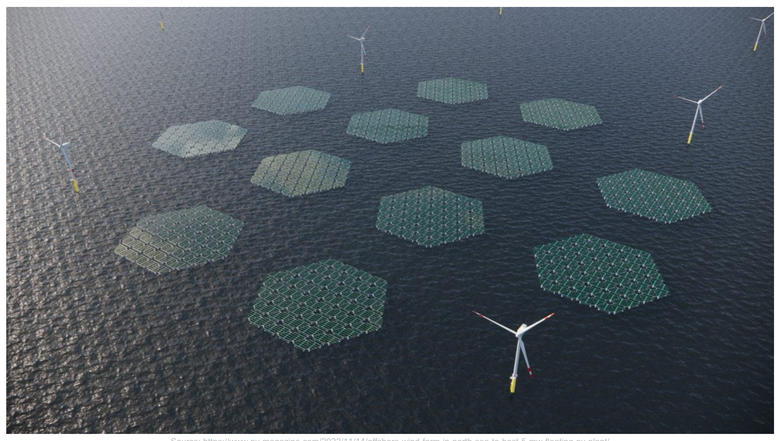
Gestão:

Reunião de Acompanhamento e Avaliação - RAA 2026

A SWARM OF FLOATING BREAKWATERS FOR THE PROTECTION OF OFFSHORE STRUCTURES

De Andrade, E. M. [1]; Fernandes, A. C. [2] ; Sales Jr, J. S. [2]
[1]Bolsista do PRH 18.1/UFRJ, Engenharia Oceânica, Rio de Janeiro – RJ. E-mail: mrson@oceanica.ufrj.br
[2]Docente do curso de Engenharia Oceânica da COPPE/UFRJ, Rio de Janeiro – RJ.
E-mail: acfernandes@oceanica.ufrj.br; joel@oceanica.ufrj.br

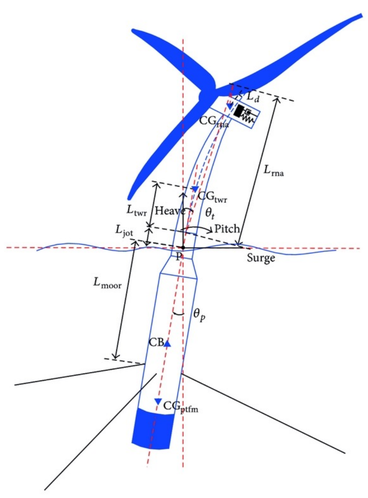
Introduction



Source: https://www.pv-magazine.com/2022/11/14/offshore-wind-farm-in-north-sea-to-host-5-mw-floating-pv-plant/



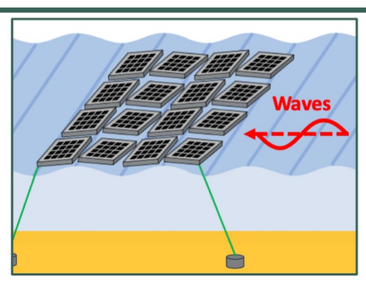
Source: https://www.pressebox.com/pressrelease/sinn-power-gmbh/why-conventional-floating-solar-pv-systems-will-fail-in-the-ocean/boxid/1086555

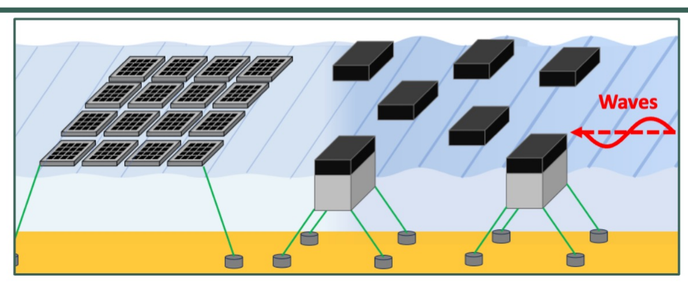


Source:https://www.hindawi.com/journals/jam/2013/679071/fig1/

Proposed approach

Scenario: Structures under wave actions **Approach:** Adaptive floating breakwaters



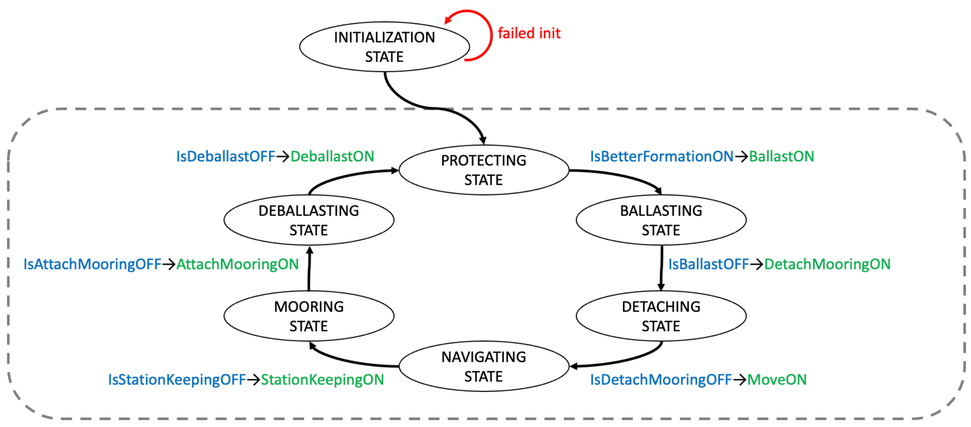




Source: Nano Banana2.

Methods

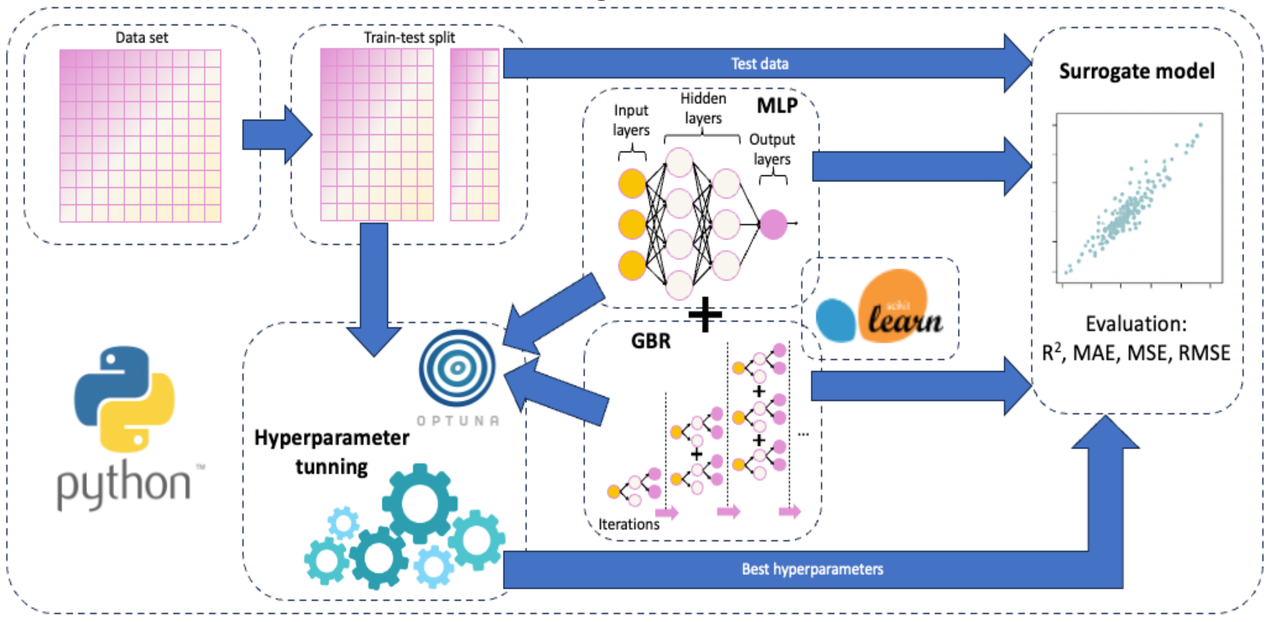
State machine



Traditional Path:
Layout → BEM Solver → Wave Field Solution → Mean Transmission Coefficient (μKt)

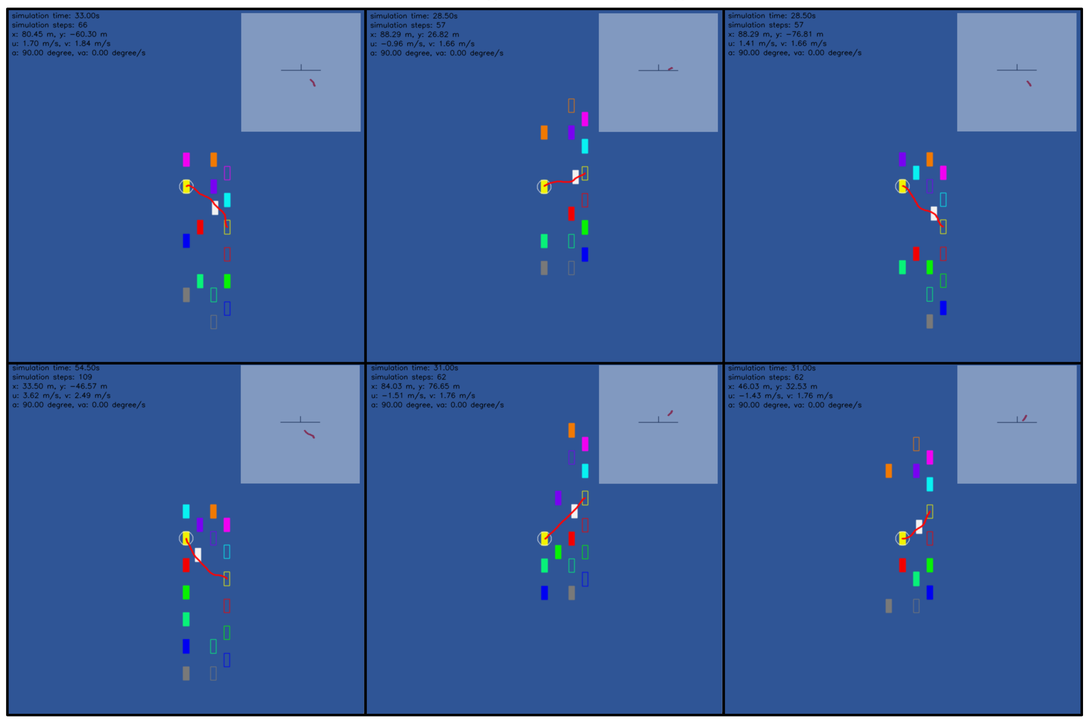
Our Path:
Layout → Surrogate model → Mean Transmission Coefficient (μKt)

Surrogate model

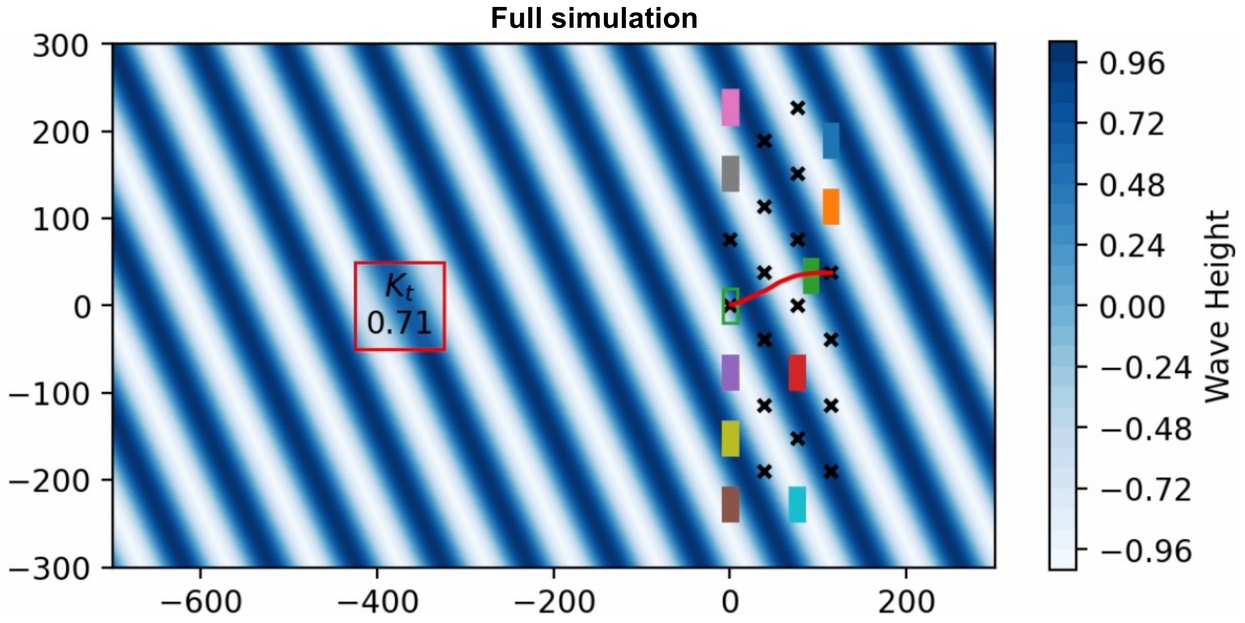


Results and Conclusions

Navigation training



Full simulation



Main outcomes

- A machine learning surrogate model replaces BEM solvers
- A predictive ML model optimizes formations, capturing 86% of the variability in the data
- Swarm of floating breakwaters adapt their formation to shield structures from waves
- The RL enables reliable RRT-based path following
- Application to protection of a floating photovoltaic (FPV) system

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