

Robotic bees

Watch the video here: <https://www.youtube.com/watch?v=1ICMI5LuGpg>

Flying **submarines** are a common idea both in science fiction and in real life. But this **robotic insect** may be the smallest one out there. Researchers have built a small robot, that can move as well underwater as it can in the air.

The small machine was **adapted** from an earlier **design** that could only fly, but in order to make it swim, they had to go *back to the drawing board*. First, it needed help staying **oriented** while underwater. The bot only weighs 175 milligrams, about the same as a **raindrop**, so to keep it from losing control, they added underwater **stabilizers**, and slowed down the **wingbeats**.

When flying, the robot's wings **flap** about 250 times a second, To keep the robot from spinning around wildly in the water, they slow it down to around 9 beats per second while **submerged**.

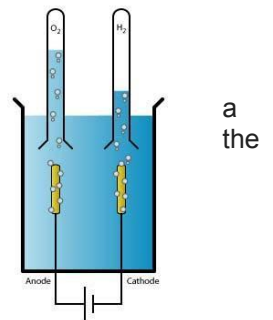
But the robot needs a way to get out of the water once it's underneath. To solve this problem, the researchers turned to **electrolysis**. **Electrolysis** is a chemical **reaction** jump started by an electric current. In water, **electrolysis** breaks up the H₂O molecules into **hydrogen** and **oxygen**.

The researchers attached an **electrolysis** device to the robot, as well as an electric "sparker"
When the apparatus is activated, the robot creates a **buildup** of gas in a **chamber** beneath itself.
And when the sparker **ignites**, the **reaction** rockets the bot to a height of 30 centimeters.

Even though it can't fly when wet, the robot can still **glide** safely back to land, and when it's dry, take to the skies once again. While you won't see this bot flying or swimming in your neighborhood soon, the researchers are **confident** that in the future, this robotic insect could be used for help in disaster cleanup or environmental surveys.

What is 'Electrolysis'?

Electrolysis is a process that uses the power of electricity to split **elements** and **compounds**. An electric **current** is passed between a negatively charged **electrode** called *cathode* and a positively charged **electrode** called an *anode*. This electric **current** breaks **bonds** that hold the **substances** together.



Vocabulary words:

Submarine - *noun* An underwater vessel.

Robotic - Something which works on its own; a machine that can make decisions

Insect - *noun* small air-breathing arthropod; a person who has a nasty or unethical character undeserving of respect

adapt - *verb* make fit for, or change to suit a new purpose; adapt or conform oneself to new or different conditions

design - *noun* the act of working out the form of something (as by making a sketch or outline or plan); a decorative or artistic work; a preliminary sketch indicating the plan for something; an arrangement scheme; the creation of something in the mind; something intended as a guide for making something else; an anticipated outcome that is intended or that guides your planned actions; *verb* intend or have as a purpose; design something for a specific role or purpose or effect; conceive or fashion in the mind; invent; make a design of; plan out in systematic, often graphic form; create the design for; create or execute in an artistic or highly skilled manner; create designs; make or work out a plan for; devise

Back to the drawing board - *Expression* - To start all over again.

Orient - *adj. verb* determine one's position with reference to another point; cause to point; be oriented

raindrop - *noun* a drop of rain

stabilizer - *noun* a device for making something stable; airfoil consisting of a device for stabilizing an aircraft; a chemical that is added to a solution or mixture or suspension to maintain it in a stable or unchanging state

wingbeats - When a bird flaps it's wings (how many flaps it makes)

flap - *noun* any broad thin and limber covering attached at one edge; hangs loose or projects freely; a movable airfoil that is part of an aircraft wing; used to increase lift or drag; a movable piece of tissue partly connected to the body; the motion made by flapping up and down; an excited state of agitation; *verb* pronounce with a flap, of alveolar sounds; move noisily; make a fuss; be agitated; move in a wavy pattern or with a rising and falling motion; move with a flapping motion; move with a thrashing motion

submerged - *adj.* beneath the surface of the water; under water; e.g. at the bottom of a body of water; growing or remaining under water

electrolysis - *noun* removing superfluous or unwanted hair by passing an electric current through the hair root; (chemistry) a chemical decomposition reaction produced by passing an electric current through a solution containing ions

reaction - *noun* doing something in opposition to another way of doing it that you don't like; a bodily process occurring due to the effect of some foregoing stimulus or agent; an idea evoked by some experience; extreme conservatism in political or social matters; a response that reveals a person's feelings or attitude; (mechanics) the equal and opposite force that is produced when any force is applied to a body; (chemistry) a process in which one or more substances are changed into others

hydrogen - *noun* a nonmetallic univalent element that is normally a colorless and odorless highly flammable diatomic gas; the simplest and lightest and most abundant element in the universe

oxygen - *noun* a nonmetallic bivalent element that is normally a colorless odorless tasteless nonflammable diatomic gas; constitutes 21 percent of the atmosphere by volume; the most abundant element in the earth's crust

buildup - *noun* the act of building up an accumulation; highly favorable publicity and praise; the result of the process of accumulation

chamber - *noun* a natural or artificial enclosed space; a room where a judge transacts business; an enclosed volume in the body; a deliberative or legislative or administrative or judicial assembly; a room used primarily for sleeping; *verb* place in a chamber

ignite - *verb* cause to start burning; subject to fire or great heat; arouse or excite feelings and passions; start to burn or burst into flames

glide - *noun* the activity of flying a glider; the act of moving smoothly along a surface while remaining in contact with it; a vowel-like sound that serves as a consonant; *verb* move smoothly and effortlessly; cause to move or pass silently, smoothly, or imperceptibly; fly in or as if in a glider plane

confident - *adj.* not liable to error in judgment or action; having or marked by confidence or assurance; persuaded of; very sure.

element - *noun* any of the more than 100 known substances (of which 92 occur naturally) that cannot be separated into simpler substances and that singly or in combination constitute all matter

compound - (chemistry) a substance formed by chemical union of two or more elements or ingredients in definite proportion by weight;

current - a flow of electricity through a conductor;

electrode - *noun* a conductor used to make electrical contact with some part of a circuit

bond - an electrical force linking atoms;

substance - *noun* that which has mass and occupies space;

Positive and Negative charges - A negative charge is carried by electrons, and positive charge is carried by the protons.