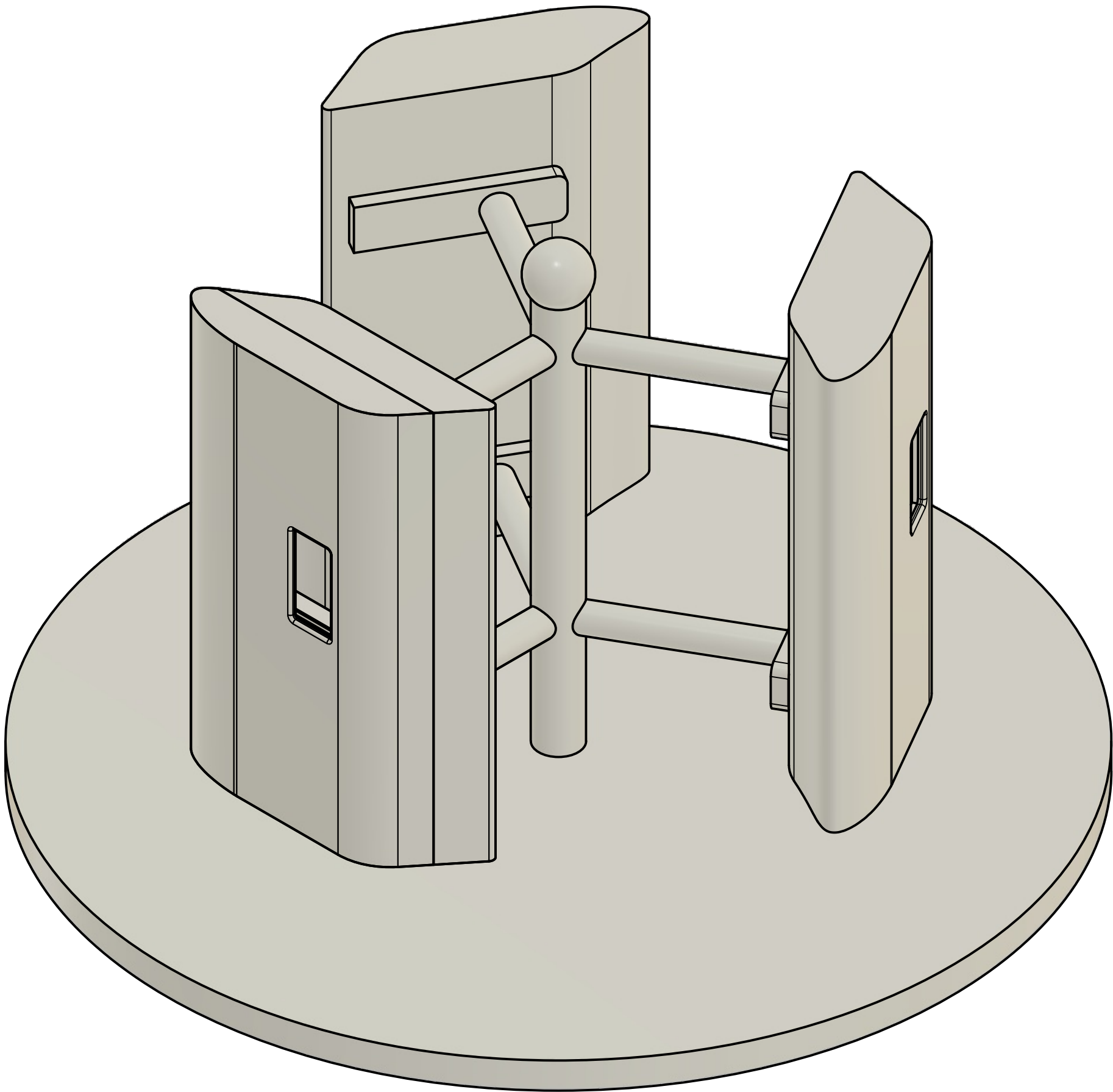


# Zephyr

## An Integrated Wind-Powered CO<sub>2</sub> Capture System



### Problem Statement

- Rising atmospheric CO<sub>2</sub> levels are accelerating climate change.
- Traditional DAC systems are bulky, energy-intensive, and unsuitable for small-scale use.
- There is a need for a compact, energy-efficient CO<sub>2</sub> capture solution.

### Proposed Solution

- A Vertical Axis Wind Turbine (VAWT) designed to passively capture CO<sub>2</sub> from ambient air.
- Utilizes wind energy both for airflow and to enable a low-energy sorbent regeneration system.
- Demonstrates a hybrid approach that integrates direct air capture into a wind turbine without external fans or power sources.
- The current prototype is downsized for prototyping feasibility, but the concept is intended for scalable real-world deployment.

### Working Principle

- Wind turns the blades → Air passes over zeolite-filled sorbent inside each blade.
- CO<sub>2</sub> is adsorbed from the air during rotation.
- For regeneration, nichrome heating wire activates inside closed blades to release CO<sub>2</sub>.
- CO<sub>2</sub> is directed through internal tubing to a central collector.