don't peek at my chart: Privacy-preserving visualization for mobile devices, by ZHANG, Songheng; MA, Dong; WANG, Yong. (2023). *Computer Graphics Forum, 42* (3), 137-148. https://doi.org/10.1111/cgf.14818 (Published)

Mobile Health With Head-Worn Devices: Challenges and Opportunities, by FERLINI, Andrea; MA, Dong; QENDRO, Lorena; MASCOLO, Cecilia. (2022). *IEEE Pervasive Computing, 21* (3), 1-9. https://doi.org/10.1109/MPRV.2022.3191711 (Published)

MEMS ultrasonic transducers for safe, low-power and portable eye-blinking monitoring, by SUN, Sheng; WANG, Jianyuan; ZHANG, Menglun; NING, Yuan; MA, Dong; YUAN, Yi; NIU, Pengfei; RONG, Zhicong; WANG, Zhuochen; PANG, Wei. (2022). *Microsystems & Nanoengineering, 8* (1), http://doi.org/10.1038/s41378-022-00396-w (Published)

Simultaneous Energy Harvesting and Gait Recognition Using Piezoelectric Energy Harvester, by MA, Dong; LAN, Guohao; XU, Weitao; HASSAN, Mahbub; HU, Wen. (2022). *IEEE Transactions on Mobile Computing, 21* (6), 2198-2209. https://doi.org/10.1109/tmc.2020.3035045 (Published)

Innovative human motion sensing with earbuds, by MA, Dong; FERLINI, Andrea; MASCOLO, Cecilia. (2022). *GetMobile: Mobile Computing and Communications Review, 25* (4), 24-. http://doi.org/10.1145/3529706.3529713 (Published)

Eye-Tracking Monitoring Based on PMUT Arrays, by SUN, Sheng; WANG, Jianyuan; ZHANG, Menglun; YUAN, Yi; NING, Yuan; MA, Dong; NIU, Pengfei; GONG, Yi; YANG, Xiaopeng; PANG, Wei. (2022). *Journal of Microelectromechanical Systems, 31* (1), 45-53. (Published)

Sensing, computing, and communications for energy harvesting IoTs: A survey, by MA, Dong; LAN, Guohao; HASSAN, Mahbub; HU, Wen; DAS, Sajal K.. (2020). *IEEE Communications Surveys and Tutorials, 22* (2), 1222-1250. https://doi.org/10.1109/COMST.2019.2962526 (Published)

Capacitor-based Activity Sensing for Kinetic-powered Wearable IoTs, by LAN, Guohao; MA, Dong; XU, Weitao; HASSAN, Mahbub; HU, Wen. (2020). *ACM Transactions on Internet of Things, 1* (1), 1-26. https://doi.org/10.1145/3362124 (Published)

EnTrans: Leveraging Kinetic Energy Harvesting Signal for Transportation Mode Detection, by LAN, Guohao; XU, Weitao; MA, Dong; KHALIFA, Sara; HASSAN, Mahbub; HU, Wen. (2020). *IEEE Transactions on Intelligent Transportation Systems, 21* (7), 2816-2827. (Published)

Conference Proceedings

ESPIRO: Natural pulmonary function monitoring via earphone-acquired speech, by CAO, Yetong; MA, Dong; XIE, Wentao; ZHANG, Qian; LUO, Jun. (2025.0). *The 31st Annual International Conference on Mobile Computing and Networking,* ACM: (Accepted)

Respear: Earable-based robust respiratory rate monitoring, by LIU, Yang; BUTKOW, Kayla-Jade;

STUCHBURY-WASS, Jake; PULLIN, Adam; MA, Dong; MASOLO, Cecilia. (2025.0). *Proceedings of the 23rd International Conference on Pervasive Computing and Communications (PerCom 2025), Washington, DC, March 17-21,* (pp. 1-16) Piscataway, NJ: IEEE. (Published)

BrushBuds : Toothbrushing tracking using earphone IMUs, by YANG, Qiang; LIU, Yang; STUCHBURY-WASS, Jake; BUTKOW, Kayla-Jade; MA, Dong; MASCOLO, Cecilia. (2024.0). *Proceedings of ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp 2024), 5th International Workshop on Earable Computing (EarComp 2024) : Melbourne VIC, Australia, October 5-9,* (pp. 655-660) Melbourne, VIC, Australia: ACM Digital Library. https://doi.org/10.1145/3675094.3680521 (Published)

How is our mobility affected as we age? Findings from a 934 users field study of older adults conducted in an urban Asian city, by TAN, Yi Zhen; TRAN, Thu; LIN, Sapphire; ZHAO, Fang; NG, Yee Sien; MA, Dong; KO, JeongGil; BALAN, Rajesh. (2024.0). *BTIW '24: Proceedings of the Behavior Transformation by IoT International Workshop, Minato-ku, Tokyo, June 3-7,* (pp. -27) New York: ACM. https://doi.org/10.1145/3662008.3662016 (Published)

Detecting foot strikes during running with earbuds, by HU, Changshuo; KANDAPPU, Thivya; STUCHBURY-WASS, Jake; LIU, Yang; TANG, Anthony; MASCOLO, Cecelia; MA, Dong. (2024.0). *BodySYS '24: Proceedings of the 10th Workshop on Body-Centric Computing Systems, Tokyo, June 3-7,* (pp. 35-40) New York: ACM. https://doi.org/10.1145/3662009.3662023 (Published)

DiTMoS: Delving into diverse tiny-model selection on microcontrollers, by MA, Xiao; HE, Shengfeng; QIAO, Hezhe; MA, Dong. (2024.0). *Proceeding of the 22nd International Conference on Pervasive Computing and Communications (PerCom 2024), Biarritz, France, March 11-15,* (pp. 1-11) France: (Published)

UR2M: Uncertainty and Resource-Aware Event Detection on Microcontrollers, by JIA, Hong; KWON, Young D.; MA, Dong; PHAM, Nhat; QENDRO, Lorena; VU, Tam; MASCOLO, Cecilia. (2024.0). *2024 IEEE International Conference on Pervasive Computing and Communications (PerCom): Biarritz, France, March 11-15: Proceedings,* (pp. 1-10) Piscataway, NJ: IEEE. https://doi.org/10.1109/PerCom59722.2024.10494467 (Published)

Heart: Motion-resilient heart rate monitoring with in-ear microphones, by BUTKOW, Kayla-Jade; DANG, Ting; FERLINI, Andrea; MA, Dong; MASCOLO. (2023.0). *Proceeding of the 21st International Conference on Pervasive Computing and Communications (PerCom 2023), Atlanta, March 13-20,* (pp. 200-209) New Jersey, USA: IEEE. https://doi.org/10.1109/PERCOM56429.2023.10099317 (Published)

Lightweight and non-invasive user authentication on earables, by HU, Changshuo; MA, Xiao; MA, Dong; DANG, Ting. (2023.0). *HotMobile '23: Proceedings of the 24th International Workshop on Mobile Computing Systems and Applications, Newport Beach, February 22-23,* (pp. 36-41) New York: ACM. https://doi.org/10.1145/3572864.3580332 (Published)

Photovoltaic cells for energy harvesting and indoor positioning, by RIZK, Hamada; MA, Dong; HASSAN, Mahbub; YOUSSEF, Moustafa
. (2022.0). *Proceedings of the 30th International Conference on Advances in Geographic Information Systems, Seattle, Washington, USA, 2022 November 1 - 4,* (pp. 1-4) US: ACM. https://doi.org/10.1145/3557915.3560952 (Published)

PROS: An efficient pattern-driven compressive sensing framework for low-power biopotential-based wearable with on-chip intelligence, by PHAM, Nhat; JIA, Hong; TRAN, Minh; DINH, Tuan; BUI, Nam; KWON, Young; MA, Dong; NGUYEN, Phuc; MASCOLO, Cecilia; VU, Tam
. (2022.0). *Proceedings of the 28th ACM Annual International Conference on Mobile Computing and Networking, Sydney, 2022 October 17-21,* (pp. 1-15) Sydney, Australia: ACM. http://doi.org/10.1145/3495243.3560533 (Published)

Improving feature generalizability with multitask learning in class incremental learning, by MA, Dong; TANG, Chi Ian; MASCOLO, Cecilia. (2022.0). *Proceedings of 2022 IEEE International Conference on Acoustics, Speech and Signal Processing, Singapore, May 22-27,* (pp. 1-5) Singapore: IEEE. http://doi.org/10.1109/ICASSP43922.2022.9746862 (Published)

Indoor localization using solar cells, by RIZK, Hamada; MA, Dong; HASSAN, Mahbub; YOUSSEF, Moustafa. (2022.0). *2022 IEEE International Conference on Pervasive Computing and Communications Workshops (PerCom): Pisa, Italy, March 21-25: Proceedings,* (pp. 1-5) Piscataway, NJ: IEEE. https://doi.org/10.1109/PerComWorkshops53856.2022.9767256 (Published)

SolarSLAM: Battery-free loop closure for Indoor localisation, by WEI, Bo; XU, Weitao; LUO, Chengwen; ZOPPI, Guillaume; MA, Dong; WANG, Sen. (2020.0). *Proceedings of the 2020 IEEE/RSJ International*

Conference on Intelligent Robots and Systems, Las Vegas, October 25-29, (pp. 1-7) Las Vegas: IEEE. (Published)

EarGate: Gait-based user identification with in-ear microphones, by FERLINI, Andrea, DONG, Ma; HARLE, Robert; MASCOLO, Cecilia. (2021.0). *Proceedings of the 27th Annual International Conference on Mobile Computing and Networking, New Orleans, 2021 October 25-29, ,* (pp. 337-349) New Orleans, USA: ACM. https://dl.acm.org/doi/pdf/10.1145/3447993.3483240 (Published)

OESense: Employing occlusion effect for in-ear human sensing, by MA, Dong; FERLINI, Andrea; MASCOLO, Cecilia. (2021.0). *Proceedings of the 19th ACM International Conference on Mobile Systems, Applications, and Services, Virtual Conference, 2021 June 24-July 2,* (pp. 175-187) Virtual Conference: ACM. (Published)

Skin-MIMO: Vibration-based MIMO communication over human skin, by MA, Dong; WU, Yuezhong; DING, Ming; HASSAN, Mahbub; HU, Wen. (2020.0). *Proceedings of 2020 IEEE International Conference on Computer Communications, Toronto, Canada, 2020 July 6-9* , (pp. 1-10) Online: IEEE. (Published)

NLC: Natural Light Communication using switchable glass, by HU, Changshuo; MA, Dong; HASSAN, Mahbub; HU, Wen. (2020.0). *IEEE INFOCOM 2020 - IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS),* Toronto: IEEE. (Published)

Enhancing cellular communications for UAVs via intelligent reflective surface, by MA, Dong; DING, Ming; HASSAN, Mahbub. (2020.0). *Proceedings of the 2020 IEEE Wireless Communications and Networking Conference (WCNC), Virtual Conference, May 25-28* , (pp. 1-6) Virtual Conference: IEEE. (Published)

Poster abstract: Data communication using switchable privacy glass, by HU, Changshuo; MA, Dong; HASSAN, Mahbub; HU, Wen. (2020.0). *Proceedings of the 19th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN), Sydney, 2020 April 21-24,* (pp. 337-338) Sydney: IEEE. https://conferences.computer.org/cpsiot/pdfs/IPSN2020-2ZapWCkbA6ELdouTqExUlt/549700a337/549700 a337.pdf (Published)

SolarGest: Ubiquitous and battery-free gesture recognition using solar cells, by MA, Dong; LAN, Guohao; HASSAN, Mahbub; HU, Wen; UPAMA, B. Mushfika; UDDIN, Ashraf; YOUSEEF; Moustafa. (2019.0). *Proceedings of the 25th ACM Annual International Conference on Mobile Computing and Networking, Los Cabos, Mexico, 2019 October 21-25* , (pp. 1-15) Los Cabos, Mexico: ACM. (Published)

Gesture recognition with transparent solar cells, by MA, Dong; LAN, Guohao; HASSAN, Mahbub; HU, Wen; UPAMA, B. Mushfika; UDDIN, Ashraf; YOUSEEF; Moustafa. (2018.0). *Proceedings of the 12th International Workshop on Wireless Network Testbeds, Experimental Evaluation & Characterization, New Delhi, India, 2018 November 2* , (pp. 79-88) New Delhi, India: ACM. (Published)

SEHS: Simultaneous energy harvesting and sensing using piezoelectric energy harvester, by MA, Dong; LAN, Guohan; XU, Weitao; HASSAN, Mahbub; HU, Wen. (2018.0). *Proceedings of the 2018 IEEE/ACM Third International Conference on Internet-of-Things Design and Implementation (IoTDI), Orlando, Florida, April 17-20,* (pp. 1-12) Orlando, Florida: IEEE. (Published)

Demo abstract: Simultaneous energy harvesting and sensing using piezoelectric energy harvester, by MA, Dong; LAN, Guohao; XU, Weitao; HASSAN, Mahbub; HU, Wen. (2018.0). *Proceedings of the 2018 IEEE/ACM Third International Conference on Internet-of-Things Design and Implementation (IoTDI), Orlando, Florida, April 17-20,* (pp. 308-309) Orlando, Florida: IEEE. (Published)

HiddenCode: Hidden acoustic signal capture with vibration energy harvesting, by LAN, Guohao; MA, Dong; HASSAN, Mahbub; HU, Wen. (2018.0). *Proceedings of the 2018 IEEE International Conference on Pervasive Computing and Communications, Athens, Greece, March 19-23* , (pp. 1-10) Greece: IEEE. (Published)

CapSense: Capacitor-based activity sensing for kinetic energy harvesting powered wearable devices, by LAN, Guohao; MA, Dong; XU, Weitao; HASSAN, Mahbub; HU, Wen. (2017.0). *Proceedings of the 14th EAI International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services: MobiQuitous 2017, Melbourne, November 7-10,* (pp. 106-115) Melbourne, Australia: ACM. (Published)

Poster: Unobtrusive user verification using piezoelectric energy harvesting, by MA, Dong; LAN, Guohao; XU, Weitao; HASSAN, Mahbub; HU, Wen. (2017.0). *Proceedings of the 14th EAI International Conference*

on Mobile and Ubiquitous Systems: Computing, Networking and Services, Melbourne, November 7-10, (pp. 541-542) Melbourne, Australia: ACM. (Published)

Conference Papers

Revisiting masked auto-encoders for ECG-language representation learning, by PHAM HUNG, Manh; SAEED, Aaqib; MA, Dong. (2024.0). *The first NeurIPS workshop on Time Series in the Age of Large Models, Vancouver, 2024 December 15,* NIPS. https://openreview.net/forum?id=RWarJNYh1D&referrer=%5Bthe%20profile%20of%20Dong%20Ma%5D(%2Fprofile%3Fid%3D~Dong_Ma5) (Published)

Research Grants

Singapore Management University

On-device Signal Processing in Knitted Wearables, SMU Internal Grant, Ministry of Education (MOE) Tier 1 , PI (Project Level): MA Dong, 2024, S$200,000

Leveraging Mobile Sensing to Provide Early Detection of Meltdowns in Children with Autism, SMU Internal Grant, Ministry of Education (MOE) Tier 1 , PI (Project Level): Rajesh Krishna BALAN, 2023, S$120,000

Context-aware Human Vital Signs Monitoring Using Wearable Devices, SMU Internal Grant, Ministry of Education (MOE) Tier 1 , PI (Project Level): MA Dong, 2022, S$100,000

Other Institutions

Pushing the Boundaries of Wearable Sensing: A Tale of Two Modalities, GRF, General Research Fund, Hong Kong Research Grant Council Weitao Xu, Co-PI (Project Level): MA Dong, 2023, SGD184,887

Enhancing Situated Learning with Mixed-Reality Avatars Driven by mmWave Motion Capture, SMU-SUTD Internal Research Grant, SMU-SUTD Internal Research Grant PI (Project Level): TANG, Tony, Co-PI (Project Level): MA Dong, Wenchao Jiang, 2023, SGD125,000

TEACHING

Teaching Areas

Internet of Things, Pervasive Sensing

Courses Taught

Singapore Management University

Undergraduate Programmes :

    Computer Science Project Experience

    Internet of Things: Technology and Applications

Postgraduate Professional Programmes :

    IoT: Technology and Applications

Postgraduate Research Programmes :

    Empirical Research Project 1

    Empirical Research Project 2

    Empirical Research Project 3

EXTERNAL SERVICE – PROFESSIONAL

Conference Chair, SmartWear 2023, 2023

Committee Member, MobiSys 2024, 2023

Committee Member, MobiCom 2024, 2023

Program Committee Member, WWW 2023, 2022

General Co-Chairs, Earcomp 2022, 2022

Program Committee Member, SmartWear 2022, 2022

Reviewer Grant Proposal, MOE TIF, 2022

Video Chair, MobiSys 2022, 2022

TPC Track Co-chairs, MASS, 2022

Publication Chair, HotMobile, 2022

Program Committee Member, Earcomp, 2021

Reviewer Conference Paper, MASS, 2021 - 2022

Reviewer Journal Article, TMC, 2021 - 2022

Reviewer Conference Paper, IMWUT, 2020 - 2022