



# Using Companion Robots for Research and Education

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Sustainability, Technology and Education 2019  
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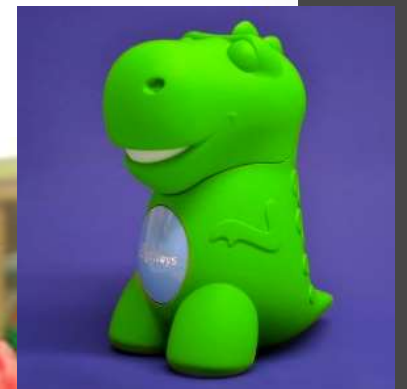
# Smart Toy Privacy Study in Canada, Argentina and Brazil

# Humanoid Toy

- A smart anthropomorphism toy is defined as a device consisting of a physical toy component in the humanoid form that connects to a computing system through networking and sensory technologies to enhance the functionality of a traditional toy.
- Many studies found out that anthropomorphic designs resulted in greater user engagement. Children trusted such designs serve a good purpose and felt less anxious about privacy.

# CogniToys Dinosaur [2016]

- Internet connected educational toys
- IBM Watson's knowledge Elemental Path's "friendgine" which is a kid-friendly database
- Using an Android or iOS app, parents connect CogniToys to their home's Wi-Fi.



# Google Toy Patent



US 20150138333A1

(19) **United States**

(12) **Patent Application Publication**  
DeVaul et al.

(10) Pub. No.: **US 2015/0138333 A1**  
(43) Pub. Date: **May 21, 2015**

(54) **AGENT INTERFACES FOR INTERACTIVE ELECTRONICS THAT SUPPORT SOCIAL CUES**

*H04N 5/225* (2006.01)  
*G06K 9/00* (2006.01)  
*H04R 1/32* (2006.01)

(75) Inventors: **Richard Wayne DeVaul**, Mountain View, CA (US); **Daniel Aminzade**, Mountain View, CA (US)

(52) **U.S. CL.**  
CPC *G06F 3/013* (2013.01); *H04R 1/32* (2013.01);  
*H04N 5/2257* (2013.01); *G06F 3/16* (2013.01);  
*G06K 9/00288* (2013.01)

(73) Assignee: **Google Inc.**, Mountain View, CA (US)

(21) Appl. No.: **13/407,159**

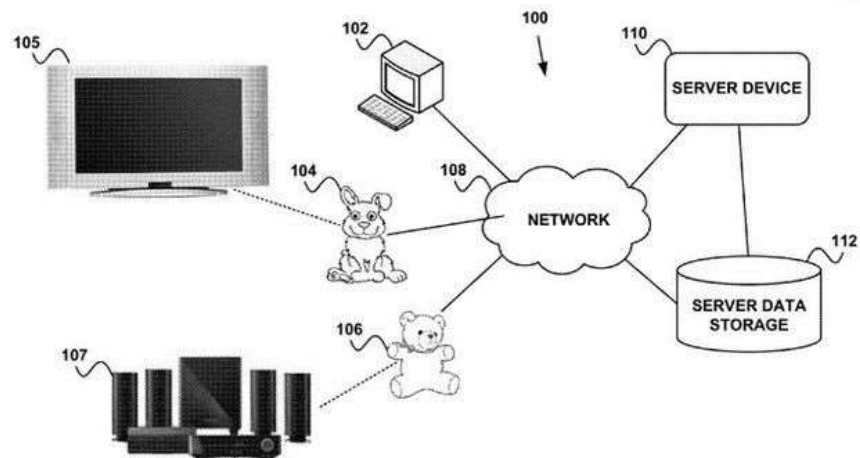
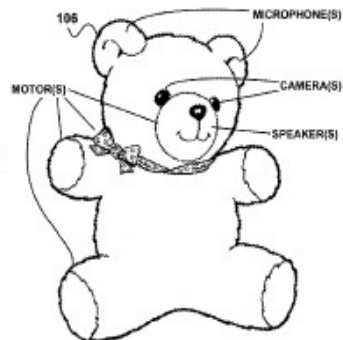
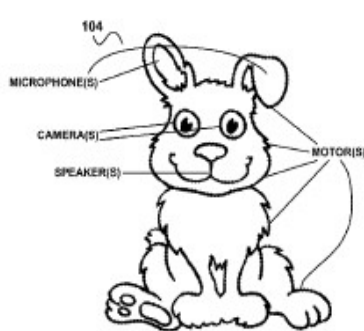
(22) Filed: **Feb. 28, 2012**

**Publication Classification**

(51) **Int. Cl.**  
*A63H 33/00* (2006.01)  
*G06F 3/01* (2006.01)  
*G06F 3/16* (2006.01)

(57) **ABSTRACT**

An anthropomorphic device, perhaps in the form factor of a doll or toy, may be configured to control one or more media devices. Upon reception or a detection of a social cue, such as movement and/or a spoken word or phrase, the anthropomorphic device may aim its gaze at the source of the social cue. In response to receiving a voice command, the anthropomorphic device may interpret the voice command and map it to a media device command. Then, the anthropomorphic device may transmit the media device command to a media device, instructing the media device to change state.



US PATENT OFFICE

# Google Toy is Ted?



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## Google patents creepy internet 'toys' that could control your home, listen in on conversations and spy on children

- Patent suggests Teddy and rabbit-shaped machines would constantly listen for commands, and turn their heads and talk in response
- Toys containing microphones and cameras could record conversations
- Would be able to control appliances like TVs, music systems and lights
- Devices may never go to market but privacy campaigners are concerned

By SARAH GRIFFITHS FOR MAILONLINE

PUBLISHED: 16:47 GMT, 22 May 2015 | UPDATED: 17:28 GMT, 22 May 2015

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Buzz Lightyear and Woody may have been able to switch lights on and off and drive remote controlled cars, but toys of the future could take control of all sorts of household appliances and

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## Google Patents Toys That Watch and Listen to Your Kids

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## Google Toy Patent Will Give You Nightmares

BY CHLOE ALBANESUS MAY 22, 2015 02:22PM EST 1 COMMENT

Google wants to patent technology that would turn toys into internet-connected controllers of gadgets in the home.

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### Technology

## Google patents 'creepy' internet toys to run the home

By Leo Kellon Technology desk editor

22 May 2015 | Technology

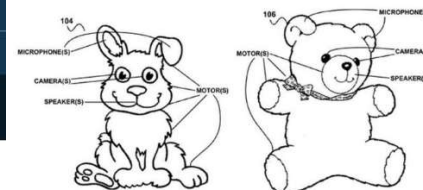
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### Features & Analysis



Fresh brew Breeding a new plant to save coffee from extinction



Google's patent shows a toy rabbit and teddy bear but says that other child-friendly designs would be possible.

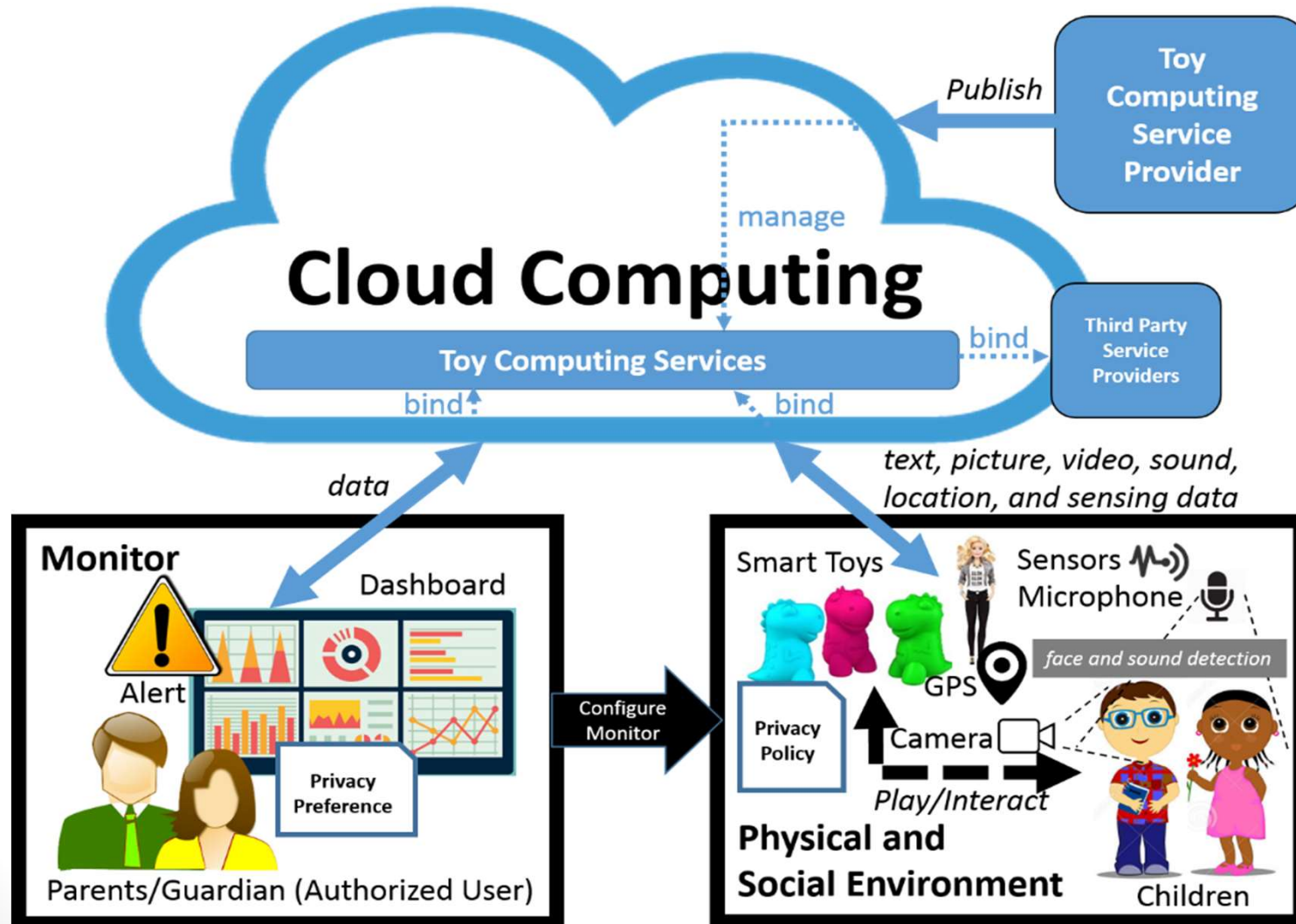
# Hello Barbie [2015]

- *“Hello Barbie can have real back-and-forth dialogue with a child about career goals, interests, favorite ice cream flavors and listen (and tell) jokes.”*
- *“But Mattel makes it clear that it never asks about personal information, like where a child lives or even their name.”*
  - Ref: Samantha Murphy Kelly, “The new Hello Barbie is like Siri trapped in a doll's body, MashableAsia, September 15, 2015.





# Conceptual Model of Toy Computing Environment



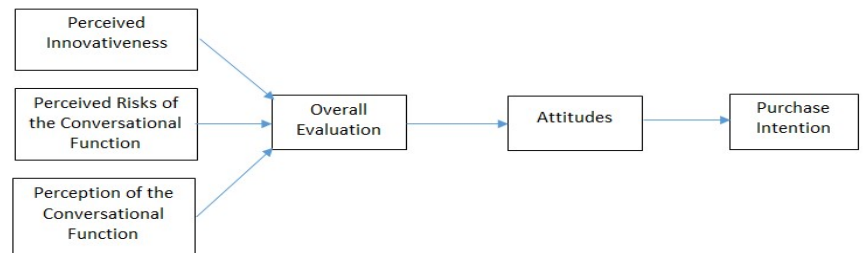
**Hello Barbie Research Sheet** Please circle your answer for each question.

- Have you ever heard of or seen Hello Barbie before this talk?  
(No) \_\_\_\_\_  
(Yes) Where: \_\_\_\_\_
- Based on the information you received earlier, what was on your mind when you thought about the Hello Barbie?  
Please write a few lines to describe what came to your mind, such as its pros and cons. \_\_\_\_\_
- How interested will you be in buying a Hello Barbie for yourself or a child?  
Not at all interested \_\_\_\_\_ Extremely interested \_\_\_\_\_  
1 2 3 4 5
- What is the probability that you will buy a Hello Barbie for yourself or a child?  
Not at all probable \_\_\_\_\_ Extremely probable \_\_\_\_\_  
1 2 3 4 5
- To what extent does the conversation function of Hello Barbie make sense to you?  
Make no sense at all \_\_\_\_\_ Make perfect sense \_\_\_\_\_  
1 2 3 4 5
- To what extent do you like the conversation function of Hello Barbie?  
Strongly dislike \_\_\_\_\_ Strongly like \_\_\_\_\_  
1 2 3 4 5
- Please evaluate how much you agree with the following statement: "Children between the age of 7 and 9 will enjoy playing with the Hello Barbie."  
Strongly disagree \_\_\_\_\_ Strongly agree \_\_\_\_\_  
1 2 3 4 5
- Please evaluate how much you agree with the following statement: "Children between the age of 10 and 13 will enjoy playing with the Hello Barbie."  
Strongly disagree \_\_\_\_\_ Strongly agree \_\_\_\_\_  
1 2 3 4 5
- I am afraid the conversation function including the recording function of Hello Barbie may violate the user's personal privacy.  
Strongly disagree \_\_\_\_\_ Strongly agree \_\_\_\_\_  
1 2 3 4 5
- I am worried that the conversation function including the recording function of Hello Barbie may gather too much of the user's information.  
Strongly disagree \_\_\_\_\_ Strongly agree \_\_\_\_\_  
1 2 3 4 5
- I am afraid that the conversation function including the recording function of Hello Barbie may lead to some potential data security issues in the future.  
Strongly disagree \_\_\_\_\_ Strongly agree \_\_\_\_\_  
1 2 3 4 5
- Do you perceive any other children safety issues with the Hello Barbie?  
(No) \_\_\_\_\_  
(Yes) Please write down the issues you perceive: \_\_\_\_\_
- Please provide an overall evaluation of Hello Barbie after considering its benefits and potential risks: \_\_\_\_\_

Hung, Fantinato, and Jiang Page 1

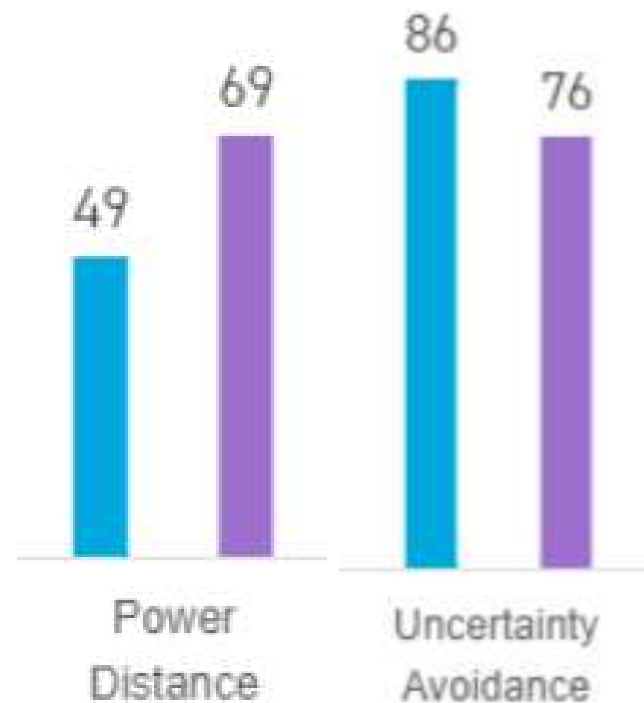
- I like to buy new and different things.  
Strongly disagree \_\_\_\_\_ Strongly agree \_\_\_\_\_  
1 2 3 4 5
- What's your major?  
A) Information Systems (Graduate)  
B) Information Systems (Post-graduate)  
C) Other, Please specify: \_\_\_\_\_
- How long have you been using a smart phone (e.g., iPhone, Samsung Galaxy, etc.)?  
A) 0-3 year  
B) 4-6 years  
C) 7-10 years  
D) 10+ years
- Which operating system is running on your smart phone?  
A) I don't own a smart phone  
B) Apple iOS  
C) Android  
D) Windows  
E) Other, Please specify: \_\_\_\_\_
- Have you ever tried any speech recognition app on your smart phone before?  
(No) Please skip the questions 21.1 and 21.2.  
(Yes) Please inform the name of the app: \_\_\_\_\_
- How often do you use this speech recognition app?  
Rarely \_\_\_\_\_ Always \_\_\_\_\_  
1 2 3 4 5
- Do you have any concern when using this speech recognition app?  
(No) \_\_\_\_\_  
(Yes) Please write down your concerns: \_\_\_\_\_ Please tell us more about yourself.  
Your Age: \_\_\_\_\_  
Your Gender: \_\_\_\_\_  
How many children do you have? \_\_\_\_\_

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Argentina \*

Brazil \*



Adapted from: <https://geert-hofstede.com/countries.html>

Note:

- The Power Distance dimension expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally.
- The Uncertainty Avoidance dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity.

# Privacy Engine Interface

- Mockup interface for parents/guardians to use as an initial setup to configure preferences and create policy rules
- Initial setup of a toy computing application

## Manage Privacy Preferences

Welcome to the online interface for managing privacy preferences for your child. Click below to begin the setup.

Start Setup

### Manage Privacy Preferences

Home > Profile > **Privacy Rules** > Review & Finish

Now you can create privacy rules to manage how your child's data is shared.

**Create a New Rule**  
Select a method for creating your new rule:

Template    New Rule

Back    Next

### Manage Privacy Preferences

Home > **Profile** > Privacy Rules > Review & Finish

**Parent/Guardian Contact Details**

First Name:

Last Name:

Email:

**Child**

You may opt to receive email updates when your child's data is collected. Please indicate below if you wish to receive updates.

Yes, I wish to receive updates.  
 No, please do not send updates.

Review Privacy Policy

Back    Next

### Manage Privacy Preferences

Home > Profile > **Privacy Rules** > Review & Finish

**Child Information**

Please provide your child's name:

Child's First Name:

By checking the box below, you agree that the user is a child under the age of 13 years old. You are the child's parent/guardian and are responsible for their privacy. You are claiming ownership over your child's data that is collected through the mobile device and are acting on the child's behalf to protect his/her data.

I agree

Review Privacy Policy

Back    Next

# FBI: 'Smart toys' could be a privacy risk for kids

Posted: Dec 12, 2017 11:51 PM TST

Updated: Dec 12, 2017 11:51 PM TST

George DuMontier, Digital Producer, Meredith [CONNECT](#)

[The FBI Internet Crime Complaint Center](#) is encouraging parents to be aware of Internet-connected toys. These smart toys often have sensors like microphones, cameras, or GPS technology. And because the toys connect to the internet, the companies could be storing sensitive and private data about your kids.



The FBI warns that in some cases, "toys with microphones could record and collect conversations within earshot of the device. Information such as the child's name, school, likes and dislikes, and activities may be disclosed through normal conversation with the toy or in the surrounding environment"

The data collected by these toys is likely stored somewhere on a server owned by the toy company, or even a third-party company who manages a specific service, like voice recognition.

Smart toys usually connect directly to your Wi-Fi network by having you input your password, but in some cases, the toy could connect to your smartphone and access the internet via your phone's connection.

Here's what to consider when buying a smart toy:

## Support Consumer Protection

- Do some research looking for security risks. Popular sites for consumer product reviews and cybersecurity research will report any security issues with smart toys.
- Don't connect the toy to untrusted Wi-Fi networks. Public Wi-Fi networks could be rigged to search connected devices for data or insecurities. Keeping the toy on trusted Wi-Fi networks is the way to go.
- Make sure the toy is up to date. Some toys occasionally receive firmware updates and security patches. If your toy has an option to update, make sure you stay updated.
- Turn it off when you're not using it. This is especially important for toys with microphones or cameras. There's no need for the toy to record you all the time, just flip it back on for playtime.

# **What is a Companion (Social/Home) Robot?**

# The Jetsons

- *Back in 1962, when the cartoon The Jetsons first aired on TVs across the nation, everything about it seemed like it came from a very far and distant future.*
- *Did you ever think that the cartoon would have been able to predict so many things about the times to come?*



Adopted from: 7 Ways That 'The Jetsons' Accurately Predicted The Future by Grace Eire  
<https://www.littlethings.com/jetsons-predict-the-future/>

# 1. Flat Screen



Adopted from: 7 Ways That 'The Jetsons' Accurately Predicted The Future by Grace Eire  
<https://www.littlethings.com/jetsons-predict-the-future/>



## 2. The Internet



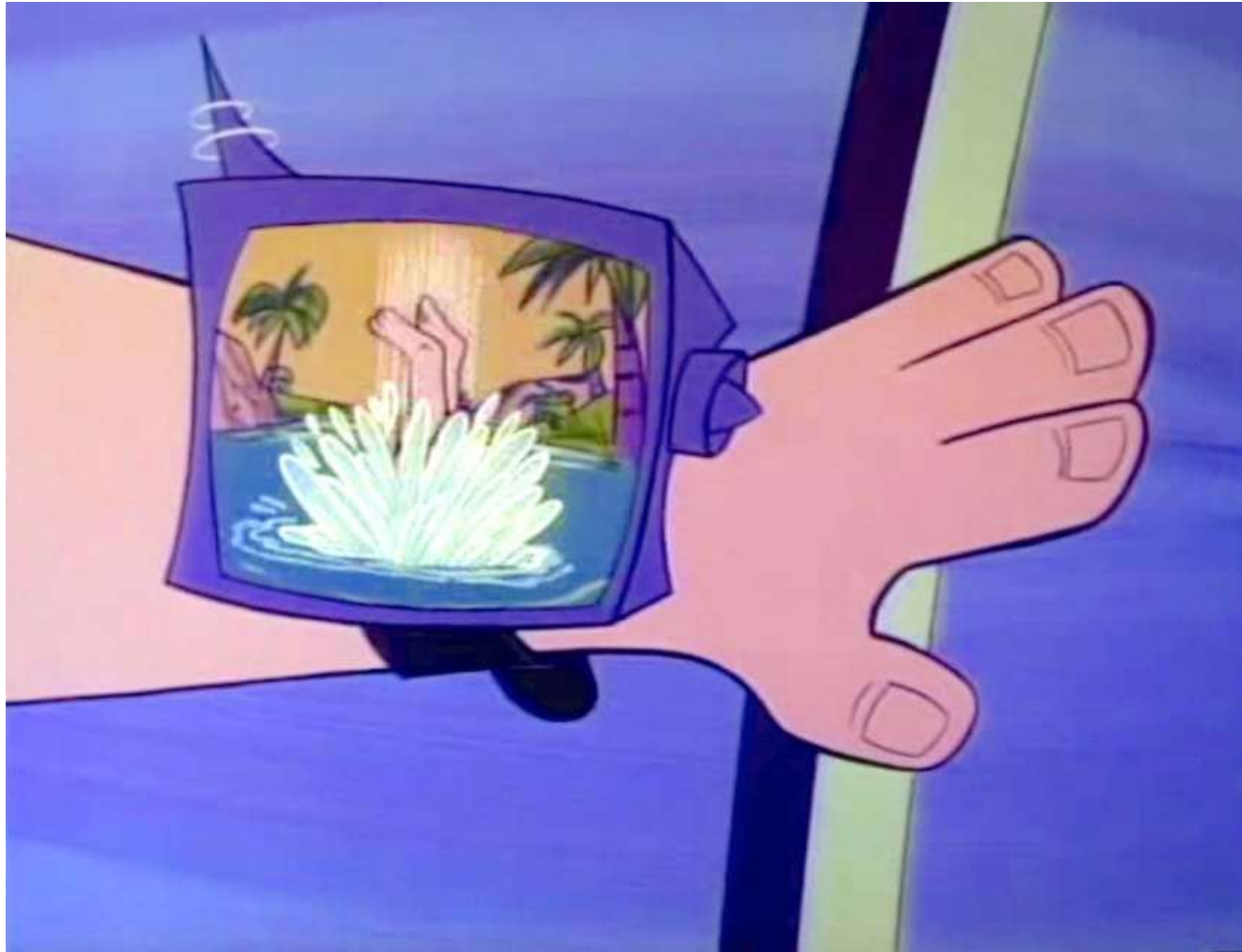
Adopted from: 7 Ways That 'The Jetsons' Accurately Predicted The Future by Grace Eire  
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# 3. Tiny Cameras That Look Inside You



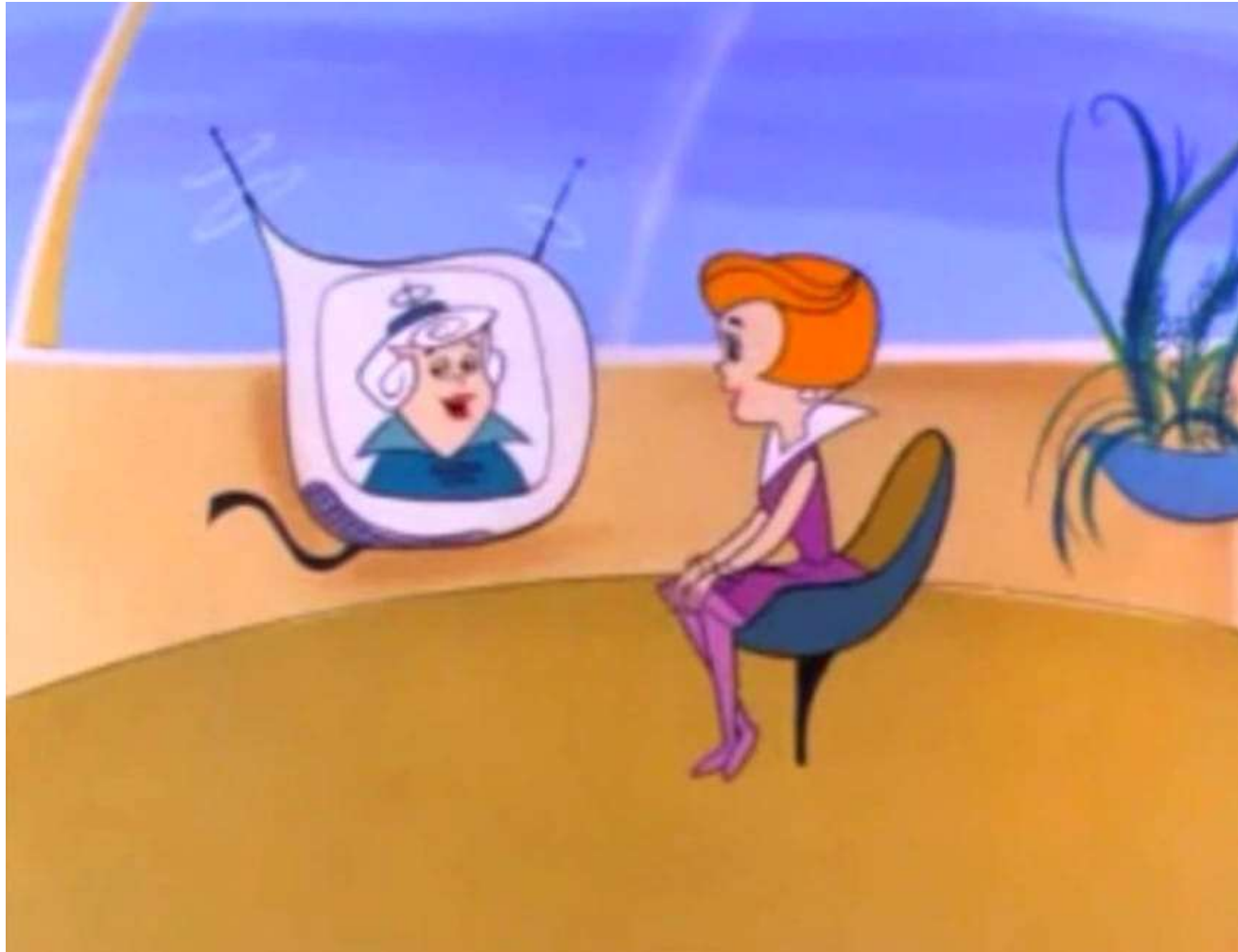
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## 4. Screens You Wear On Your Wrist



Adopted from: 7 Ways That 'The Jetsons' Accurately Predicted The Future by Grace Eire  
<https://www.littlethings.com/jetsons-predict-the-future/>

# 5. Telecommunication



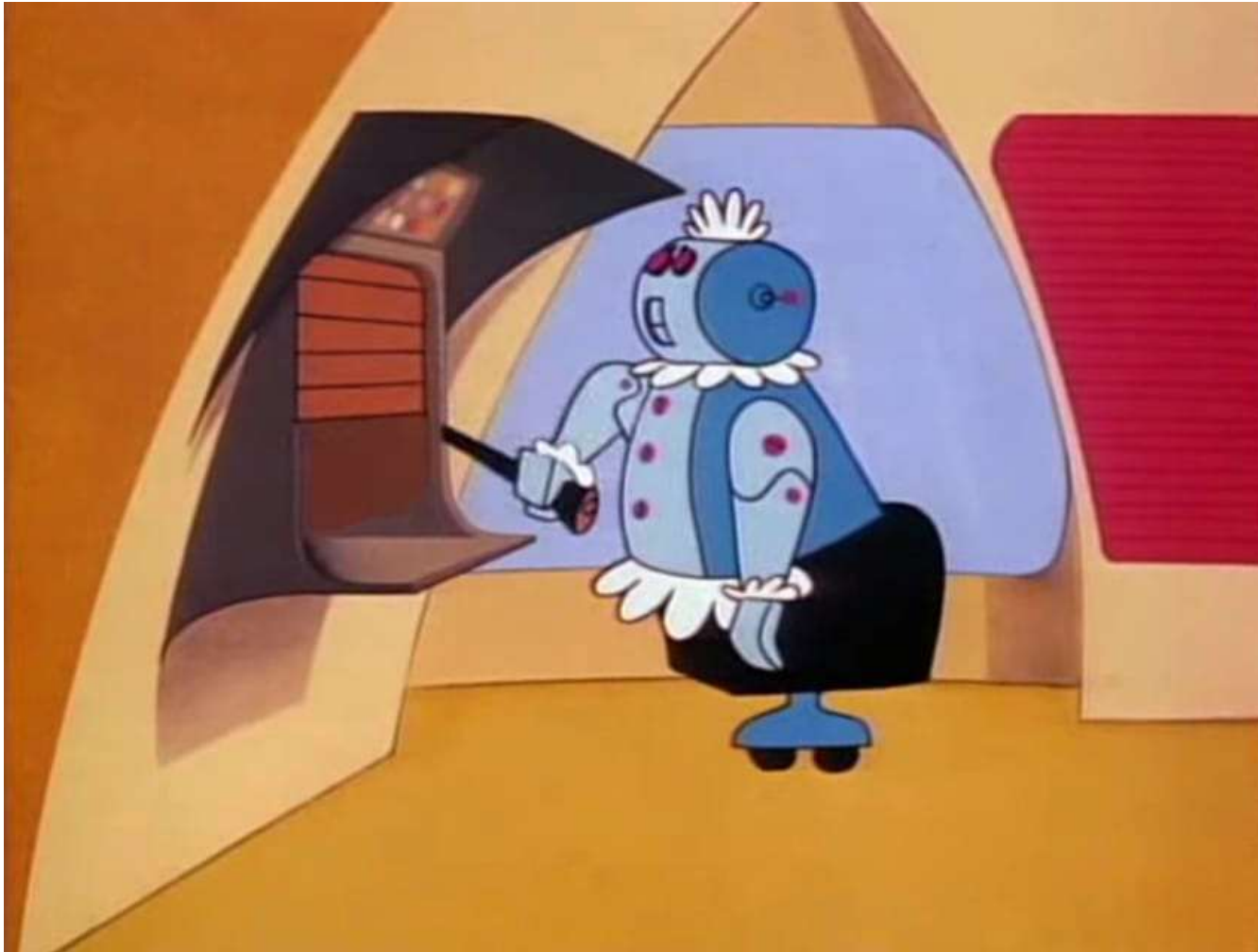
Adopted from: 7 Ways That 'The Jetsons' Accurately Predicted The Future by Grace Eire  
<https://www.littlethings.com/jetsons-predict-the-future/>

## 6. Meals At The Touch Of A Button



Adopted from: 7 Ways That 'The Jetsons' Accurately Predicted The Future by Grace Eire  
<https://www.littlethings.com/jetsons-predict-the-future/>

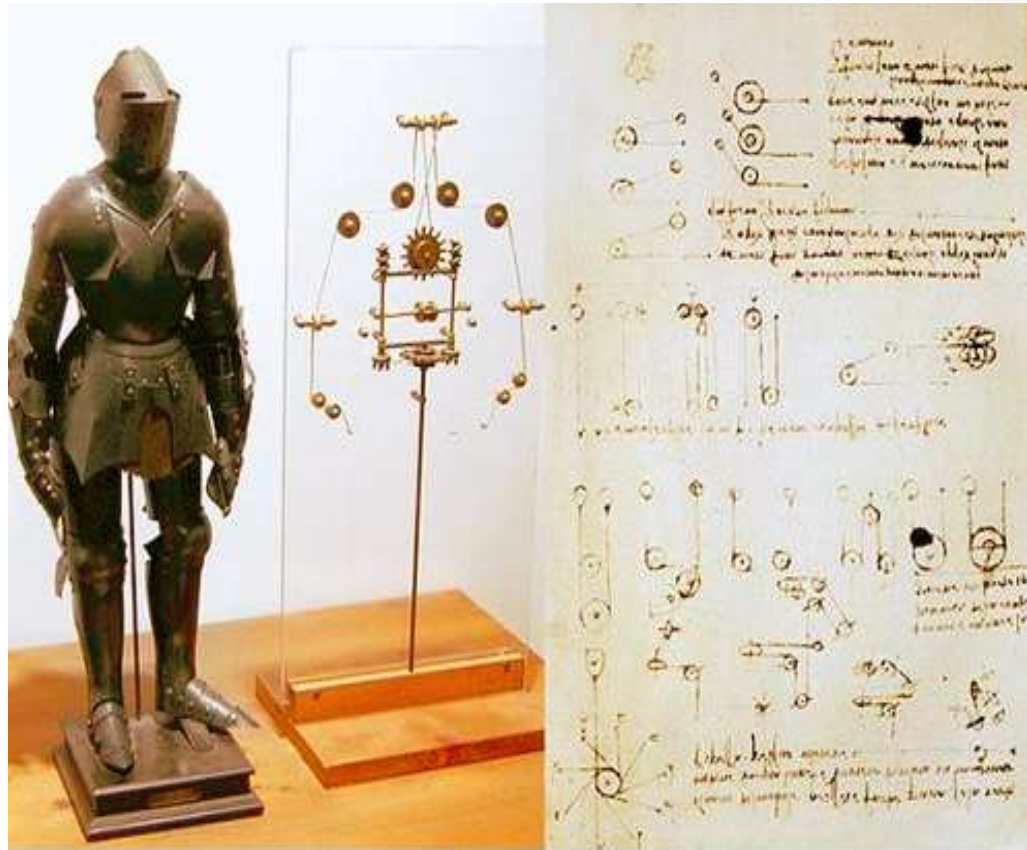
# 7. Helpful Robots Rosie



Adopted from: 7 Ways That 'The Jetsons' Accurately Predicted The Future by Grace Eire  
<https://www.littlethings.com/jetsons-predict-the-future/>

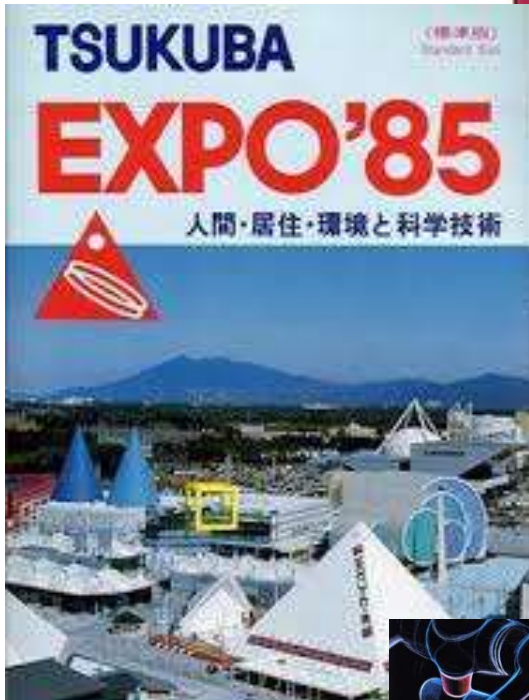
# First Robot in History

- Early recordings of the first domestic robot was made by Leonardo da Vinci (1452-1519).
- It was design to look like a human in the shape of a knight.
- The knight would be controlled by a set of pulley, gears and string.
- The basic functions of the knight would be to mimic human actions such as waving, moving the arms, up and down, etc.
- This was for the purpose of entertainment for the nobles and the courts.



Ref: Gorvett, Zaria. "Future - Leonardo Da Vinci's Lessons in Design Genius."  
BBC News, BBC, 28 July 2016: <https://www.bbc.com/future/story/20160727-leon>

# Japan has a robot culture for long!



3,225 views | Feb 6, 2019, 08:13pm

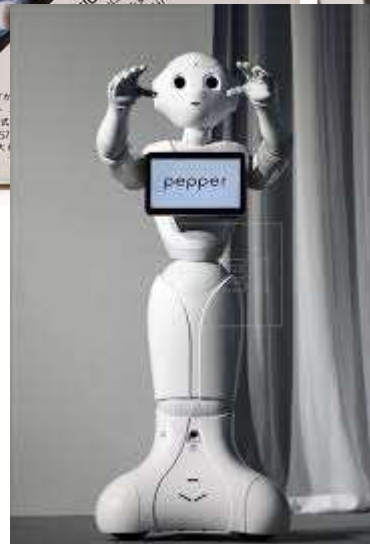
## A Machine That Does Nothing? Cuddly LOVOT May Be The Most Innovative Japanese Robot Yet



Japan BRANDVOICE



2019 Consumer Electronics Show In Las Vegas, LOVOT was named BEST ROBOT of CES The Verge. © GOV OF JAPAN





Technology

# Amazon Has a Top-Secret Plan to Build Home Robots

By [Mark Gurman](#) and [Brad Stone](#)

April 23, 2018, 7:00 AM EDT Updated on April 23, 2018, 11:22 AM EDT

- ▶ Prototypes can navigate from room to room like driverless cars
- ▶ Company hopes to start testing bots in homes later this year

Advertisement 0:12



## TALKING TECH

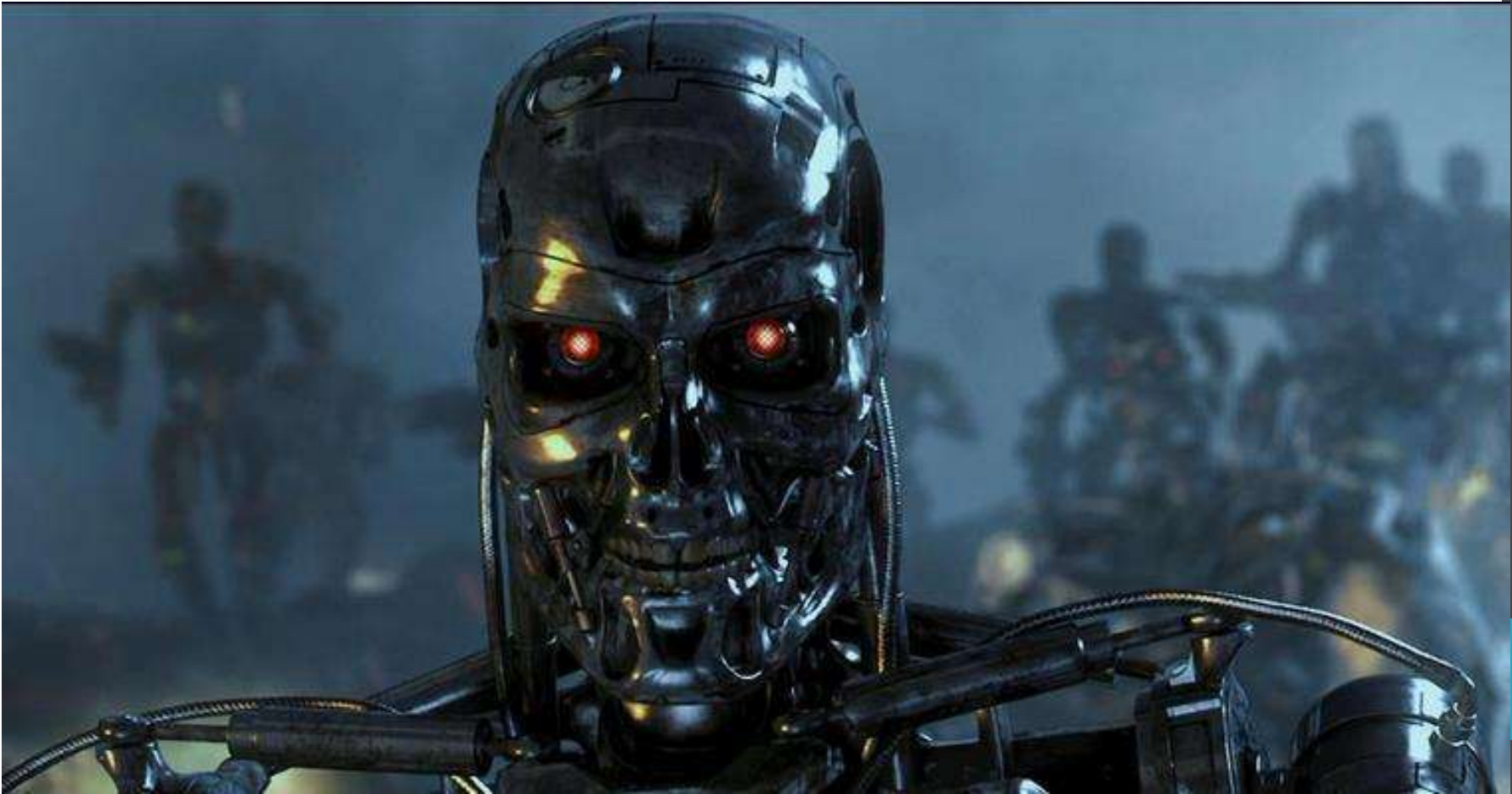
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# Amazon is working on a live-in robot named Vesta, says report

Shelby Fleig Published 2:19 p.m. ET April 23, 2018 | Updated 3:20 p.m. ET April 23, 2018

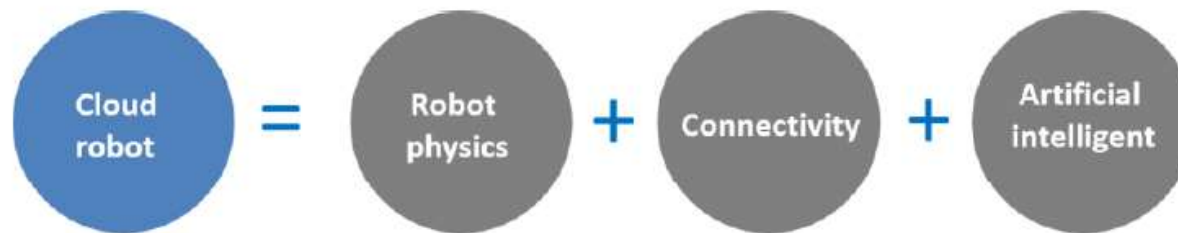


# Robots are bad!



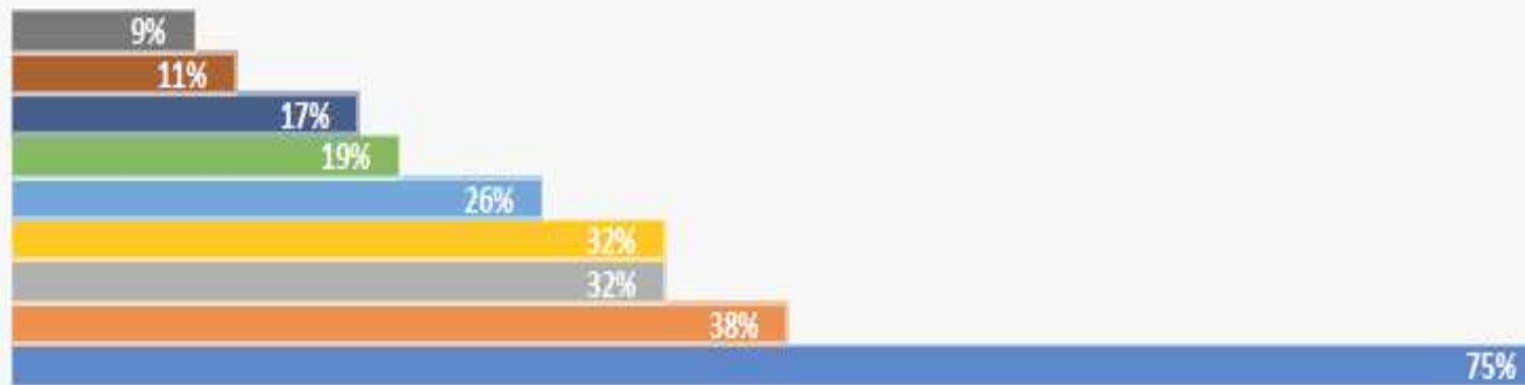
# Cloud Robots

- **Information Sharing:** Many cloud robots can be controlled from one brain, and the brain can accumulate visual, verbal, and environmental data from all connected robots.
- **Offloaded Computation:** Offloading to the cloud data-intensive tasks such as voice and image recognition, voice generation, environmental mapping and motion planning will lower the hardware requirements and power consumption of robots, making them lighter, smaller, and cheaper.
- **Collaboration:** Cloud robots do not need to work alone.



Adopted from: GTI 5G and Cloud Robotics White Paper by GTI, 21-06-2017  
<http://www.gtigroup.org>

# Purchase Reason



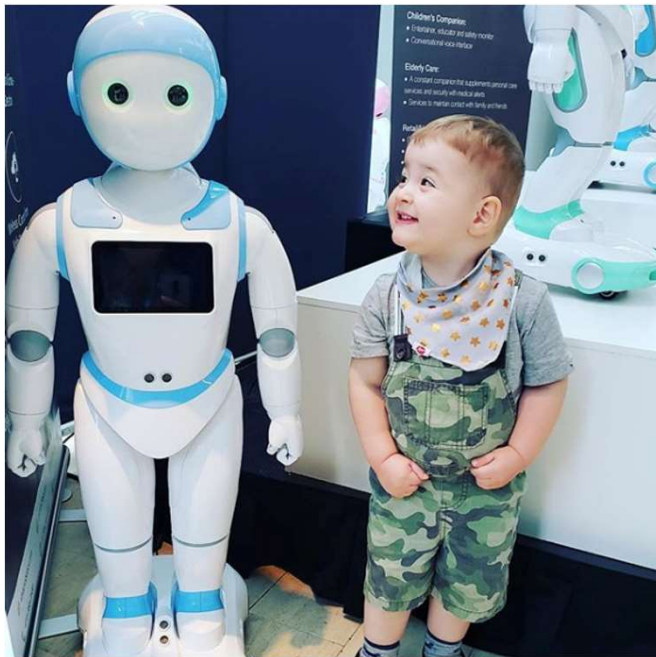
- Other
- Fancy toy
- Pet replacement
- Companion for family
- For coolness factor
- Education tool for child
- Home security
- Extension of electronic devices
- Household chores

## Reasons for purchase a home robot

Adopted from: GTI 5G and Cloud Robotics White Paper by GTI, 21-06-2017  
<http://www.gtigroup.org>

# Human-Robot Interaction (HRI)

- Human-Robot Interactions (HRI) is a study area of understanding, designing, and evaluating robots for use by or with humans.



Ref: Kantharak, K., Somboonchai, C., Tuan, N. T., and Thinh, N. T., "Design and development of service robot based human-robot interaction (HRI)," International Conference on System Science and Engineering, 2017, pp. 293-296

CANADA

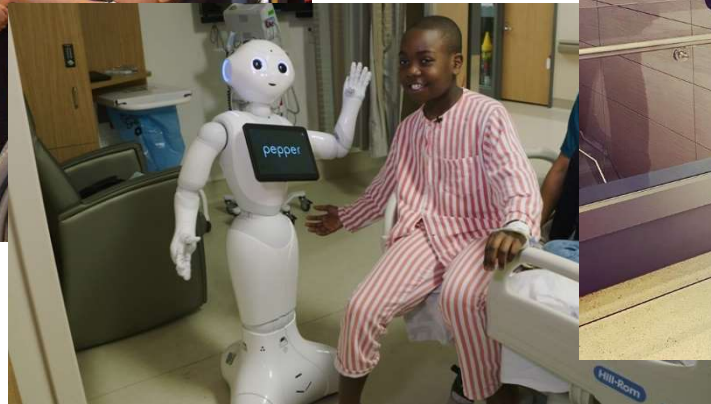
May 8, 2018 8:00 am

# Meet Pepper – Canada’s first emotionally sensitive robot for sick kids



By Aalia Adam

Online Video Journalist Global News





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 **Diana Petrarca**  
@\_DrDi

Meet Zenbo, the sweet talking robot. He thinks I'm 26 and I have a "beautiful smile". 😊



2018-09-13 5:10 PM

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 **Lennart Nacke** shared a post.  
Thursday at 19:52 · 👥

Awesome visit today from Patrick and his students showing their robots.

 **HCI Games Group**  
Thursday at 18:49 · 🌐

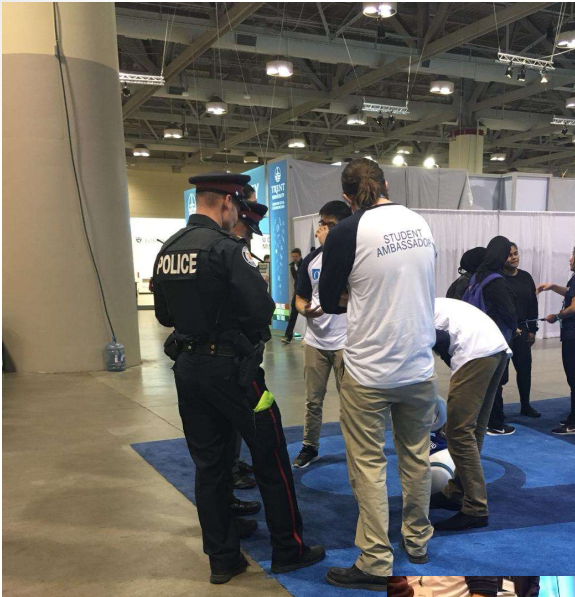
Patrick Hung and his students from UOIT visits **The Games Institute - University of Waterloo.**  
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 An adorable visitor from #UOIT today @GamesInstitute thanks to @uwhci @hcgamesgroup





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Video

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Metro Toronto Convention Centre



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uoit Have you met Zenbo at our OUF booth? Swing by to meet him! #ONTechU #OUF2018

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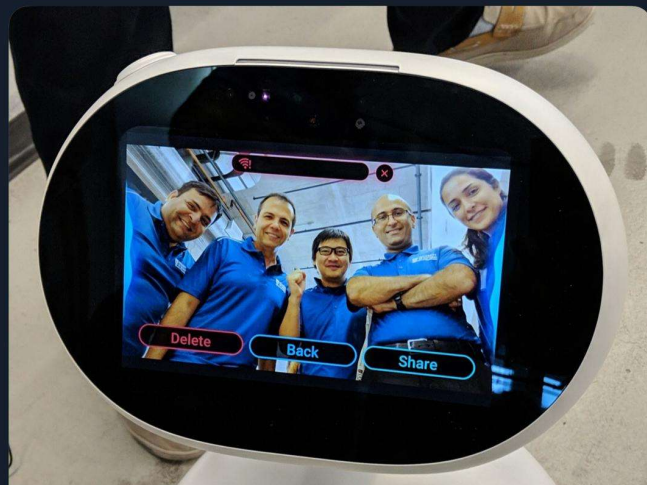


**OUF**  
Ontario Universities' Fair



Silicon Hall  
@SiliconHall

#zenbo taking photo from #feas faculties in @UOIT #ONTechU open house... Visit us in ACE Wind Tunnel and learn more about @uoitEngineering and @StleUoit

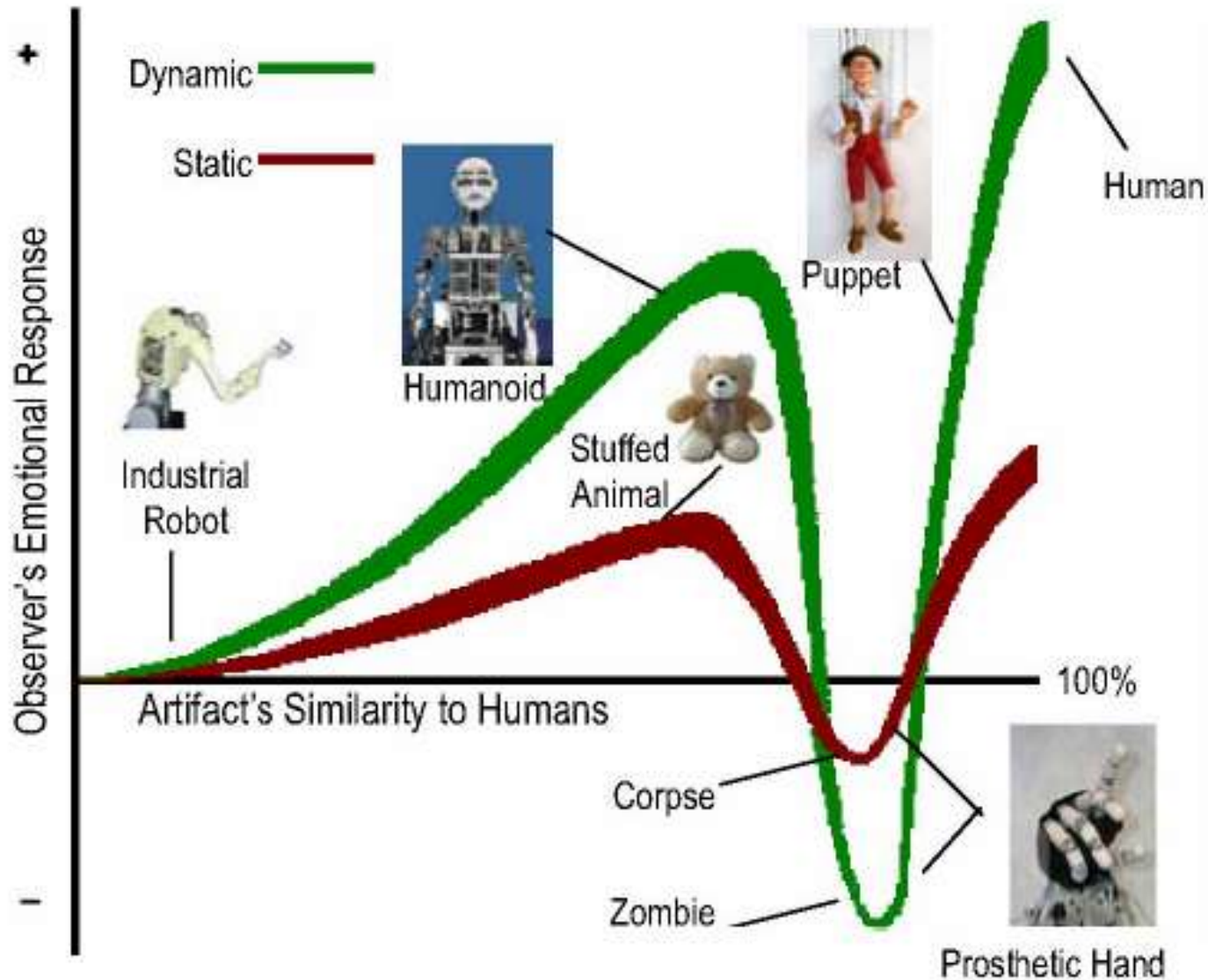


Steven Murphy  
@DrStevenMurphy

Great open house at both downtown and north locations. Wonderful turnout of staff, students and faculty! Come join the @UOIT #ONTechU family! So nice to feel the positive energy in both campus locations. Special shout out to #studentambassadors. 🙏



# The Uncanny Valley



Adapted from:  
M. Mori, K. F. MacDorman, and N. Kageki, "The uncanny valley,"  
Robotics & Automation Magazine, IEEE, vol. 19, no. 2, pp. 98–100, 2012

# AUthentic Robotic Assistant (AURA)

Prof. Ruth Stock-Homburg  
Department of Marketing & Personal Management  
Technische Universität Darmstadt, Germany

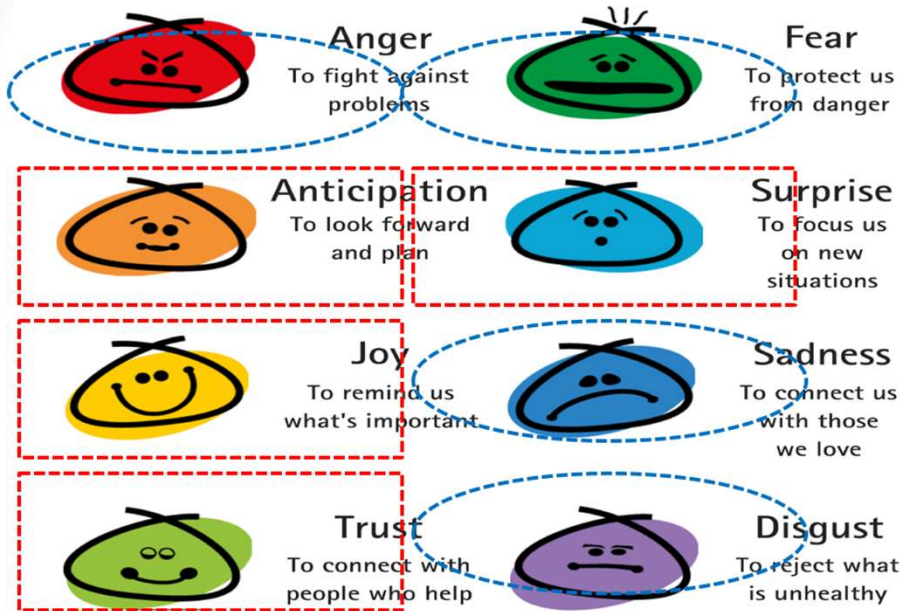


# Emotions

- Emotions are defined as “a strong feeling deriving from one’s circumstances, mood, or relationships with others”.
- When talking about emotions pertaining to social robots, it can be about how people feel about the appearance, the tone, the movement, the interaction, and the communication of the robot.
- For social robots, emotion is crucial as it is one of the biggest design features. In order to be social, it must understand, and express emotions making it more companionable and home friendly.

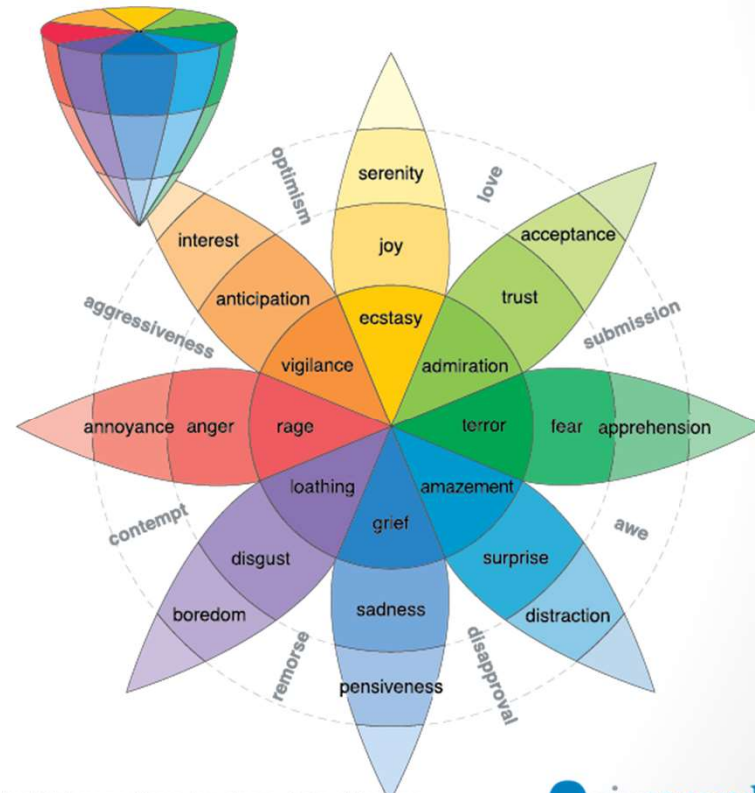
# 8 Basic Emotions

And the purpose of each one



Pessimistic/Negative      Optimistic/Positive

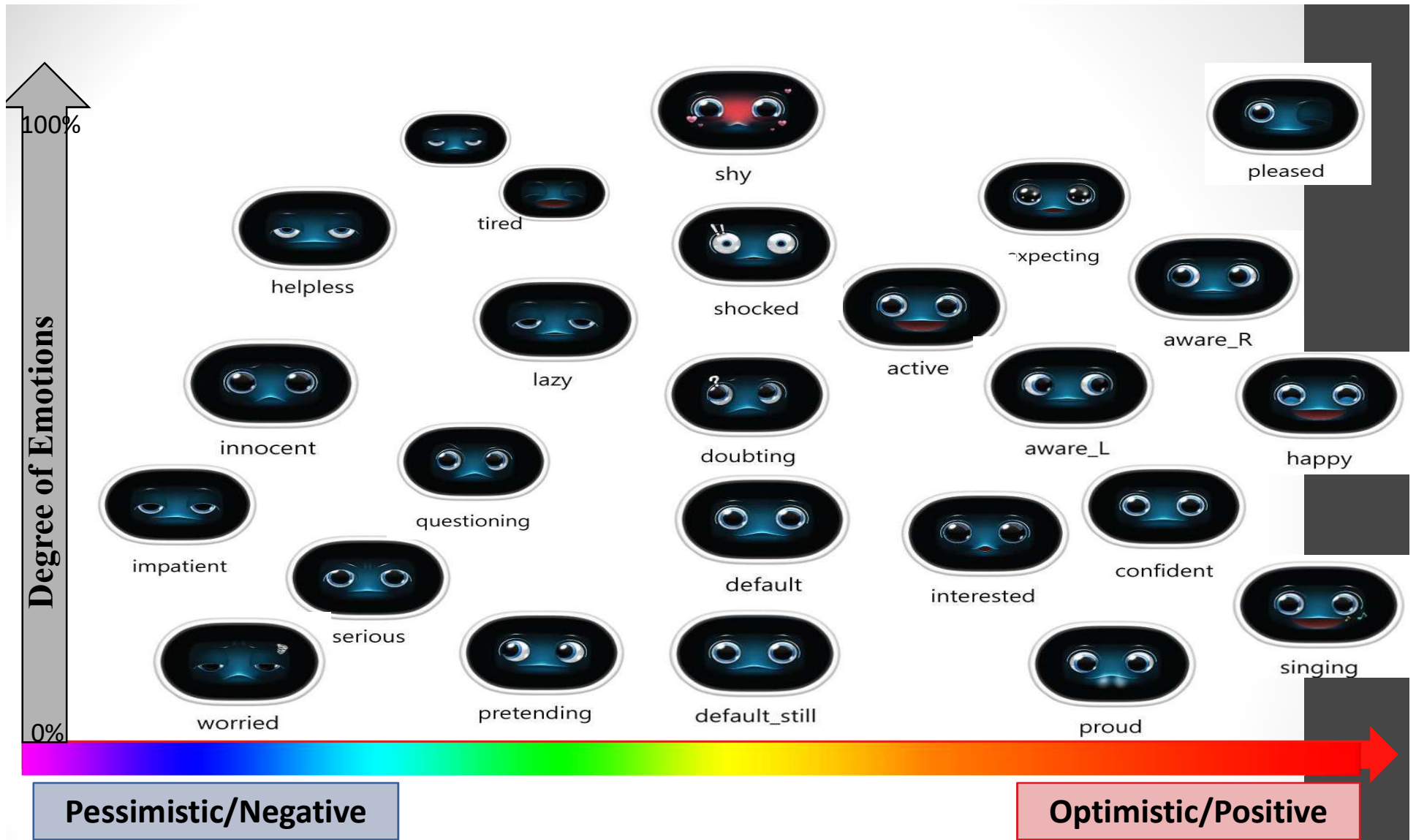
Adapted from: <https://www.6seconds.org/2017/04/27/plutchiks-model-of-emotions/>

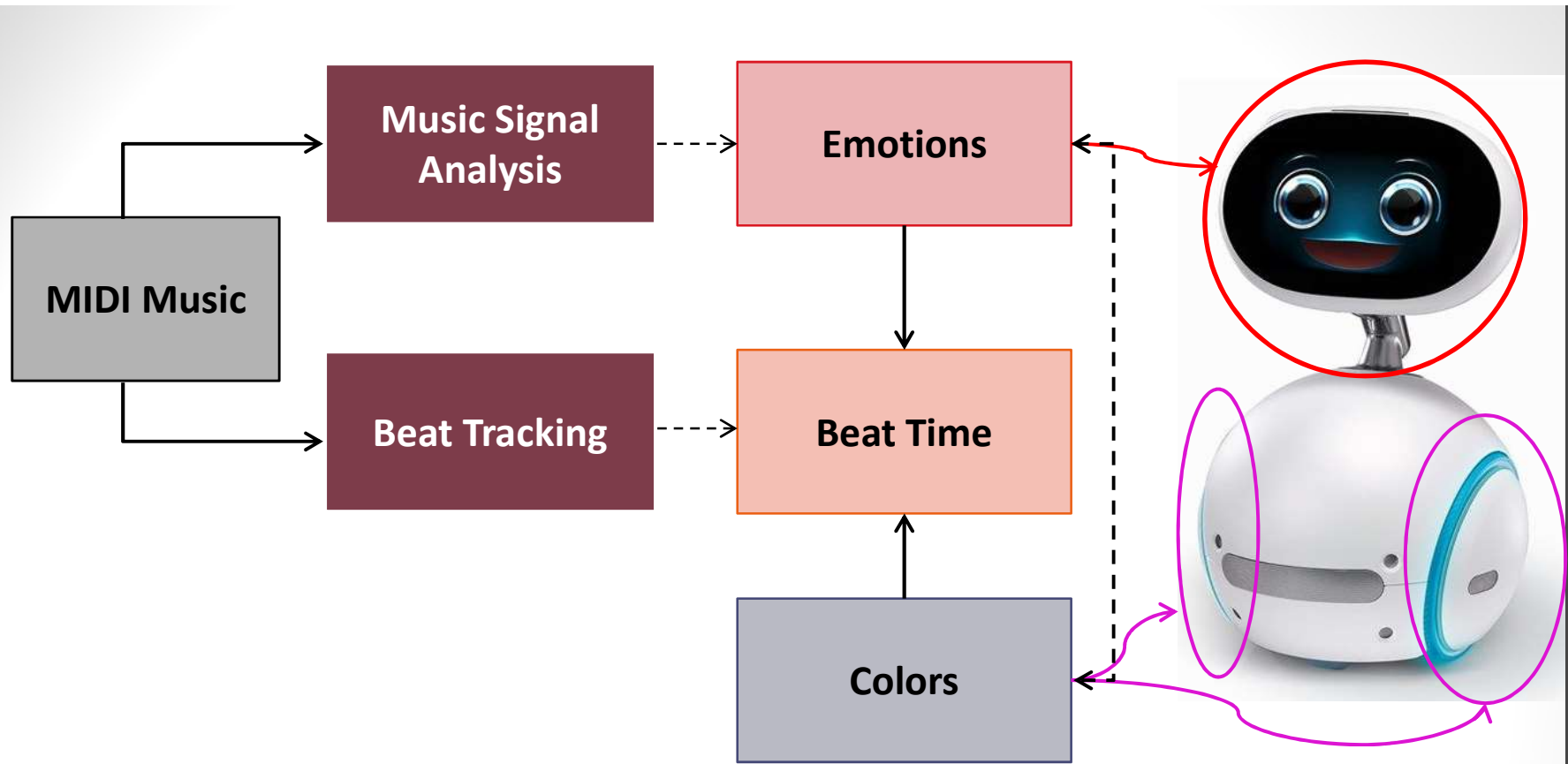


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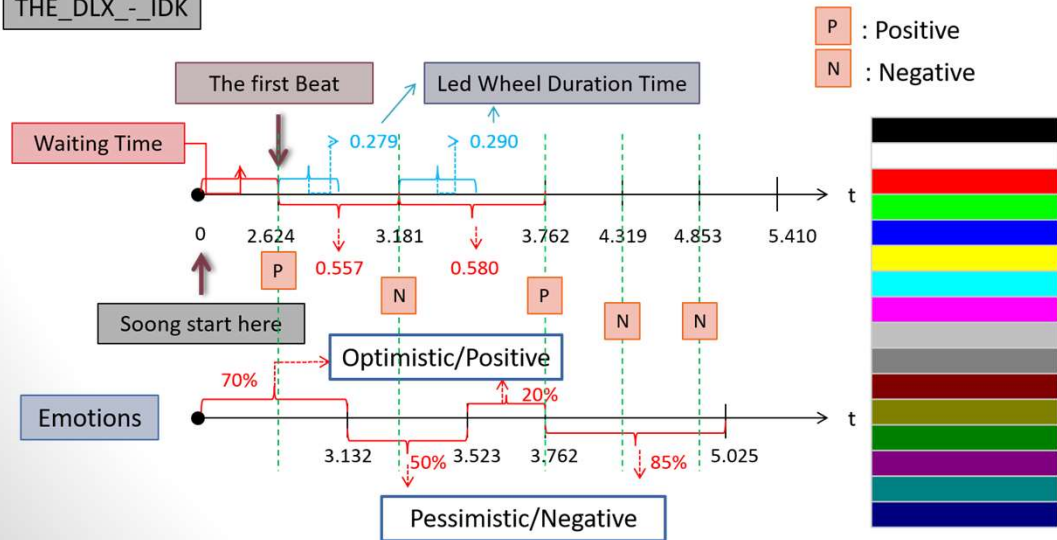


Adapted from: Wheel of emotion depicting different emotions per shade of color.  
<https://www.6seconds.org/2017/04/27/plutchiks-model-of-emotions/>





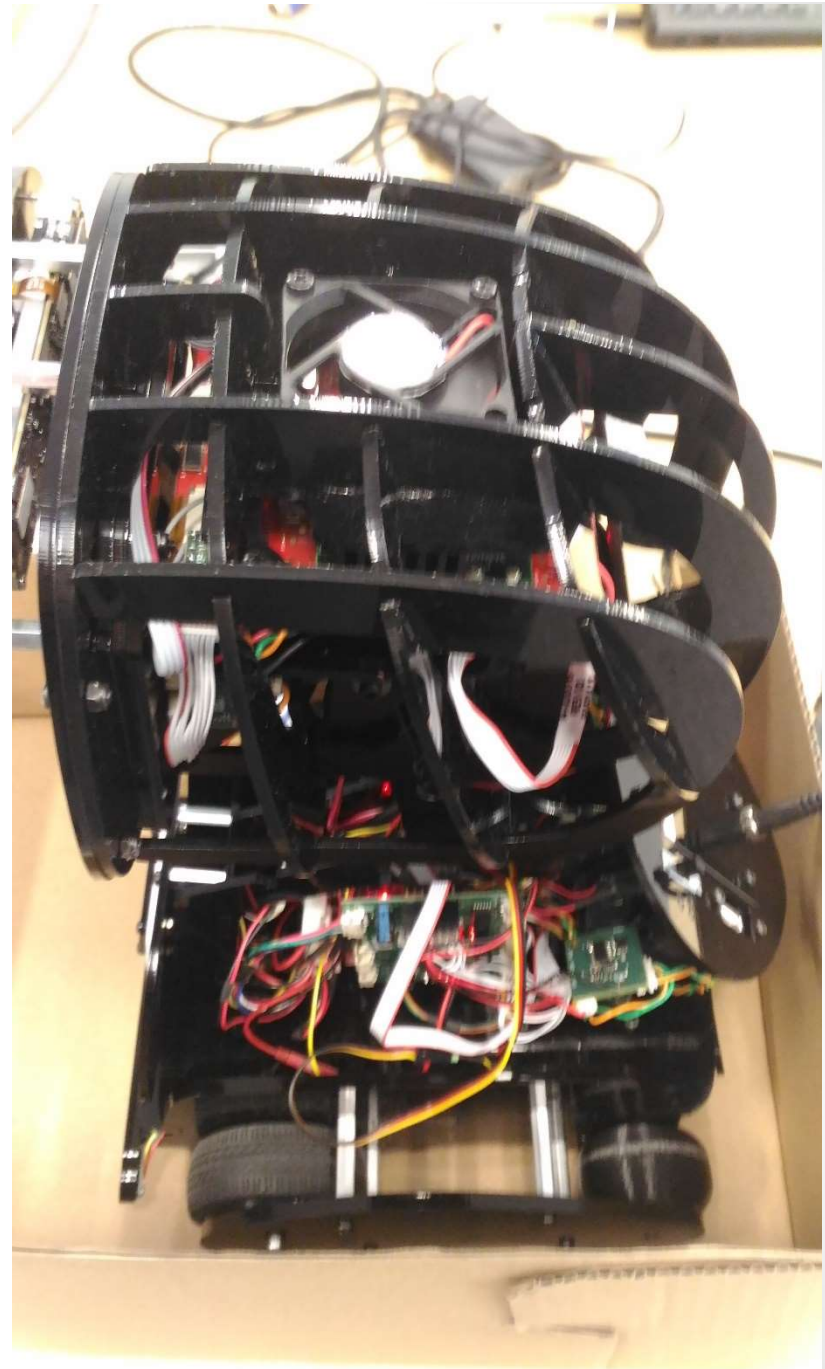
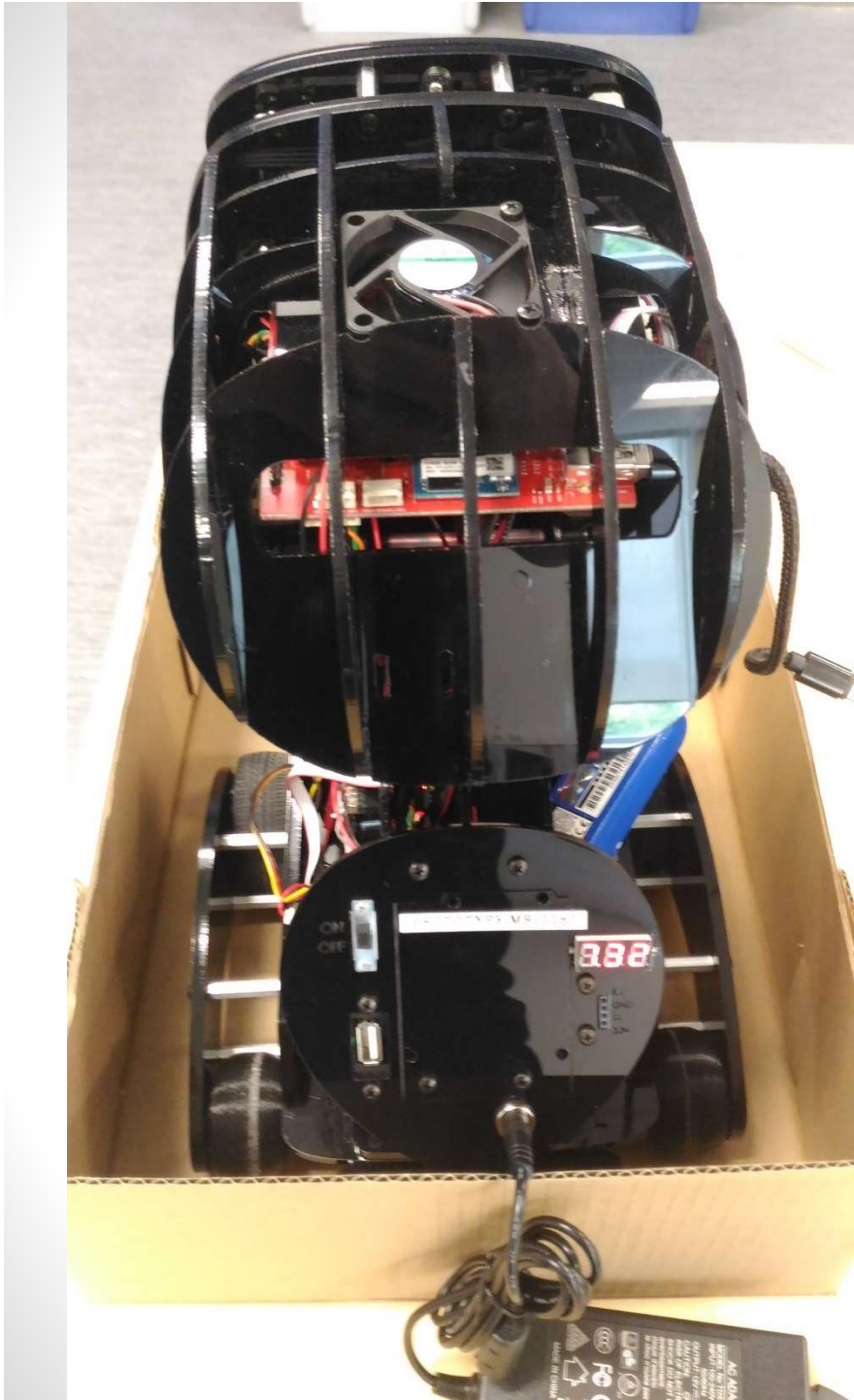
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# Our testing





# Thank you for your listening!

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