

## Singapore Science and Engineering Fair 2021 Awards

GOLD AWARDS		
S/N	Project ID	Project Title
1	AS001	Supplementation of Lactobacillus casei reduces B-amyloid accumulation in Alzheimer Drosophila melanogaster
2	BE001	Wearable Strain Sensors with Silver Nanowires for Health Monitoring
3	BE018	Gait Monitoring and Analysis of Parkinson's Disease Patients
4	BH010	The Use of Digital Aids in the Learning of Geometry and Its Effects in the Home-Based Learning Setting
5	BM015	Transcriptional Candidates as Biomarkers for Allergic Rhinitis
6	CB004	Antimicrobial, Antioxidant, Toxicity and Phytochemical screening of Dieffenbachia camilla and the synthesis of a novel and green topical delivery method for it
7	CB005	Isolation and Characterisation of Human Proteins that interact with the Orf10 Protein of Sars-CoV-2
8	CB006	Host Target Proteins for the Spike protein of Sars-Cov-2
9	CH012	Novel Coating of Porous Cu as Heat Pipe for Thermal Management
10	CO010	Developing a low-cost and long term population abundance measure to support emerging deep-learning tools: stochastic models for abundance estimation for remote underwater video (RUV) stations.
11	CO012	A Differential Gene Expression Analysis of Alzheimer's Disease Single-Cell RNA-Seq Transcriptomes
12	EE005	Intricate study of hydrothermally-synthesised hexagonal K <sub>2</sub> W <sub>4</sub> O <sub>13</sub> nanowires for the adsorption and photodegradation of organic dyes and heavy metal ions
13	EE006	Synthesis of magnetic chitosan hydrogel from crab shells as an environmentally-friendly adsorbent for water purification
14	EE010	Treatment of Effluent With Azo Dyes and Heavy Metals by Electrochemical Advanced Oxidation Processes (EAOPs) Using Graphene-Coated Electrodes
15	EE025	Optical Technique for Rapid and Quantitative Bacteria Detection
16	EE034	Fabrication of eco-friendly cellulose-reduced graphene oxide hybrid aerogel from various fruit wastes for water purification
17	EM007	Design and Testing of a Novel Single-Rotor Tailsitter
18	ES007	Designing a Low-cost and Compact Circuit to Effectively Perform Nuclear Quadrupole Resonance (NQR) Spectroscopy on Medical Pills Containing N-14 Nuclei
19	ES023	Deep-Learning Driven IoT System for Noise Pollution Analysis on Marine Biodiversity
20	MA007	Investigation of the Shoelace Method in Higher Dimensions
21	MI008	Potentiation of Antibiotic Activity by Cationic Cyclic Peptides on Gram-Negative Bacteria
22	PH016	Topology and Geometry of 3-Band Models
23	PS023	Heterologous Expression of a Mangrove K <sup>+</sup> Transporter, AoHKT1 increases salt tolerance of Arabidopsis Thaliana
24	RO003	Stool Recognition for Colorectal Cancer Detection through Deep Learning
25	RO020	LIAR LIAR PANTS ON FIRE: A COMPUTER VISION APPROACH TO DECEPTION DETECTION
26	SS009	Unveiling music genre structure through common-interest communities
27	SS013	IMPROVED GRAPHICAL USER INTERFACE FOR INTERACTIVE PIXEL TIGHT SEGMENTATION

## Singapore Science and Engineering Fair 2021 Awards

SILVER AWARDS		
S/N	Project ID	Project Title
1	AS007	The Evolution of Colours in Butterflies
2	BH005	Impact of Social Jet lag (SJL) on Depressive Symptoms of Adolescents
3	BH007	Linguistic Indicators of Success in Aviation Emergencies: A Cockpit Voice Recorder (CVR) Investigation
4	BI005	Rapid Ligand Binding Assay of Zika Virus NS2B-NS3p for Drug Development using 19F-NMR Spectroscopy
5	BI017	Investigating the antioxidant potential of berries namely Blueberry ( <i>Vaccinium corymbosum</i> ), Blackberry ( <i>Rubus fruticosus</i> ), Raspberry ( <i>Rubus idaeus</i> ), Cranberry ( <i>Vaccinium subg. Oxycoccus</i> ), and Strawberry ( <i>Fragaria ananassa</i> ) through a mung bean shoot ( <i>Vigna radiata</i> ) bioassay and Onion root ( <i>Allium Cepa</i> ) bioassay
6	CB001	Supplementary DHA ameliorates motor and cognitive dysfunction in <i>Drosophila melanogaster</i> model of Alzheimer's Disease
7	CH030	Synthesis and Intercalating Abilities of Ruthenium-Arene Complexes with Chalcone and Bidentate Ligand
8	CO004	Artificial Intelligence Models for Predicting Statin-Induced Myalgia using Clinical and Genetic Factors
9	EA003	Synthesis of an Eco-friendly and Reusable Magnetic Ferrofluid using Orange Peel Extract for Oil Spill Cleanup
10	EA007	Green synthesis of calcium hydroxyapatite using eggshells for the removal of heavy metal ions and fluoride ions
11	EA014	Potential of Acid and Alkali chemical activators of Biochar for the Effective Removal of Ibuprofen
12	ES016	Wideband Sinuous Antenna Design
13	MA004	Brannan's conjecture and trigonometric polynomials: the case strictly between 0.5 and 1
14	MA006	Investigating the Effectiveness of Non-pharmaceutical Interventions on COVID-19
15	MA031	Characterisation of Quantum Walk with Cross-Entropy
16	MA040	Riemann Zeta Function: A Real Analytic Approach
17	MS001	Synthesis of Novel Silica Aerogel Composites
18	MS015	Emergence of Fluorescence Properties in Human Hair tailored by Focused Laser Beam
19	MS026	Formation and stability of tannic acid and gelatin multi-layers
20	PH018	Quantification of Kinetic Friction Coefficient with Timoshenko Oscillator
21	PH024	2D Moire Heterostructure
22	RO001	Cross-lingual Information Retrieval
23	RO008	Machine Learning/Deep Learning Techniques for Advanced Image Inference Tasks
24	RO025	Data-Driven Method for Li-Ion Battery Health Monitoring
25	RO036	EMG Signals Decoding
26	RO050	VAE-U-nets: Addressing the weaknesses of GANs used for image resolution enhancement

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SILVER AWARDS		
S/N	Project ID	Project Title
27	RO051	Automatic diagnosis of Coronary Artery Disease through multi-vessel analysis of coronary angiograms with a novel AI approach
28	SS018	Developing Suspect Detection Systems using Machine Learning
29	SS028	Detection and Removal of Obstructions in Still Images Utilising Machine Learning

## Singapore Science and Engineering Fair 2021 Awards

BRONZE AWARDS		
S/N	Project ID	Project Title
1	BE008	Electrocardiogram-based Arrhythmia Classification using Machine Learning and Complexity Analysis Techniques
2	BE012	Limb Hypothermia for Preventing Chemotherapy Induced Peripheral Neuropathy: Effects of Different Limb Hypothermia Modalities on Motor Nerve Functions
3	BE015	Development of a Paper-based Test for the Detection of IL-6
4	BM001	Investigation of Lactobacillus casei in the Treatment of Parkinson's Disease in the Nematode Model Caenorhabditis elegans
5	BM008	Elucidating the role of MAMDC2 in head and neck squamous cancer
6	CO001	A Computational Model of Microtubule Dynamics for Multi-Nuclei Positioning in Myotubes
7	EA011	Effectiveness of Non-defatted _Carica_ Papaya Seed Powder as a Low-cost Biosorbent in the Removal of Wastewater Pollutants
8	EE011	Investigating the effectiveness of common biodegradable waste products in Singapore in cleaning up oil spills
9	EE020	Electrochemical Enhancement of Activated Carbon Fibre for the Purification of Solvent Contaminated Pharmaceutical Effluents
10	EM001	Design of Underground Structure to Mitigate Effects of Soil Liquefaction
11	EY003	Interfacial Engineering for High Efficiency Perovskite Solar Cells
12	MA010	The Math Behind Scaffolding
13	MA011	Plague Inc: Mathematical Model of Contagions
14	MA016	The study of epidemic model in the context of Singapore
15	MA020	Spectral Analysis of Public Transport Networks
16	MA030	Analysis of a Pseudorandom Bit Generator Based on Elliptic Curves
17	MI004	Investigating the effects of sugarcane and lotus root extracts on the growth of Lactobacillus sp. and its effects on microbial antagonism.
18	MI014	Investigating how the microbial community in the soil changes when Food Waste Anaerobic Digestate is used as fertiliser for the cultivation of the vegetables Bayam (Amaranthus dubius) and Chinese Cabbage (Brassica rapa) and its implications on growth and yield.
19	MI018	Isolation & Characterisation of Salmonella Phages
20	MI020	Isolation and Characterisation of Acinetobacter Baumannii Phages from the Environment
21	MS014	Coloured Carbon Black: A Laser Initiation
22	MS017	Flora-scence: Graphene oxide-Blue Butterfly Pea Flower Composite
23	PH021	A quasi-static approach to calculating the sinking time of damaged floaters and verification of model's predictive power with motion path analysis
24	PS001	In-vitro propagation of Tillandsia bulbosa
25	PS025	investigating how charcoal to soil ratio aids in remediating allelopathy
26	RO007	COVID-19 fake news detection using deep learning

## Singapore Science and Engineering Fair 2021 Awards

BRONZE AWARDS		
S/N	Project ID	Project Title
27	RO011	Evaluation of a new multivariate uniformity metric based on information entropy for efficiently accessing the uniformity of a meta-dataset based on an expertise space
28	RO013	Automating the playtesting of turn based strategy games using AI
29	RO022	Document Layout Analysis via Machine Learning
30	RO037	Explaining Adversarial Vulnerability with a Data Sparsity Hypothesis
31	SS001	Evaluation of divided attention performance using overt and covert SSVEP with different visual angles
32	SS017	Human Movement Analysis using Handphone IMU sensors
33	TM001	Assessment of highly sensitive surface plasmon resonance biosensors for the SARS-CoV-2 virus detection by computational modeling & simulation
34	TM005	Automatic Classification of Tau-PET images using Deep Learning

## Singapore Science and Engineering Fair 2021 Awards

MERIT AWARDS		
S/N	Project ID	Project Title
1	AS002	Epigenetic modifications of fruitless in mushroom bodies influence male <i>Drosophila</i> courtship behaviour
2	BE019	An Ex Vivo Beating Heart Study Model
3	BH002	Effects of listening to motivational high and low tempo music on 400m sprint performance in female youths.
4	BH015	Personalized Guided Perceptual Learning
5	CH023	Asymmetric remote functionalization for enantioselective synthesis of pharmaceutical molecules
6	CH025	Metal Ion Release Assembly (MIRA): A Novel Approach to Ultrafast Deposition of Conformal Two-Dimensional Material Multilayers on Arbitrary Substrates
7	EA005	Investigating the application of the separation capabilities of a Zirconium MOF B-oriented MFI zeolite membrane
8	EA009	Chitosan-modified rice husk biochar and its effects on heavy metal ion sorbency
9	EE013	Crude Oil Reclamation from polluted waters using Nets and Blowers
10	EE030	Study of the properties of fruit seed starch bioplastics and the effects of gelatin and used coffee grounds on it
11	EM003	Effectiveness of Canards Compared to Strakes as High Lift Devices
12	EM008	Traffic Strategy for Mixed Traffic in Container Terminals
13	EM015	Where Does the Signal Come From
14	EM018	Investigation and Construction of a Hot Wire Anemometer
15	EY005	Future of solar energy: Global optimisation of all perovskite tandem solar cells through artificial intelligence
16	MA014	Functional Equations with Permutations of Finite Order
17	MA018	Optimisation of Water Systems
18	MA023	Variants of the Gale-Berlekamp Switching Game and their Solutions: Balancing the Rectangle and the Cube
19	MA027	Investigating Number of 5G Small Cells Required in Singapore
20	MA029	Brannan's conjecture and trigonometric polynomials
21	MI012	Comparison of Microbial Safety and Quality Indicators in Spontaneous v.s. Probiotic-Controlled Fermentation of Carrots in a Home Fermentation Setting
22	MI019	The Combinatory Effects of Microplastics and Emerging Contaminants on model green alga <i>Chlamydomonas Reinhardtii</i>
23	MS006	Winding-less magnetometer to measure permeability and core losses
24	PH003	A Numerical Simulation Study on Opinion Evolution in Complex Social Networks
25	PH007	Dynamics of a bouncing rigid capsule
26	PH009	A Comprehensive Study into the Magnetic Levitation of a Magnetic Stirrer
27	PH023	Viscous flow around a bottle
28	PH031	An aeroacoustic study of the swinging sound tube
29	PS006	Effects of UV Light on Plant Development
30	RO006	Into the Online World: Human or Bot?
31	RO021	Determining feasibility of mixed integer linear programming problem by machine learning
32	RO027	AI Panorama Art of Proteins with Image Blending Deep Learning

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MERIT AWARDS		
S/N	Project ID	Project Title
33	RO032	AI-driven data sentiment analysis
34	RO033	Finding Nemo: a fish-inspired soft robotic drone
35	RO042	Motion Tracking for Fingers
36	RO044	Self-supervised Learning with Deep Neural Networks for Computer Vision

## Singapore Science and Engineering Fair 2021 Awards

SSEF SPECIAL AWARDS		
Organisation	Project ID	Project Title
Electrochemical Society, Singapore Chapter Special Award	EY003	Interfacial Engineering for High Efficiency Perovskite Solar Cells
Electrochemical Society, Singapore Chapter Special Award	EY005	Future of solar energy: Global optimisation of all perovskite tandem solar cells through artificial intelligence
Electrochemical Society, Singapore Chapter Special Award + Institution of Chemical Engineers (IChemE) Singapore Award	EY001	Electricity Generation from Quercetin and Anthocyanin using Microbial Fuel Cell
Institution of Chemical Engineers (IChemE) Singapore Award	EY006	Thermal Signature Analysis of Singapore's Housing Infrastructure
Singapore Association for the Advancement of Science (SAAS)	AS007	The Evolution of Colours in Butterflies
Singapore Association for the Advancement of Science (SAAS)	BH014	SORBET Project
Singapore Association for the Advancement of Science (SAAS)	BI008	Investigating Methods of Producing Bioplastics and its Physical Properties with Different Amounts of HCl
Singapore Association for the Advancement of Science (SAAS)	CB006	Host Target Proteins for the Spike protein of Sars-Cov-2
Singapore Association for the Advancement of Science (SAAS)	CO001	A Computational Model of Microtubule Dynamics for Multi-Nuclei Positioning in Myotubes
Singapore Association for the Advancement of Science (SAAS)	EA003	Synthesis of an Eco-friendly and Reusable Magnetic Ferrofluid using Orange Peel Extract for Oil Spill Cleanup

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Singapore Association for the Advancement of Science (SAAS)	EA011	Effectiveness of Non-defatted _Carica_ Papaya Seed Powder as a Low-cost Biosorbent in the Removal of Wastewater Pollutants
Singapore Association for the Advancement of Science (SAAS)	EE034	Fabrication of eco-friendly cellulose-reduced graphene oxide hybrid aerogel from various fruit wastes for water purification
Singapore Association for the Advancement of Science (SAAS)	ES023	Deep-Learning Driven IoT System for Noise Pollution Analysis on Marine Biodiversity
Singapore Association for the Advancement of Science (SAAS)	MI007	Investigating the effect of bacteria and its synergistic effect on biodegradation of plastic
Singapore Association for the Advancement of Science (SAAS)	MS015	Emergence of Fluorescence Properties in Human Hair tailored by Focused Laser Beam
Singapore Association for the Advancement of Science (SAAS)	MS020	Don't Trash the Ash - Burning Characteristics of the Fluorescence and Conductivity of Bottom Ash
Singapore Association for the Advancement of Science (SAAS)	PS001	In-vitro propagation of Tillandsia bulbosa
Singapore Association for the Advancement of Science (SAAS)	RO020	LIAR LIAR PANTS ON FIRE: A COMPUTER VISION APPROACH TO DECEPTION DETECTION
Singapore Association for the Advancement of Science (SAAS)	SS013	IMPROVED GRAPHICAL USER INTERFACE FOR INTERACTIVE PIXEL TIGHT SEGMENTATION
Singapore Mathematics Society Award for Ingenuity	MA001	The Wheels of Life
Singapore Mathematics Society Award for Ingenuity	MA014	Functional Equations with Permutations of Finite Order
Singapore Society for Microbiology and Biotechnology (SSMB)	MI014	Investigating how the microbial community in the soil changes when Food Waste Anaerobic Digestate is used as fertiliser for the cultivation of the vegetables Bayam ( <i>Amaranthus dubius</i> ) and Chinese Cabbage ( <i>Brassica rapa</i> ) and its implications on growth and yield.

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SSEF SPECIAL AWARDS		
Organisation	Project ID	Project Title
SUTD R&I Award: Artificial Intelligence	MA032	Investigating James Stein paradox and applying James Stein estimation to machine learning problems
SUTD R&I Award: Artificial Intelligence	RO007	COVID-19 fake news detection using deep learning
SUTD R&I Award: Aviation	EM006	Reliability Design and the In-Orbit Lifetime of Satellites
SUTD R&I Award: Aviation	EM022	Airfoil shape optimization using machine learning techniques
SUTD R&I Award: Cities	EA012	Synthesis of activated carbon from coconut endocarp for the adsorption of microplastics and heavy metal ions removal
SUTD R&I Award: Cities	EE030	Study of the properties of fruit seed starch bioplastics and the effects of gelatin and used coffee grounds on it
SUTD R&I Award: Healthcare	BM008	Elucidating the role of MAMDC2 in head and neck squamous cancer
SUTD R&I Award: Healthcare	RO003	Stool Recognition for Colorectal Cancer Detection through Deep Learning
SUTD R&I Award: Multi-Disciplinary	BE008	Electrocardiogram-based Arrhythmia Classification using Machine Learning and Complexity Analysis Techniques
SUTD R&I Award: Multi-Disciplinary	PH003	A Numerical Simulation Study on Opinion Evolution in Complex Social Networks
Yale-NUS	CH014	Investigating the effect of different types of vinegar as adjuvants on the toxicity of Radix Bupleuri (RB)
Yale-NUS	CH027	To investigate the effect of temperature on shrimp-shell derived chitosan's adsorption capacity onto cationic and anionic toxic dyes (Methylene Blue and Eriochrome Black T respectively)
Yale-NUS	EE007	reDISHsign your bins
Yale-NUS	MA004	Brannan's conjecture and trigonometric polynomials: the case strictly between 0.5 and 1
Yale-NUS	MA027	Investigating Number of 5G Small Cells Required in Singapore
Yale-NUS	MA040	Riemann Zeta Function: A Real Analytic Approach
Yale-NUS	MS026	Formation and stability of tannic acid and gelatin multi-layers
Yale-NUS	PH007	Dynamics of a bouncing rigid capsule
Yale-NUS	PH009	A Comprehensive Study into the Magnetic Levitation of a Magnetic Stirrer
Yale-NUS	SS020	A Novel and Lightweight Virtual Proctoring System for Online Assessments