IES Prestigious Engineering Achievement Awards 2024 Winners

Innovative and Sustainable Solution for Seawall Construction in Coastal Development
By Housing Development Board & National University of Singapore

The project explores the use of geotextile tubes filled with lightly treated locally excavated soft soil to be used as coastal protection structures. This innovation aims to re-purpose excavated materials collected from the construction industry for enhanced environmental and financial sustainability. Successfully developed and tested a novel deep-water installation method to accommodate coastal protection needs in deep waters.

Development and Deployment of Singapore Police Force (SPF) Community Engagement Robot
By Ngee Ann Polytechnic

The SPF Community Engagement Robot (also known as "CODY") was developed by the Singapore Police Force (SPF) and Ngee Ann Polytechnic (NP), in consultation with the Home Team Science & Technology Agency (HTX).
CODY interacts with the public and disseminates crime prevention messages through a wide range of personalized multimedia activities such as videos, games, quizzes and chats, and can communicate in local languages.
Having been deployed at numerous SPF community outreach events, CODY enables SPF officers to reach out to more members of the public, enhancing engagement across Singapore's diverse, multilingual community.

Aqueous CO2 sequestration and utilisation in ultra-low carbon concrete production
By Singapore Institute of Technology

The team developed an innovative, cost-effective aqueous carbon sequestration system to produce sustainable ready-mixed concrete, addressing environmental and industry needs in Singapore. This system uses CO_2-enriched solutions to replace plain water, converting inorganic carbon into nano-sized $CaCO_3$ that is permanently stored in the concrete. The nano-$CaCO_3$ enhances cement hydration and reacts with cement components to allow up to 80% replacement with blast furnace slag, reducing embodied carbon by 65%.

Structural Digital Twin of Jack-up Platform – Methodology Verification & Validation
By Technology Centre for Offshore and Marine, Singapore, National University of Singapore, Seatrium

The project focuses on developing, verifying and validating a Structural Digital Twin for jack-up platforms to enhance the operational safety and efficiency.
It involves designing and testing a novel large-scale model equipped with a comprehensive sensing system for basin model test purpose and developing a robust digital twin framework with real-time predictive capabilities targeting at predictive maintenance.
This innovative approach aims to optimize asset life-cycle management and has recently been awarded a Statement of Maturity at the Concept Verified stage by American Bureau of Shipping.

Modification and Flow Diversion to a Live DTSS Segmental Tunnel
By Public Utilities Board

The project involves constructing a temporary and permanent sewer connections into Singapore's DTSS to allow LTA's TEL MRT Construction to proceed quickly by diverting impacted sewers to the DTSS.

A temporary Helicoidal Drop Structure placed in an existing deep shaft was replaced by a permanent sewer connection at 37-meter depth which required precision cutting into live DTSS tunnel, without damaging the tunnel composite structure and finishing the connection safely while managing high sewage flow and noxious gases levels

Innovative solutions like a Contingency Flooding System, steel beam stitching of the tunnel segments, water jet cutting, and a specially designed safety steel cover were employed to safeguard the tunnel and ensure a safe working environment.

cycleye
By cycleye

cycleye is an innovative safety for cyclists, offering real-time alerts on potential dangers using advance "Dep-tection" technology – combining obstacle detection & Depth Models.

cycleye transforms any mobile device into a power data system, allowing cyclists to stay aware of their surrounding with ease and accuracy.

Affordable and portable, cycleye is designed for everyday cyclists, ensuring reliable performance in a variety of riding scenarios.

Aircraft Predictive Maintenance (APM)
By Institute for Infocomm Research, Agency for Science, Technology and Research (A*STAR)

A prognostics tool that leverages sensor data recorded in the aircrafts to predict failure of components and systems in advance thus improving engineering operations and averting unplanned flight delays.

I^2R's APM uses a hybrid of human expert-based feature engineering and state-of-the-art deep learning technologies to predict failures of critical components/ systems in multiple aircraft systems.

By predicting potential failures, this solution enables proactive maintenance, preventing flight disruptions due to engineering faults, thereby significantly reducing Aircraft on Ground (AOG) incidents.