

Jurong Lake District Innovation Challenge winning solutions

Challenge statement 1
<p>How might we design a system that promotes interest to monitor and manage sustainability-related information from multiple sources for visualisation and to encourage sustainable practices?</p> <p>(Sponsored by Science Centre Singapore)</p>
Winner
Gametize
Proposed solution
<p>Gametize's solution is a gamified application that allows players to monitor their sustainability efforts, such as their consumption and waste habits, and identify areas of improvement by completing various challenges and tasks.</p> <p>By using gamification elements such as achievements, rewards and feedback, the solution seeks to engage and motivate users in adopting more sustainable practices. Social gaming elements will not only allow users to share data and tips on sustainable practices, such as supporting sustainable businesses, transport options and other lifestyle behaviours, but also create a like-minded online community. Users can also download real time reports on their sustainability progress.</p> <p>The application will be piloted with selective groups of visitors and school participants at the Science Centre to gather an initial data set and feedback for improvement, before being enhanced with more educational content and features that can be used by the larger JLD community.</p>

Challenge statement 2

How might we design a smart building management system that can optimise energy consumption throughout the day while still delivering thermal comfort to building occupants?

(Sponsored by Lendlease Global Commercial REIT)

Winner

Zuno Carbon

Proposed solution

Zuno Carbon's proposed solution is PEMS.ai, a thermal comfort predictive model that uses real-time and historical data (e.g. power consumption, ambient air conditions) of a building. With this data, PEMS.ai forecasts the building's temperature and humidity requirements based on parameters such as ambient or outdoor temp, and relative air flow velocity. It then generates recommendations for optimal settings of the Heating, Ventilation, and Air Conditioning (HVAC) systems to balance energy efficiency and the building occupants' thermal comfort.

By integrating the data with weather forecast information, PEMS.ai can help building operators predict changes to cooling requirements and adjust the HVAC systems accordingly.

Building operators would also be able to visualise real time data of the building including carbon emissions through Zuno Carbon's Environment Social Governance management platform, Veridis.

Lendlease intends to pilot the solution at a small scale in JEM. Should the solution be assessed to be effective, it could be scaled up to be applied to the rest of the development and subsequently modified to suit other Lendlease assets.

Challenge statement 3

How might we optimise the performance and energy efficiency of existing Air Handling Units (AHUs) while ensuring good thermal comfort for patients and staff, and meeting hospital operational requirements?

(Co-sponsored by Ng Teng Fong General Hospital and Jurong Community Hospital)

Winner

Ngee Ann Polytechnic Environmental & Water Technology Centre of Innovation (EWTCOI)

Proposed solution

Recognising the variety of room types, uses and layouts in hospitals, the team's solution is a Human Thermal Comfort Controller (HTCC) that automatically adjusts air temperature, taking into account environmental factors such as convection, evaporation and radiation. Unlike a conventional room thermostat that only measures air temperature, the HTCC also uses an AI Occupancy Sensor to regulate the amount of outdoor air required in a room based on occupancy level, resulting in better indoor air quality and energy savings.

An energy efficient solution, the HTCC uses a terminal box fan that responds promptly to room temperature changes and allows for smaller AHUs, as fan power can be shared with the terminal box fans.

The HTCC also uses a Passive Displace Ventilation (PDV) System that leverages natural air buoyancy. Energy savings can be derived from a reduced cooling load where the upper part of rooms does not need to be cooled, and a further reduction in size of AHUs. The draft free system also provides better comfort for occupants whose activity levels are low.

The solution could be potentially test-bedded at a rehabilitation clinic in Ng Teng Fong General Hospital to assess the performance of the AHU in meeting thermal comfort and energy efficiency outcomes.

Challenge statement 4

How might we design a digital solution that can collect, aggregate and report waste data from large commercial properties?

(Sponsored by CapitaLand)

Winner

iZeeM and Otto

Proposal

iZeeM and Otto's solution involves placing sensors at smart bins to gather data on fill levels, weight and equipment performance, with image recognition technology to capture types of waste and recyclables. Supported by user profiling data of tenants, the smart bin data will be analysed to identify patterns, optimise operations and encourage recycling.

For instance, users may be notified of potential contamination in recyclables, or be rejected when they attempt to dispose potentially non-recyclable or hazardous items. Together with data collected from iZeeM and Otto's Smart Recycling Center, building owners may be able to identify tenants with low recycling rates for further engagement.

For more comprehensive waste tracking, the proposed system can also interface with other smart compactors and/or food waste digesters buildings' premises.

CapitaLand intends to pilot the Smart Recycling Centre at IMM and the Nordic European Centre in International Business Park. If the solution demonstrates improved productivity and is financially viable, larger scale implementation may be considered for the rest of CapitaLand's portfolio.

Challenge statement 5

How might we encourage drivers to go car-lite and promote more Walk Cycle Ride modes of transport for trips within the Jurong Lake District?

(Sponsored by SMRT)

Winner

Mapxus

Proposed solution

Mapxus proposes a comprehensive navigation experience via an application that seamlessly connects indoor and outdoor spaces, making it easier for people to get around using public transport and active mobility. By integrating the solution with real-time public transport datasets, Mapxus provides users with up-to-date information on bus and train schedules, routes and disruptions, enabling them to make informed decisions about their public transportation choices.

Additionally, the application actively encourages active mobility, offering two indoor wayfinding options: the shortest route and the barrier-free route which avoids escalators and stairs. By promoting walking as a viable and enjoyable option, Mapxus motivates individuals to incorporate active mobility into their daily routines, promoting both physical well-being and social inclusiveness.

To further engage users and support the local retail community, retail solutions offered by other providers could be integrated into the navigation experience. This integration could involve implementing an online queue system and an online food ordering system for smaller F&B and personal care service establishments, reducing waiting times and enhancing the overall retail experience. In addition, Mapxus can display available promotional coupons or discounts for nearby businesses on the digital map, incentivising users to patronise local establishments.

Mapxus' solution will be tested selectively within JLD to assess its effectiveness and receptiveness, and may be integrated with SMRT's existing travel and lifestyle application, Wink+, to enhance convenience and mobility options for commuters.

Challenge statement 5

How might we encourage drivers to go car-lite and promote more Walk Cycle Ride modes of transport for trips within the Jurong Lake District?

(Sponsored by Land Transport Authority)

Winner 1

Nippon Koei

Proposal

The personalised journey planner application seeks to encourage the switch to public transport. With features such as cost comparison for various transport options, carbon footprint tracker, real-time movement tracker, e-wallet and rewards redemption, the application promotes benefits for choosing car-lite options, such as time savings, positive health outcomes and positive impact on the environment.

Nippon Koei's solution will be piloted for journeys to and from the Jurong Lake District to assess its efficacy in changing perceptions and encouraging usage of Walk Cycle Ride modes of transport. If effective, it could be expanded to other areas as well.

Challenge statement 6

How might we design a pre-emptive and predictive water tank monitoring system that reduces the need for corrective maintenance work?

(Sponsored by CapitaLand)

Winner 1

AccuPredict

Proposal

AccuPredict's proposal taps on applying their experience in predicting failures in machine components and structures using vibration, to three components in water tank monitoring:

1. Tank level monitoring: Wireless vibration sensors will be installed at key points on the tank to detect water level. As water level decreases, the frequency of vibration will increase based on the inverse proportionality of mass and frequency.
2. Water pump monitoring: Sensors will be installed on the bearings of the motor and pump. By analysing the vibration frequency spectrum, the type of emerging component failure can be identified months ahead of occurrence, with preemptive action taken to ensure failure-free operations.
3. Pipe leakages: Using vibration resulting from dynamic interaction of the pump and the pipe geometry as water is pumped through the pipe, the location and cause (i.e. scaling, choking or resonance related excess vibration) of leakage can be identified.

CapitaLand will pilot the sensors at IMM and Nordic European Centre in International Business Park. If the solution is effective and commercially viable, it may be deployed in other CapitaLand developments.

Challenge statement 6

How might we design a pre-emptive and predictive water tank monitoring system that reduces the need for corrective maintenance work?

(Sponsored by Lendlease Global Commercial REIT)

Winner 2

Teredo Analytics

Proposal

Teredo takes a similar approach as what mechanics and plumbers do – by going after the source of noise and fixing it – but with an AI dimension. Teredo’s solution seeks to automate the traditional way of detecting anomalies through an AI algorithm that is capable of discerning environmental and man-made noise. The technology is also capable of detecting continuous leak and synchronising time between sensors to deliver accurate results.

Lendlease intends to trial Teredo Analytics’ solution in one area of the water system in JEM by creating multiple leaks intentionally to test the effectiveness of the solution. If proven effective, the solution could be applied to the entire water system in JEM, including potable, NEWater, and rainwater pipes.