

Fan-powered Vehicle

Specialized tools/technology used	Experience level required
Plastic fan blade, Craft materials	beginner
3D printed specialty parts	beginner if pre-printed intermediate if student-designed

Grade Level (of this example): K - 8

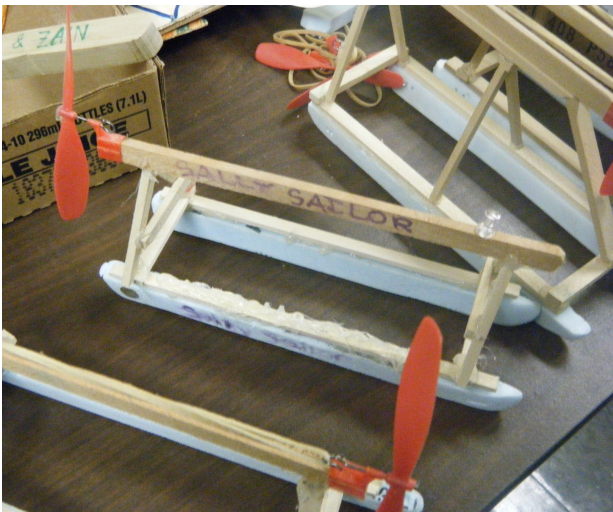
Time: 2+ class periods

Topic/Content Standards (of this example): Defined by teacher - see detailed Project Work Details below for standards used in original project.

Summary of Project:

Students will design and construct a fan-powered vehicle that meets design criteria designated by the teacher. They will use a plastic fan and elastic, combined with other materials to create a moving vehicle. They will work individually to design, test, and complete building their vehicle. Presentation and evaluation can incorporate a display of the working model for the class, or student projects can compete in any of the following:

- speed
- distance on a flat or inclined surface
- trajectory
- load-bearing over a set distance





Possible design constraints

- specific materials, parts (e.g. teacher allows only one type of fan blade, bans paper)
- Size / weight
- Must carry a set load across a set distance
- Distance
- Speed across a set distance
- straightness of trajectory

Project Extension Ideas

Rubber band fan

- measure total distance traveled per rubber band stretch distance and twist of each vehicle (or parameter decided by student) to determine energy efficiency of vehicle (math, physics)
 - do it numerous times and see whether efficiency decreases a noticeable amount (math: significant digits)
 - have students swap rubber bands to different vehicles and measure efficiency again to determine variation in energy storage across rubber bands (math: statistics)
- develop a beginning or final explanation of how energy stored in rubber band becomes kinetic energy of fan, kinetic energy of vehicle, present in the medium of students' choice (physics)

Motor powered fan

- Make most efficient vehicle (math, physics)
- Make cheapest vehicle (math, physics)
- Make Arduino-controlled motor trigger that responds to sound, light, moisture, etc.
- Make radio- or tether-controlled fan vehicle and navigate a route

While these offer natural tie-ins to STEM standards, consider using them as jumping off points to understand ELA or Social Studies topics via research/reading, argument from evidence, and multimedia communication:

- Design a vehicle for people in an environment where wheels are not useful - provides ideal transportation, carries a cargo that solves a problem for people
- Design a vehicle that is ideal in a certain literary or geographical setting Design a vehicle that is ideal for a chosen literary or historical figure
- Create videos or advertising materials for the vehicles with a specific audience/goal in mind
- Make a low-blight vehicle for densely populated area or an ecotourism setting (quietest, cleanest fuel consumption, safe for animals, etc.)