Row-Bot eating pollution for environment clean-up

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Abstract:

Initially goal was to create a robot that would help humans in reducing pollution, and also they should be like a wild animal, so it wasn't dependent on humans to constantly recharge and reenergize itself. Inspired by the water boatman and basking shark Row-bot was invented. It's a tiny machine that eats waste and pollution and receives electrical power in return. It can be the answer to waste in future, let the row-bot into the stream, and wait until they eat all the garbage.

Introduction:

Now, of course you all know about robots. While making robot we have taken inspiration from the natural biological organisms and they do some really cool things that we can't, and current robots can't either. They do all sorts of great things like moving around on the floor; they go into our gardens and they eat our crops; they climb trees; they go in water, they come out of water; they trap insects and digest them. So they do really interesting things. They live, they breathe, they die, they eat things from the environment. Our current robots don't really do that. So we use some of those characteristics in future robots so that we could solve some really interesting problems.

There are a couple of problems now in the environment where we can use the skills and the technologies derived from these animals and from the plants, and we can use them to solve those problems.

Necessity:

Let's take example of the two environmental problems. They're both of man interacting with the environment and doing some unpleasant things.

Fig: Massive growth of algae across oceans.

The first one is to do with the pressure of population. Such is the pressure of population around the world that agriculture and farming is required to produce more and more crops. Now, to mean with the demand of population, farmers put more and more chemicals onto the land. They put on fertilizers, nitrates, pesticides, all sorts of things that encourage the growth of the crops, but there are some negative impacts. One of the negative impacts is if you put lots of fertilizer on the land, not all of it goes into the crops. Lots of it stays in the soil, and then when it rains, these chemicals go into the water table. And in the water table, then they go into streams, into lakes, into rivers and into the sea. Because of the overuse of fertilizers, pesticides and nitrates other living organisms are affected by that for example, Algae.

Algae love nitrates, it loves fertilizer, so it will take in all these chemicals, and if the conditions are right, it will mass produce. It will produce masses and masses of new algae. That's called a bloom. The trouble is that when algae reproduce, it starves the water of oxygen. So because of this the other organisms in the water can't survive. So we try to produce a robot that will eat the algae, consume it and make it safe.So that's the first problem.

Fig: Oil tank flushes oil in sea.

The second problem is oil pollution. Oil comes out of the engines that we use, the boats that we use. Sometimes tankers flush their oil tanks into the sea, so oil is released into the sea, So using robots that could eat the pollution the oil field.We make robots that will eat pollution.

Theme:

To actually make the robot, we take inspiration from two organisms the basking shark and the water boatman.

Fig: Basking shark

The basking shark is a massive shark. It's noncarnivorous, and the basking shark opens its mouth, and it swims through the water, collecting plankton. As it does that, it digests the food, and then it uses that energy in its body to keep moving. So, could we make a robot like the basking shark that chugs through the water and eats up the pollution. But also, we take the inspiration from other organisms like a water boatman. When it's swimming in the water, it uses its paddle-like legs to push itself forward.

Fig: Water Boatman

So we take those two organisms and we combine them together to make a new kind of robot. Because we're using the water boatman as inspiration, and robot sits on top of the water, and it rows, we call it the “Row-bot”.

Hardware:

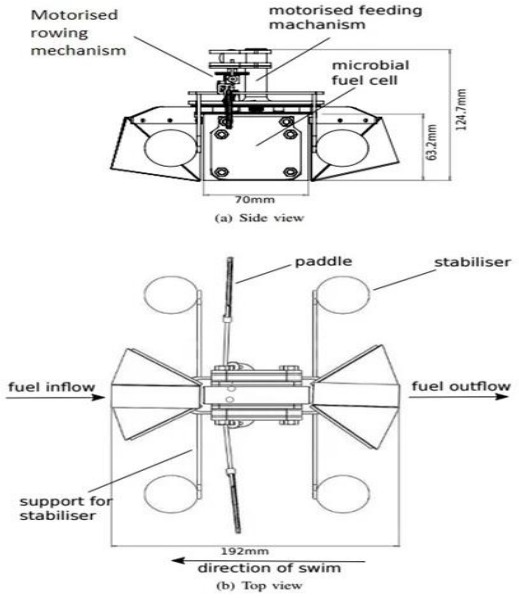
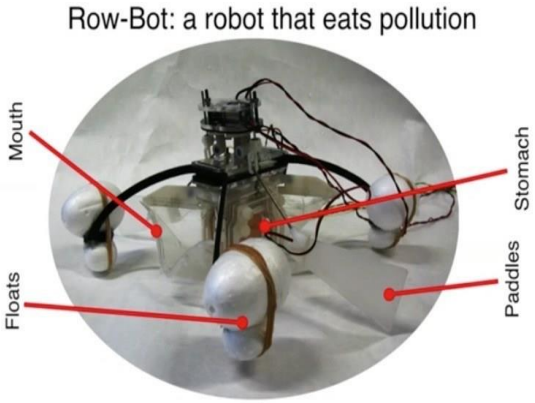


Fig: Block diagram.

Row-bot is a robot that rows, it's made up of plastic. The Row-bot is made up of three parts, three parts are really like the parts of any organism. It's got a brain, a body and a stomach. It needs the stomach to create the energy. Any Row-bot will have this three components, and any organism will have this three components. It has a body, and its body is made out of plastic, and it sits on top of the water. And it's got flippers on the side, it has paddles that help it move, just like the water boatman. It has plastic body, and has soft rubber mouth it's got two mouths. One is to let the food go in and the other is to let the food go out.



The second component is the stomach. We need to get the energy into the robot and we need to treat the pollution, so the pollution goes in and It has a cell in the middle called a microbial fuel cell, instead of having batteries, instead of having a conventional power system and it this cell creates electricity.

Fig: Microbial cells.

So a microbial fuel cell is a little bit like a chemical fuel cell .Chemical fuel cells take hydrogen and oxygen, and combine them together and you get electricity. It's the same principle. Its got oxygen on one side, but instead of having hydrogen on the other, it has some soup, and inside that soup there are living microbes. If we take some organic material or waste products, some food, maybe a bit of your sandwich, the microbes will eat that food, and they will turn it into electricity. Not only that, but if we select the right kind of microbes, we can use the microbial fuel cell to treat some of the pollution. If we choose the right microbes, the microbes will eat the algae. If we use other kinds of microbes, they will eat petroleum spirits and crude oil. So the stomach could be used to treat the pollution but also to generate electricity from the pollution.

So the robot will move through the environment, taking food into its stomach, digest the food, create electricity of mill watts, or microwatts, use that electricity to move through the environment and keep doing this. When the Row-bot has done its digestion, when it's taken the food in, it will sit there and it will wait until it has consumed all that food. That could take some hours, it could take some days. A

Conclusion:

This Row-bot can be used by humans in reducing pollution, It has special feature of self-recharge and reenergize its independent, without any hands on humans operator required.

Future scope:

We can put this Row-bot out there, and it eats up all of the pollutions and then we have to collect them as it contains motors, it contains wires, it contains components which themselves are not biodegradable. Current Robots contain things like toxic batteries. We can't leave those in the environment, so we need to track them, and then

when they've finished their job of work,we need to collect them. That limits the number of Row-bots you can use.

If we make a robot a little bit like a biological organism, when it comes to the end of its life, it dies and it degrades to nothing.

So wouldn't it be nice if these robots, instead of being like this, made out of plastic, instead made up of other materials which are bioderagdable. That changes the way in which we use robots. Instead of putting 10 or 100 out into the environment, having to track them, and then when they die, collect them, we could put a thousand, a million, a billion robots into the environment. Just spread them around. And we know that at the end of their lives, they're going to degrade to nothing. You don't need to worry about them. So we can make robots which are biodegradable. We can use household materials to make these biodegradable robots. You can make a robot out of jelly. Instead of having a motor, which we have at the moment, we can make things called artificial muscles. Artificial muscles are smart materials, we apply electricity to them, and they contract, or they bend or they twist. They look like real muscles. So instead of having a motor, we have these artificial muscles. And we can make artificial muscles out of jelly. If we take some jelly and some salts, and do a bit of jiggery-pokery, we can make an artificial muscle. We've also shown we can make the microbial fuel cell's stomach out of paper. So we could make the whole robot out of biodegradable materials. We throw them out and they degrade to nothing.

It's going to totally change the way in which we think about robots, but also it allows us to be really creative in the way in which we think about robots.

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