IMPact@SUTD
Impossible Made Possible by architects, catalysts and technologists

July 2023

IMPact@SUTD is a regular update featuring works by SUTD Faculty, Researchers, Students and Research Centres/Labs. We hope to create awareness of the Research by SUTD within the SUTD community and beyond. Share with us your SUTD works today so that we can include it in our next update.

Congratulations

Associate Professor Bige Tunçer & PhD student Ling Ban Liang
Architecture & Sustainable Design (ASD)

On receiving the best paper award at Computer-aided Architectural Design (CAAD)* Futures 2023 for their paper, *'Enabling Flexible Architectural Design Re-representations Using a Phenotype-Based Strategy'*.

*CAAD Futures is a biannual International Conference on Computer-aided Architectural Design. The CAAD Futures Foundation plays a major global role in advancing and documenting research with its biennial Conference, in collaboration with a richly diverse community in several regionally focused groups. Over recent years, CAAD Futures took place in Los Angeles (2021), Daejeon (2019), Istanbul (2017), São Paulo (2015), Shanghai (2013), and many more before.

Role of bilingual experience in children's context-sensitive selective trust strategies
Bilingualism: Language and Cognition

SUTD Author: Yow Wei Quin, Li Xiaoqian

"Early bilingual experience can enhance children's social-cognitive skills. This study with 140 3- to 5-year-old children found that those with greater language diversity were more likely to adapt their accuracy-based selective trust strategy based on contextual information. Results provide new insights into how diverse linguistic experiences can shape children's social-cognitive development."

--- [Yow Wei Quin]

Shrinkage prediction and correction in material extrusion of cellulose-chitin biopolymers using neural network regression
Virtual and Physical Prototyping

SUTD Authors: Stylianos Dritsas, Revathi Ravindran, Jian Li Hoo, Javier G. Fernandez

"The article presents an approach for predicting and correcting the deformations caused by shrinkage when 3D printing biomaterials with high water content. The team trained a neural network to learn the physics of shrinkage by providing pairs 3D printed and 3D scanned objects, before and after drying and subsequently developed an algorithm that given a design shape, it first predicts how it will deform, and then makes small adjustments to the design recursively until shrinkage is compensated."
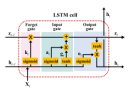
--- [Stylianos Dritsas]

Pre-Computing Batch Normalisation Parameters for Edge Devices on a Binarized Neural Network
Sensors

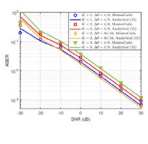SUTD Authors: Nicholas Phipps, Shang Jin-Jia, Teo Tee Hui

"This text introduces the Binarized Neural Network (BNN), a smaller model achieved through quantizing the Convolutional Neural Network (CNN). The Batch Normalization (BN) layer is crucial in BNNs but is computationally intensive on edge devices. To address this, the text proposes pre-computing BN parameters before quantization, reducing memory usage by 63% with no major accuracy impact. This enables the BNN to run efficiently on edge devices, taking only two cycles for computation."
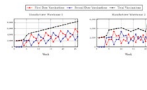
--- [Teo Tee Hui]

A Federated Learning-Based Industrial Health Prognostics for Heterogeneous Edge Devices Using Matched Feature Extraction
IEEE Transactions on Automation Science and Engineering
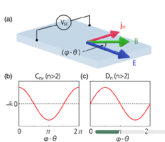
SUTD Authors: Anushiya Arunan, Qin Yan

A Universal Framework of Superimposed RIS-Phase Modulation for MISO Communication
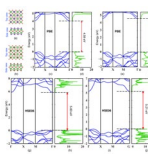*IEEE Transactions on Vehicular Technology*

SUTD Authors: Xu Jindan, Yuen Chau

Efficient and effective large-scale vaccine distribution
International Journal of Production Economics

SUTD Author: Peter L. Jackson

Intrinsic Nonlinear Planar Hall Effect
Physical Review Letters

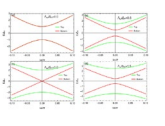SUTD Authors: Huang Yue-Xin, Feng Xiaolong, Wang Hui, Yang Shengyuan A.

Lanthanum Oxyhalide Monolayers: An Exceptional Dielectric Companion to 2-D Semiconductors
IEEE Transactions on Electron Devices

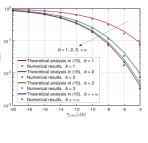SUTD Authors: Jiang Zhuoling, Su Tong, Cherq Chua, Ang L. K., Ang Yee Sin

MagneticKP: A package for quickly constructing k & BULL;p models of magnetic and non-magnetic crystals
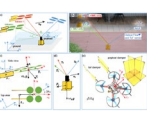*Computer Physics Communications*
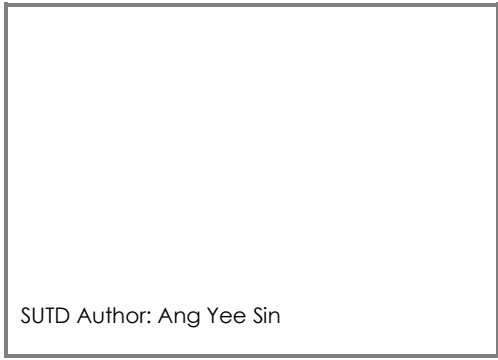
SUTD Authors: Zhang Zeying, Yu Zhi-Ming, Yang Shengyuan A.

Magneto-optical conductivity and giant Faraday-Kerr rotation in Floquet topological insulators
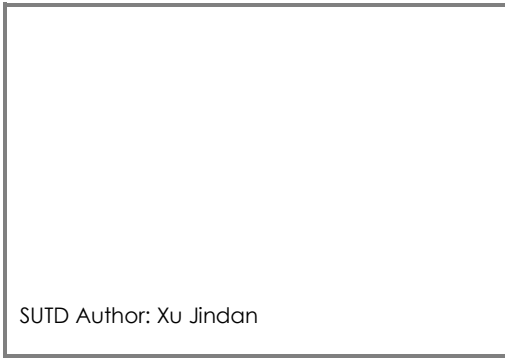*Physical Review B*

Secure Outage Analysis of RIS-Assisted Communications With Discrete Phase Control
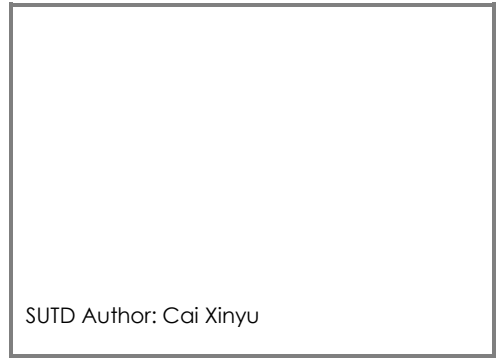*IEEE Transactions on Vehicular Technology*

Stabilizing Aerodynamic Dampers for Cooperative Transport of a Suspended Payload with Aerial Robots
Advanced Intelligent Systems
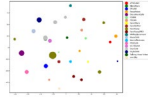

SUTD Author: Ang Yee Sin
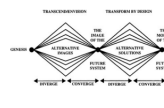
SUTD Author: Xu Jindan

SUTD Author: Cai Xinyu

Striving for Authentic and Sustained Technology Use in the Classroom: Lessons Learned from a Longitudinal Evaluation of a Sensor-Based Science Education Platform
International Journal of Human-Computer Interaction
SUTD Author: Priyashri Kamlesh Sridhar

The Same Name Is Not Always the Same: Correlating and Tracing Forgery Methods across Various Deepfake Datasets
Electronics
SUTD Authors: Sun Yi

Visualizing design project team and individual progress using NLP: a comparison between latent semantic analysis and Word2Vector algorithms
AI EDAM
SUTD Authors: Matt Chiu, Siska Lim, Arlindo Silva

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