An educational cute social garbage robot

Abstract

Simple, unanimated and commons objects at our house, especially the ones that we don't like but we have to use, as garbage, could have a different design to more attractive. The cute trash can will transform a garbage in almost a new member of the family/environment which educates people to properly thrown away trash in the right place. This goal was achieved through physical and psychological methods as a cute design and a manipulation behavior. This robot can be used as an example for future developments which wants to improve the design and their programming. Test weren't made, however the acceptance of its simple function and design was approved by most of people which had a fast interaction with it.

1.Introduction

The vision from robots as an engineering value[1] is not the only way humans look to them anymore. Robots along the years achieve big transformations, from robots that repeatedly performed the same dangerous tasks from cars industries to robots that interacts with people understanding and responding to human behaviors.

The second case brought a new research in this field: how humans respond to robots and how this relationship can change our behavior with them in a physiologic way. This is called Complex Interactives System (CIS), and is based upon three basic principles: interactivity, equifinality, and multimodality[2]. Now the new challenge is to create a robot that can interacts with humans and pleased them at the same time, creating a bond with us.

That's is the goal of this research. The cute garbage can will stimulate people, with different types of methods physics and phycology, to throw away trash on it. According with Heather Knight, even robotics that were constructed to be as just assistants were able to create a bond with people and be looked as companions or artificial partners.

assistant robots, as the cute trash can, can reflect behaviors such as the interactive stimulation robots which consisted in an anthropomorphized appearance or animated form of existing and non-existing beings or objects that are used to entertain or even as a therapy[3] (robotherapy).

[1] Libin, "Person-Robot Interactions from the Robopshychocologists' Point of View"
[2] Libin, "Person-Robot Interactions from the Robopshychocologists' Point of View"
[3] Libin, "Person-Robot Interactions from the Robopshychocologists' Point of View"

The trash will stimulate people with its cuteness and empathy to thrown away trash in the right place.

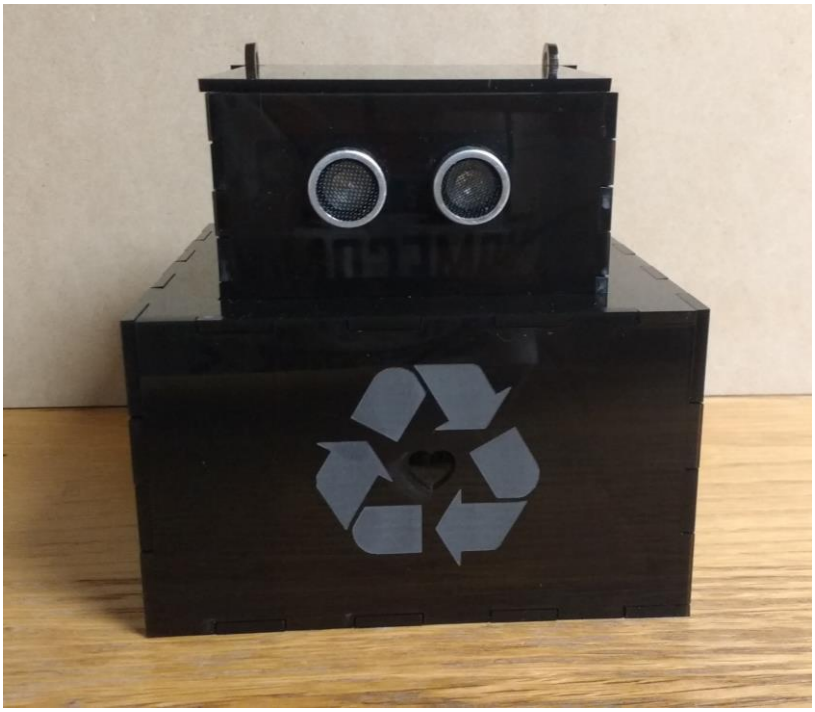

Image 1-Cute trash can

2.0 Concept

2.1Humans and robots

Humans can attach to robots as they attach to people. This bond as the human bond is created with the time we spent with them and with the function that they were made for: social, safe, construction. If they responded well to their function and shared the same experiences while they had them, the bond is bigger.

The trash can as a social robot which are characterized to leverage social interactions and cues in order to attain the internal goals of the robot will meet the cognitive and social needs of human beings.[4] As humans it will have a personality which will change according with how people treat it. Certain kind of behavior are not expected from a robot, however for social robots, as the trash can, have to be made by commons parameters of social expectations, as someone said, if the robots adheres to social expectation for example being charismatic, people will find the interaction enjoyable, feeling empowered and competent.

[4] Reben, “Interactive Physical Agents for Story Gathering”. 19

In this research the cute trash initially will have a shy personality when someone is approaching, becoming more excited as the person come closer. This will be transmitted by lights that have different times in “fade in and fade out” according to the distance between the trash and the person.

However, another trash can’s behavior which the robot incorporated to have a positive and successful expectation is the “human dependent robots”[5] which consists in robots that complete their goals with the help of humans. This situation requires people to me more engaged with the system becoming stronger their relationship compared with independent robots. We can compare this dependence to babies. Adults must take care of babies so they can grow healthy and, however this dependence creates a careful thought about the baby. The way they treat them have different results.

The trash can would just open if someone touch it more than one time, if they touch it less than four times the robot gets angry, if they do cute songs and lights will turn on. These needy and manipulated action are similar with children which responds to a social expectation that humans are used and feel comfortable to deal with it, becoming accept and comfortable robot to interact.

2.2. Robots as educational instruments

Robots are also made as an educational method. One area where social interaction is desirable is “robot as a persuasive machine”[6] The robot is used to change the behavior, feelings or attitudes of humans. This is the case when robots mediate human–human interaction, as in autism therapy.[7]

The trash will be used as an educational instrument because people still don’t thrown away things in garbages, even if this object is not that far away. The cute trash will persuasive people to do the right thing calling their attention with lights and sounds, and hopefully with a repetitive action will make people create a new habit of putting trash on garbages, instead on the floor.

As a social robot, the trash can have a better change to be successful as an educational instrument because will interact repeatedly with people, depending on them to finish its duty. During their interaction while they “help” the trash they are learning at the same time to do the right habit. These action is similar at schools when the teacher begins a sentence and asks the students to finish it, and with repetition the students will remember it. The cute trash can is at the same time a respectful and mindful robot.

[5] Fong, Nourbakhsh, Dautenhahn, “A survey of socially interactive robots”.147
[6] Fong, Nourbakhsh, Dautenhahn, “A survey of socially interactive robots”.147
[7] Fong, Nourbakhsh, Dautenhahn, “A survey of socially interactive robots”.147

2.3 Cute design and behavior

Designing a robot is complex. Human will interact and behavior different with them depending on their physical appearance. The acceptance, the desire and comfortable will change according with its morphology. For example, a robot that resembles a dog will be treated differently (at least initially) than one which is anthropomorphic.[8]

The trash can was specifically created to be similar as a pet. It will stand on a place, like a normal garbage however the action of "open" the lid will just happen if the person pets its "head" more than one time. This action is hidden behind an inoffensive manipulative action that makes people more engaged and comfortable with the robot, because its behavior is similar with pets.

Besides this fact, cute things have a bigger acceptance from humans, independent if it is similar to us or strange. Small eyes, smile, kids voice are things that attract easily people. Our emotional reactions and empathy for cute things is hardwired into our brains through evolution[9] making easier and more effective the interaction between this artificial creature and human. The trash can besides have a pet behavior having a small eyes and a little smile to give a cute appearance to it, making it possible the robot-human interaction "creature-like".[10]

3.0 Materials and Methods

The concept of the research was achieved through different kind of materials which combined made it the perfect cute trash can. The most important component of the robot was the hardware "Arduino Uno" which controlled all the functions from the robot.

These functions were helped by components compatible with Arduino. For example, it was used an ultrasonic sensor which would determine the distance between the robot and the person, and activate another component if some action was made it.

Another components, related with the robot's personality are the RGB which changed color and a buzzer which make happy sounds when it received enough pets.

For the "pet" function, it was used a bottom located in the left side of the head which according with the number of presses would activate the micro servo that makes the lid open and closes.

For the body it was used translucid acrylic so the light from the RGB could pass Through the material and the little heart open. The ultrasonic sensor was used as the eyes.

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[8] Reben, "Interactive Physical Agents for Story Gathering". 19

[9] Reben, "Interactive Physical Agents for Story Gathering". 28

[10] Fong, Nourbakhsh, Dautenhahn, "A survey of socially interactive robots".147

4.0 Outcomes what was the result

When someone is approaching, the cute robot will calculate the distance between the person and turn on the RGB -fade in and fade out- with the blue color. The “fade in and fade out” becomes faster when the distance is smaller, like it is excited. The lights turn off when the distance is too close.

To open the lid the person will need to press the button more than four times. For each press, less than four times, the robot turns on the RGB blinking with the red color. When it’s more than four the buzzer turns on, the servos move opening the lid and the RGB with green color fades in and fades out. After some seconds the lid is closed by the servo.

Image 2-Blue RGB on

5.Conclusion

Robots can easily fascinate people, its mechanic, movements and appearance make us thing how a complex code system with just numbers and letters can give life to an artificial creature. More interesting is how we create a one side relationship with them.

The bond created between a relationship of the cute trash can with humans provided an educational habitat which was increased by methods of dependence, manipulation, appearance, sounds and light. All these topics are essential to make a social assistant robot successful in our complex environment with artificial machines.

The trash can could have a more complex system to be more effective and attractive, for example being more similar to a pet, walking and respond to human voices, or having a system which blocks someone to open the lid without pet it. However, for the main purpose of this research the results were acceptable.

Thus, this research proved that it is possible to transform a simple unanimated object at our house which has a dirty function that make people disliked to touch many times, into an educational cute pet that people enjoy to interact with it.

6.Sources

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