



# Robots for Fighting Plastic Pollution

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## Call to Action

**Start from where you are now, & you will have started a wave of change!**

**Dr. Jane Goodall's Roots & Shoots:**

**[www.rootsandshoots.org](http://www.rootsandshoots.org)**

**JGI UK for Wildlife Research,**

**Education & Conservation: [www.](http://www.janegoodall.org.uk)**

**[janegoodall.org.uk](http://janegoodall.org.uk)**

## Values

- Concern
- Imagination
- Patience
- Optimism
- Environmentalism

## Lessons Learned

**You are already old enough, smart enough, and wise enough to start changing the world; don't wait!**

**Change has a snowball effect: it may start small, but if you keep at it, it can grow and spread around the world.**

**Think about what we consider "normal" and the problems it has generated.** When you see a problem, think of ways to make it better. Then, tell everyone about it, and get them to help you find a solution.

**When faced with a problem, be willing to use your skills in unconventional ways in order to solve it.**

**Listen to the people around you, learn from their comments, even negative ones, and focus on improving your work.**

**Sainath Manikandan once read a story about the famous environmentalist, Dr. Jane Goodall.**

She'd helped him to see that no matter how small a step might seem, the tiniest effort can eventually make a huge difference. He was just a young boy in school, but he had paid attention when she said that it didn't matter how old someone was; what mattered was the action they took to move the world in the right direction. So Sainath decided to start where he would be able to make a change—in his own school. He'd seen that a lot of his classmates in the United Arab Emirates (UAE) used single-use plastics in their everyday lives. He found this extremely concerning. He'd first noticed the impact of single-use plastics when he had visited his family's hometown in India when he was 8 years old. Sainath was bothered enough by this that when he got home, he did some research. "This is a problem all over the world," he says. "An estimated amount of eight million tons of plastic ends up in the world's oceans every year." If that continues, it is estimated that by 2050 there will be more plastic in the oceans than there is marine wildlife. These shocking numbers made Sainath wonder what he could do about it.

## Language Arts

**Who is Dr. Jane Goodall, and why is she so important to the environmental movement?** Create a 10-minute video about Dr. Goodall, and about her work as an environmentalist/conservationist. Why do you think Sainath was so inspired by her? What parts of her life and career do you (personally) find inspiring?

**Write a children's story about Sainath's campaign to collect plastic bags and electronics at his school.** Show his journey from the time he learned about Dr. Jane Goodall. Imagine how he connected her story with his own life, his family's trip to India, and how he became more aware of the problem of plastic

pollution. Make sure you depict him creating and advancing his project step by step, starting with collecting plastic bags and electronics, and show how this was the seed for greater change.

**Choose one environmentalist you admire.** What is or was their cause? Create a digital campaign designed to educate people about this cause. What practices are making the problem worse? What can we all do to help mitigate (or even solve!) the problem? Where and how can people get involved in the solution? Your campaign must include written posts (for the digital platform of your choice) as well as video and graphics.

## STEM Activities

**Watch this [video on plastic pollution](#)<sup>1</sup>.** Using the information given in the video about how much plastic gets into the ocean every year, create a graph that shows the accumulation of plastic in the ocean over time. Use 1930 as the year of “zero” plastic in the ocean (this was the decade when mass production of plastic began). Then use this graph to predict how much plastic will be in the oceans by the year 2050 if plastic pollution continues at the current rate.

**In this [activity](#)<sup>2</sup>,** learn about how ocean currents work, and analyze marine debris data to predict where the debris will end up, based on local currents.

**In teams, use [Seaperch resources](#)<sup>3</sup> to design and build an underwater remotely-operated vehicle.** Use the engineering design process to add additional functionality to the robot, such as the ability to see or grab objects.

**Sainath is a member of [Dr. Jane Goodall Institute’s Roots & Shoots program](#)<sup>4</sup>.** Dr. Goodall, known for her work with chimpanzees, is also an advocate for sustainability and climate change action. Find out about one way that Jane Goodall’s work has impacted the world (CO2 emission levels, support for environmental organizations, etc). What would these numbers look like without her contributions?

## Sustainability Innovations

**In addition to Sainath’s innovations to assist with the problem of plastic pollution, many individuals within the industry have created robotic advancements to solve sustainable problems.** In this [article](#)<sup>5</sup>, robotics assistance in six different sectors is highlighted, with strategies to continue to improve sustainability in business.

**Plastic pollution has been Sainath’s main focus, but sustainable agriculture has also developed extensively with the use of robotics.** The [Robotics Industry Association](#)<sup>6</sup> highlights innovations and the use of AI in the cultivation of sustainable agriculture.

**Sainath’s project is one of the many highlights of sustainability innovations in the UAE.** Abu Dhabi hosts an annual sustainability week that awarded Eco Wave Power the Global Innovation Award 2021 in the “Life Under Water” category. Learn more about Eco Wave Power’s ability to improve wave energy [here](#)<sup>7</sup>.

## Sustainability Career Pathways

**Roboticist.** If you love the ocean (and robots), perhaps you should be a roboticist. Along with Sainath’s M-bot, roboticists are designing autonomous underwater vehicles that will be the future of ocean exploration, aquaculture, and coral restoration--a sector of the Blue Economy that is growing, and that is lacking qualified employees. Even if you don’t like oceans, there are dozens of fields in

which roboticists are needed. Interested? [Learn more about entering the field of robotics here](#)<sup>8</sup>.

**Recycling Industry.** Americans produce more than [290 million tons of waste each year](#),<sup>9</sup> about a quarter of which is recycled. Recycling is a big business: drivers, sorters, mechanics, technicians, and plant managers are all needed. It's not a "pretty" job, but it's one you can be pretty proud of. After all, one of the best ways to prevent plastic pollution is making sure it is recycled and made into new products. [This article gives a great overview of the recycling industry](#)<sup>10</sup>.

**Conservationist.** Like Jane Goodall, you too could be a conservationist, helping to preserve and protect wildlife habitats and their many rare and awe-inspiring wildlife inhabitants. Conservationists play many different roles: as advocates, liaisons with governments and affected communities, managers, fundraisers, and so much more. This witty essay looks at the [12 different types of conservationist](#)<sup>11</sup> you could be. And this [article gives a more thorough introduction to the field](#)<sup>12</sup>.

**Designer in the Circular Economy.** Recognizing that waste is a significant cost to companies and to the planet, a whole new generation of designers is creating new things that can be fully dismantled—reusing the long-lived parts, recycling the worn parts, and enabling the services that come from goods without the toxic disposability often designed into our products. For example, while most phones can't be easily recycled or repaired (and are instead designed to have a lifespan of only a few years) Fairphone is designed for long life, and can be completely dismantled and various parts replaced if they break. Why not help design goods that have long lives and that at the end of their lives can be fed, with zero waste, into the next generation of products? [Learn more about the circular economy, and get inspired here](#)<sup>13</sup>.

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1 <https://www.calacademy.org/educators/preventing-plastic-pollution>

2 <https://ocean.si.edu/sites/default/files/2020-11/baydriftlesson.pdf>

3 <https://seaperch.org/resources/build/>

4 <https://www.rootsandshoots.org/>

5 <https://www.allerin.com/blog/how-green-robots-are-helping-with-environmental-sustainability>

6 <https://www.automate.org/industry-insights/cultivating-robotics-and-ai-for-sustainable-agriculture>

7 <https://www.ecowavepower.com/>

8 <https://www.northeastern.edu/graduate/blog/what-does-a-roboticist-do/>

9 <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials>

10 <https://www.bls.gov/green/recycling/>

11 <http://www.jamesborrell.com/the-12-types-of-conservation-career-and-how-to-choose-which-one-is-for-you/>

12 <https://www.thebalancecareers.com/conservationist-526002>

13 <https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview>

