



SMART FLOATING SYSTEMS FOR COASTAL PROTECTION

Project V1-P3

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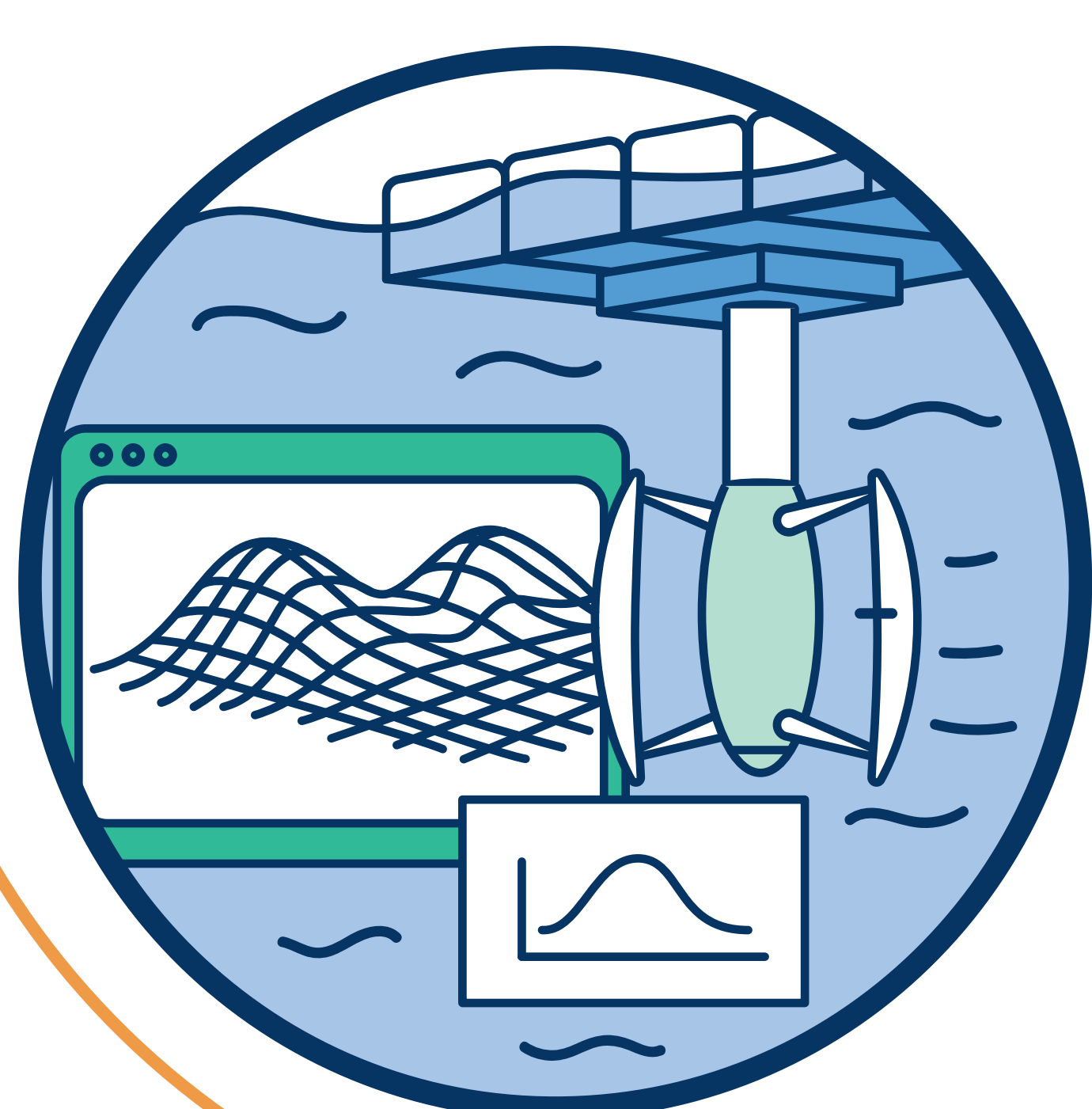
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Smart and multifunctional floating structures for coastal protection and flood control

Existing seawalls may not fully address the coastal erosion and storm impacts intensified by climate change. This project develops modular, anchored floating breakwater systems that shield shorelines and ports while co-locating renewable energy generation. By combining protection, energy harvesting and structural health monitoring in a single platform, it supports Singapore's push for climate-resilient, multi-purpose coastal infrastructure.

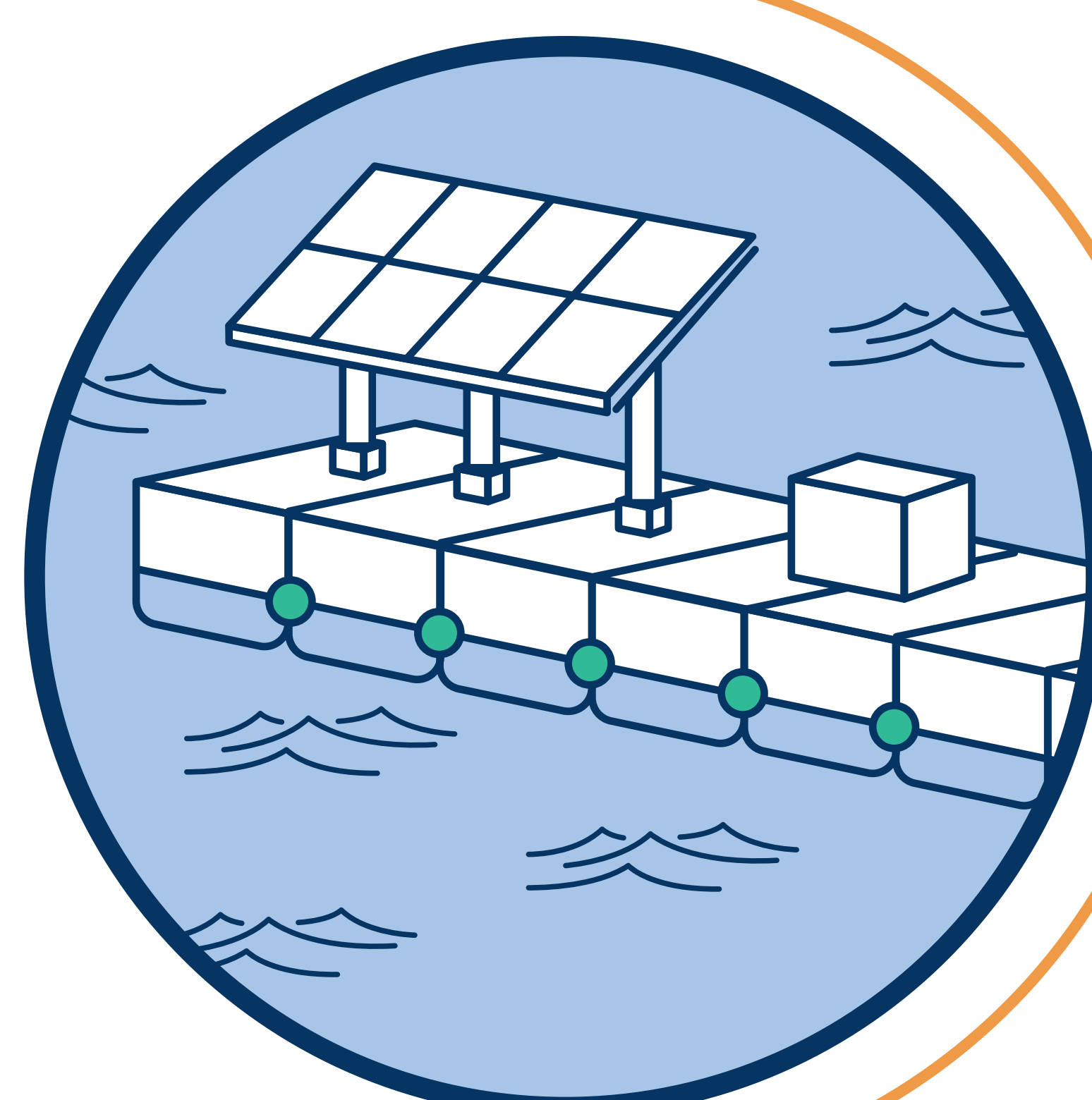


Progress

- 1 Used high-resolution simulations to optimise breakwater geometries and mooring systems for wave attenuation and energy dissipation.
- 2 Showed that tidal turbines can deliver stable power under combined wave-current conditions, supporting adaptive control in changing marine environments.

Outputs

- 1 Optimised floating breakwater configurations validated for Singapore's coastal conditions.
- 2 Proven feasibility of integrating renewable energy harvesting into coastal structures.
- 3 A multifunctional design framework combining wave attenuation, energy generation and smart structural monitoring.



Impact

- 1 Reduced wave exposure and erosion risk for vulnerable shores, ports and key coastal assets.
- 2 A flexible, relocatable adaptation option for coastal planners.
- 3 Contribution to energy resilience through local, low-carbon marine renewables.
- 4 Alignment with Singapore's multifunctional infrastructure approach and Green Plan 2030.