

The Consciousness about global warming through RoboCupJunior Activities

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Abstract

Although many protocols have been adopted for global warming, we can not see enough results. It is necessary to have more people understand the current state of the earth. It is also necessary to develop technology considering the prevention of global warming. This is one possible solution for "Sustainable Earth". I made 5 robots based on endangered animals to appeal to people about the impact of global warming. And, through RoboCupJunior activity, I tried to raise everyone's consciousness of global warming prevention.

Key Words

Robots, global warming, Consciousness, RoboCupJunior.

1 Introduction

In 1997, the "Kyoto Protocol" was adopted. The protocol ensured the decrease of CO₂ in the air by 2012. Similar to this, many other protocols have been adopted for global warming.

I think most of you do not know about the current state of earth. According to the Japan Center for Climate Change Actions, the concentration of carbon dioxide in the atmosphere is increasing year by year. Earth's temperature is also increasing. The sea level is expected to continue to rise. Moreover, according to the Ministry of Environment in JAPAN, the number of extinct species is also increasing. From these, we can not see any good results. Even if we recognize it as a problem of the current situation, we can not stop our daily conveniences. For example, it is impossible to stop driving cars and also stop using electricity immediately.

However, one possible solution is "Sustainable Development". We need to do development that satisfies the desires of future generations while also satisfying the desires of the modern age. To do so, it is necessary to have more people understand the current state of the earth. It is also necessary to plan a development considering the prevention of global warming. To take an action, I made robots based on endangered animals to appeal to people about the impact of global warming. Through Robo Cup Junior activity, I tried to raise everyone's awareness of global warming prevention.

2 Development and Research

I made five cute robots that mimic the characteristics and movements of each animals. These

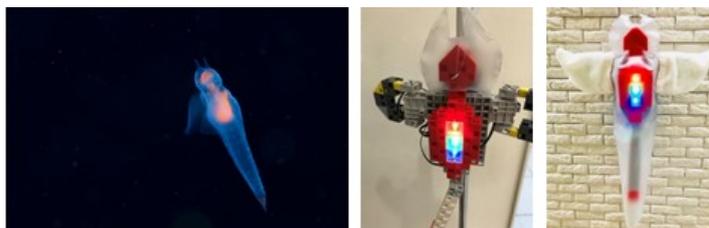
animals live in the Antarctic and actually connect with the food chain. At first, I decided to make a Clione which is a sea slug living in the bottom of the sea and the idea came from discussion at Girls Art Project community on June 16th 2018.

Carbon dioxide brings about not only global warming but also global warming in the ocean and promotes "acidification of sea" by blending into the sea. According to the Sankei News, acidification of the sea proceeds from the cold sea, and it is said that in the future Clione's bait, Limachina will be extinct. Therefore, it is said that Cliones which eat only Limachina will lose their food and will be extinct. Since fish also eat Clione, the balance of the food chain may collapse. From this, Clione is said to be a symbol of the beautiful sea. If global warming progresses, these animals may become extinct and we as human also might become extinct too.

2-1 Design

(1) "Clione Robot".

Both hands hover back and forth. In addition to this, I observed Clione's movie and added a movement like a tail which moves right and left.



(2) "Limachina Robot".

I used a drone to express the beauty of floating and made this frame by 3D printer. It was very difficult to make the strong and light frame for a small drone. I tried over and over again, but I needed more than just a 3D printer to make the frame. To solve this problem, I used Japanese traditional paper to reinforce the thin 3D printer frame. Japanese traditional paper is light and strong. So, I could surround the drones' propeller with a high frame. It works for safety during its flight.

It is new collaboration of cutting edge technology and a Japanese traditional hand crafts.



(3) "Parent penguin Robot with a fish".

The child penguin chases the fish following the parent penguin using infrared. I programmed the child penguin to keep a certain distance from the fish. And after a while the child penguin gets lost and starts rolling.



(4) “Child penguin Robot”.

Since the child penguin does not work very well in block programming, I made it workable in C language correctly. In order to make it look like a child penguin, I programmed it to walk while shaking left and right from my observation. A foot cover was attached so as to be easy to receive infrared without being influenced by sunlight.

(5) “Seal Robot”.

The seal watches penguins from behind a drift ice. There are 2 LEDs in right and left eyes and flash in turn. I made a circuit diagram for them. And, I added a resistance to protect LEDs. In addition to this, the seal’s tail moves right and left.



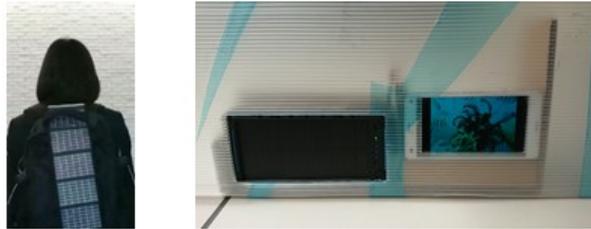
2-2 Human-Robot Interaction

For a human-robot interaction, I used a voice sensor with the Clione robot and programmed to make it react to mainly people’s clap. Moreover, I designed a shiny school uniform which I developed for our team’s exciting stage. It can flash in six different colors synchronized with Clione’s LEDs during our performance. At first, I wasn’t able to turn on LED lights because the voltage provided by Arduino wasn’t enough. I solved this problem by using transistors. In addition to this, I used 100Ω of resistance in order to reduce brightness.



2-3 Sustainability

For our earth, I am using sun light to power some robots. For it, I made a school bag which has a solar panel attached to it. In addition to this, I used recycled mobile phones that also work by using solar power. For studies of sustainability, I attended a discussion about global warming at a college with professors and students who major in the environment. Through it, I understood that using renewable energy is good for our earth.



2-4 safety

At RoboCupJunior Japan open, I attached strings and weights to my programming drone according to the instructions of the Japanese technical committee. It only flew for 10 seconds and flew very low during our team's performance. I took it off many times during the competition in Japan. There was no problem. However, I could not get permission to fly my drone in RoboCupJunior World competition. So, I decided to show only the programmed LED lights of it and a movie that shows flying.

3 Result

My team's OnStage performance at the RoboCupJunior Japan Open aimed to address the issue with the audience. My team performed not only the RoboCupJunior Japan Open, but also at the RoboCupJunior project status meeting in Kanazawa and surveyed people's awareness about global warming. We were interviewed by two local TV stations, and it also appeared in the newspapers. It also illustrates that there is a possibility of having a big influence through RoboCupJunior activities.

I tool a survey with some people about their consciousness of global warming after our team stage. At the RoboCupJunior project status meeting in Kanazawa, there were about 50 people. 14 people answered the questionnaire. Most of them responded that their awareness had increased and that they wanted to protect these animal by looking at these cute robots.

However, the number of people who responded to the questionnaire was small, and I got some advice that I should prepare five choices instead of two choices, yes or no, for each question. I am going to do a larger survey at the science exhibition scheduled to be held in Tokyo in November.



A survey sample written by Japanese & English

アンケート 以下の質問に○をつけて下さい。 Please make a circle the following questions.

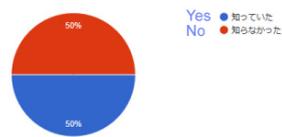
- 1 私達のステージは楽しかったですか。 Did you enjoy our performance?
楽しかった Yes つまらなかった No
- 2 ステージに出てきた生物たちが絶滅の危機にあることを知っていましたか。
Did you know that the animals that came out on stage are in danger of extinction?
知っていた Yes 知らなかった No
- 3 かわいいロボットを見て、これらの生物たちを守りたいと思ったか。
Did you think that you want to protect these animals by looking at these cute robots?
思った Yes 思わなかった No
- 4 地球温暖化に対する意識は高まったか Has your awareness of global warming increased?
高まった Yes 高まらなかった No
- 5 この活動を地球温暖化防止のために続けていくべきだと思うか。
Do you think that this activity should be continued to prevent global warming?
思う Yes 思わない No
- 6 年齢に○をつけて下さい Please make a circle on your age.
10代~20代 Teens ~ 20s 30代~40代 30s ~ 40s 50代~70代 50s ~ 70s

The result of the questionnaire

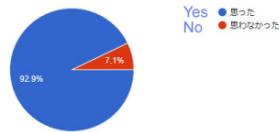
私達のステージは楽しかったですか。
14件の回答 1 Did you enjoy our performance?



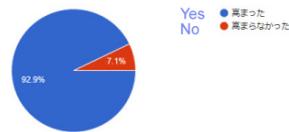
ステージに出てきた生物たちが絶滅の危機にあることを知っていましたか。
14件の回答 2 Did you know that the animals that came out on stage are in danger of extinction?



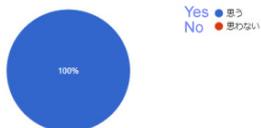
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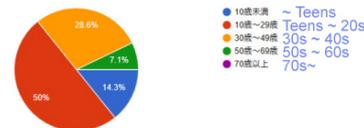
地球温暖化に対する意識は高まったか
14件の回答 4 Has your awareness of global warming increased?



この活動を地球温暖化防止のために続けていくべきだと思うか。
14件の回答 5 Do you think that this activity should be continued to prevent global warming?



あなたのご年齢は
14件の回答 6 Please make a circle on your age.



4 Conclusion

The result from our performance and the survey showed that awareness of the urgent need of global warming prevention has increased through RoboCupJunior activity. I'm going to continue these activities and I hope my challenge will influence the awareness of people even just a little. If everyone decides to do a little more towards sustainable development, we can make a big leap forward towards a sustainable earth. Moreover, I strongly recommend to younger students to challenge themselves by tackling social problems through RoboCupJunior activities, especially through OnStage performance. I am going to continue my activities and now my dream is to hold an eco-tour at the Antarctic with the penguin robots as tour guides by 2050.

Acknowledgments

I would like to thank Professor Kousei Demura, Dept. of Robotics, Kanazawa Institute of Technology and member of Girls Art Project for giving me valuable advices. And, I am grateful to Professor Asami Shikida, Dept. of Knowledge Management, Japan Advanced Institute of Science and Technology, who supports me.

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