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Fan Power Challenge

Design & Technology Concepts

- **Stability**
- **Weight VS Power**
- **Pull VS Push**

Plastic three AA battery holder

Program Aim Design, Create, Program & Debug a fan powered vehicle capable of travelling along the ground from a limited set of material

1, The Challenge | 2, Prototype Build | 3, Programming & Testing

Learning Path

Resources

Power Maker Card, Motor maker card, Crumble board, USB cable, Four crocodile clip cables, corrugated card (standard box packaging recycled), plastic fan blade, sellotape, masking tape, selection of wheels, straws, 3AA battery holder, 3AA batteries, 4mm, dowel wood, teacher slides, planning sheet, cutout sheet

Optional:- For steering adaptation, servo motor, more crocodile clipped cables, servo motor card

Year Group

-This could be taught in Y4-6 depending on pupils DT abilities as the programming is very simple until the optional extension activity

Time Needed

-2 hours in Years 5-6 a bit longer in Y4

Groups

-Pairs works well for this alt-hough if you had enough kit 1:1 would work well

1, The Challenge

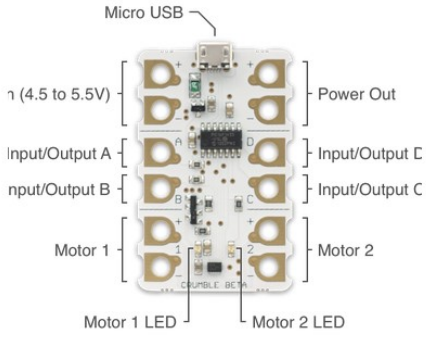
Design, build, make and program a fan powered car.

Challenge 1 Can the vehicle move from stationary powered solely by the fan? (no pushing or slopes)

Challenge 2 How far can the vehicle move with 30 seconds (30,000 ms) of power? The power can be split up and separated by any unit of time **TOP CHALLENGE**

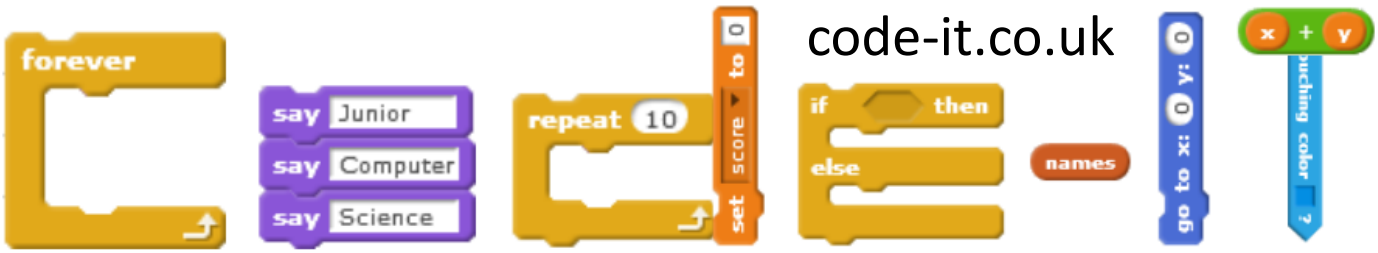
Challenge 3 Can the vehicle be programmed to travel over a metre and then return to its exact starting point without any obstacles put on the floor

Crumble control board



Low voltage electric motor found in most primary schools 4.5-5.5v

My thanks to **Cobie van de Ven @hetdigilab,** an excellent Dutch educator, whose fan powered car inspired this idea. The rich vein of ideas flowing between Holland and England is a source of inspiration.



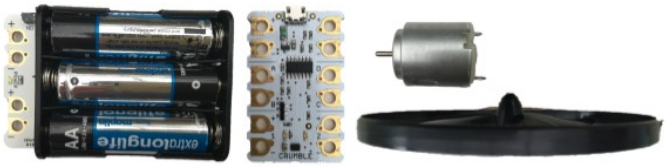
Fan Power Challenge P2

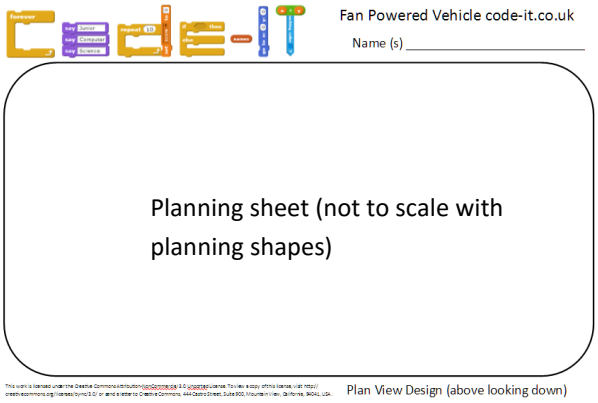
Teachers slides contain lots of the challenges pupils will need to overcome to solve this STEM challenge

1, The challenge continued

Use the teacher slides to introduce the challenge and various hurdles to overcome. Hand out the basic materials so pupils know what they can use. Hand out the planning sheet for pupils to sketch a quick design. They can cut out some objects and stick them onto the plan view to speed the process up. Before they move onto the build process they must check their design with their teacher. Don't fix every design fault just make sure pupils have added everything they need to the design before they build the first prototype.

Cut out and stick planning shapes to scale (with each other)





2, Prototype build 3, Programming & Testing

Stage 2 and 3 often blur into each other as pupils build, program test refine followed by more building programming and testing.

Our job as teachers is to make sure there is a testing area marked out, a long flat corridor or hall is good for this. The smoother the surface the better to help reduce friction. A clipboard for pupils to measure and record their distance attempts helps as well.

Common Software Hardware Bugs

- Software not connecting to crumble (try USB in another USB port) or (Give computer time to find drivers if this is the first time the crumble has been used) or (check the USB cable firmly plugged into crumble top)
- Motor running too long (Has a wait block and stop motor block been used)
- Motor running too quickly once battery pack switched on (build a wait time before program runs)

Remember hints not full solutions

Common problems

Physical Design Problems

- Too much weight for the fan to move the vehicle (reduce the weight)
- Wheels locked (look for ways to free them)
- Fan not fixed high enough (adapt or change fan housing)
- Fan not fixed securely (look at ways of designing a fan mount slide)
- Vehicle tipping up (adjust where the battery holder is mounted to move to centre)
- Motor not working (check battery pack turned on) or (check no wires are touching each other because crocodile sheath removed) or change batteries)

Remember hints not full solutions