

## Fan-Powered Vehicle

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

**Grade Level** (of this example): K - 8

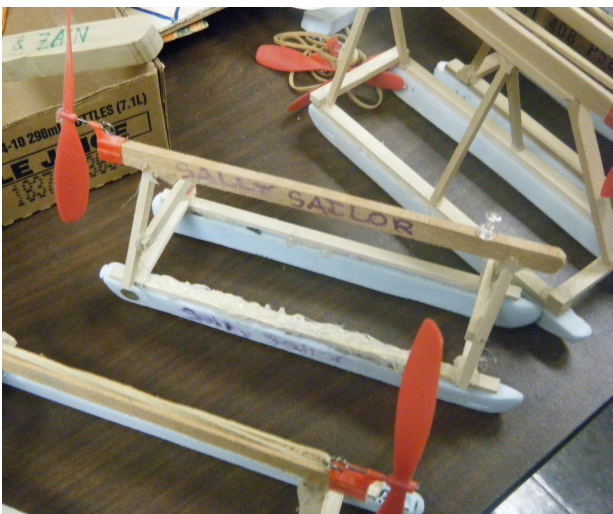
**Time:** 2+ class periods

**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.)