

Interactive Toys, Robots and Engaging Entertainment Products

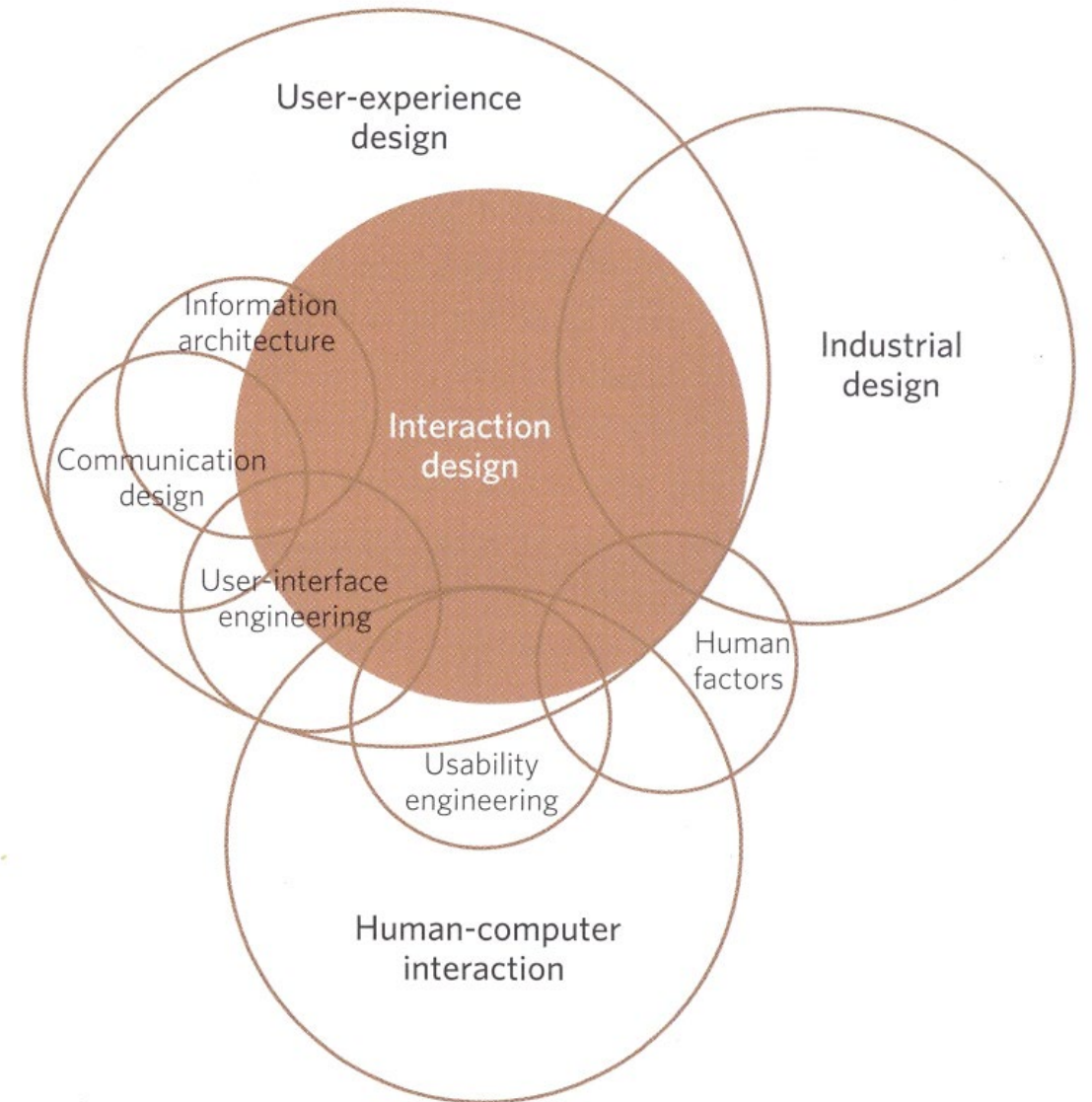
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Research Context

- Interaction Design
- Human-Computer Interaction
- Tangible Interaction



Tangible Interaction (1)

- Hornecker, E., Buur, J. (2006) Getting a Grip on Tangible Interaction : A Framework on Physical Space and Social Interaction. Proceedings of CHI 2006, pp 437-446.
 - <https://www.designandmake.org/x/CwHfAQ>
- Encompasses a broad range of systems and interfaces building upon and synthesizing the following views:
 - Data-centred view
 - Expressive-movement-centred view
 - Space-centred view
- Key characteristics
 - Tangibility and materiality
 - Physical embodiment of data
 - Embodied interaction and bodily movement as essential part of interaction
 - Embeddedness in real space

Tangible Interaction Framework

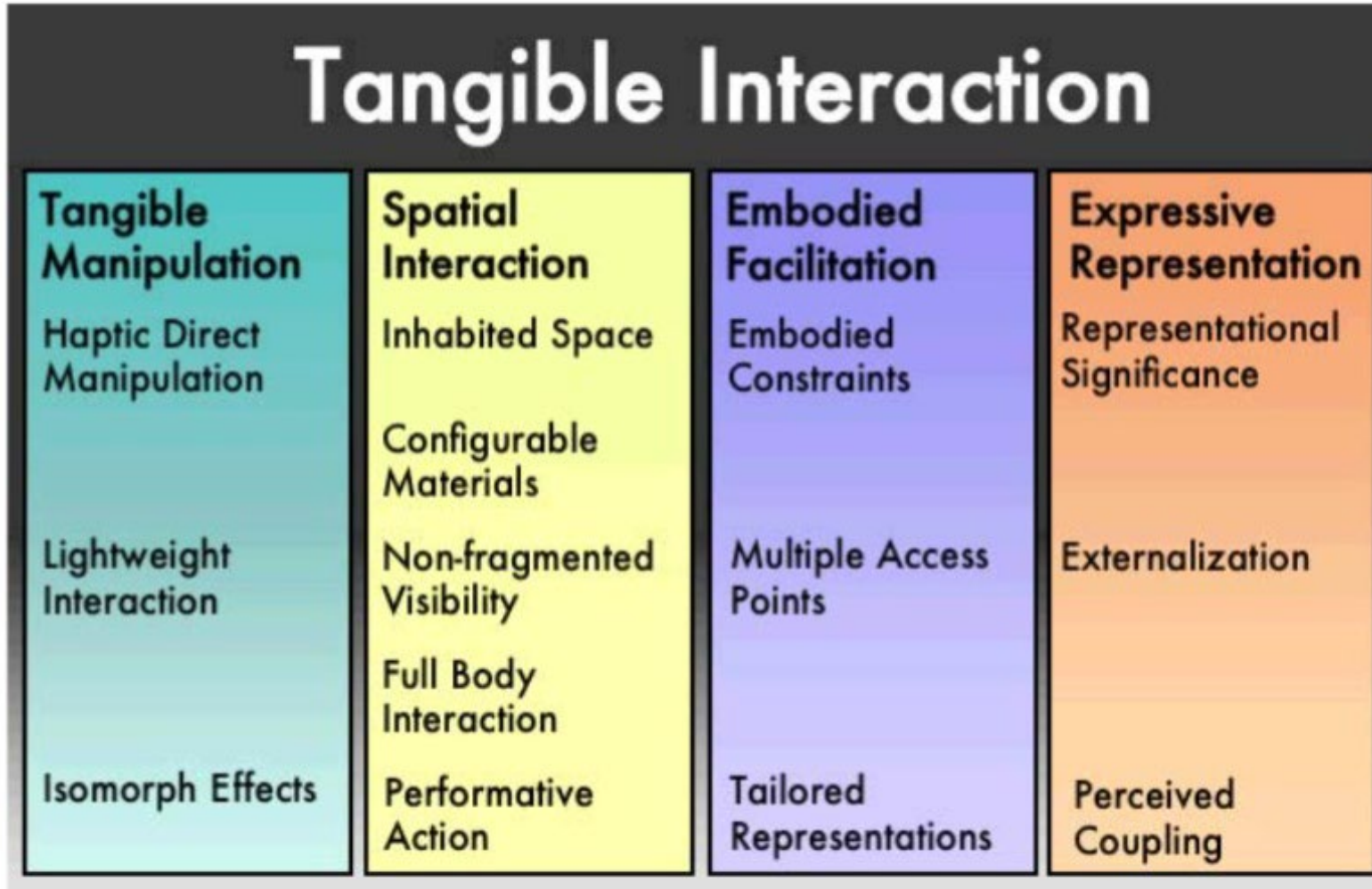


Figure 1. Tangible Interaction Framework with themes and concepts

Playful Interactions (1)

- Bekker, T., et al (2010) Designing playful interactions for social interaction and physical play - Personal and Ubiquitous Computing
 - <https://www.designandmake.org/x/nABoDw>
- Suggested three design values for designing playful interactions:
 - Motivating feedback to players' behaviour
 - Creating opportunities for players to define their own game goals and rules
 - Focus on creating social player-interaction patterns, by designing various opportunities for players to collaborate and compete with each other using interactive play objects

Playful Interactions (2)

Fig. 4 ColorFlares and children trying to send the color of their ColorFlares



What is Game?

- Our ancestor played games to learn survival skills, e.g. fighting, hunting
- Evolve to become a tool for teaching us essential skills in a fun way
- For example,
 - Scrabble – vocabulary, spelling
 - Monopoly – manage financial assets
 - SimCity – urban planning
 - Counter-strike – teamwork

Definitions of Game (1)

- Chris Crawford's definition through a series of dichotomies:
 - Creative expression is art if made for its own beauty, and entertainment if made for money.
 - A piece of entertainment is a plaything if it is interactive. Movies and books are cited as examples of non-interactive entertainment.
 - If no goals are associated with a plaything, it is a toy. If it has goals, a plaything is a challenge
 - If a challenge has no “active agent against whom you compete”, it is a puzzle; if there is one, it is a conflict
 - Finally, if the player can only outperform the opponent, but not attack them to interfere with their performance, the conflict is a competition (e.g. racing). However, if attacks are allowed, then the conflict qualifies as a game

Definitions of Game (2)

- “A form of play with goals and structure.” (Kevin Maroney)
- “A game is a form of art in which participants, termed players, make decisions in order to manage resources through game tokens in the pursuit of a goal.” (Greg Costikyan)
- “An activity with some rules engaged in for an outcome.” (Eric Zimmerman)
- “It [Game] provides a fun way for us to learn serious skills” (Raph Koster)

Interactive Products for Children (1)

- Markopoulos, P., et al (2008) Evaluating Children's Interactive Products Principles and Practices for Interaction Designers (<https://www.designandmake.org/x/oQBoDw>)

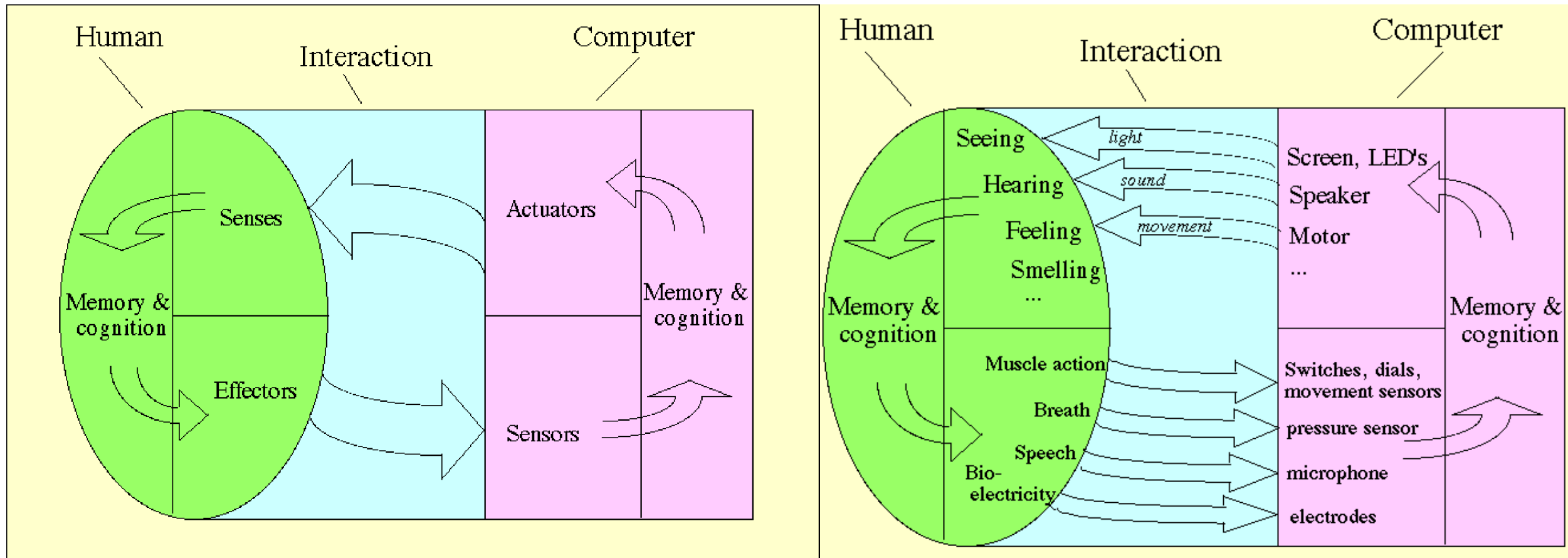
Stage	Ages	Key Points for Interactive Product Design
Sensorimotor	Birth-2	
Preconceptual Thought	2-4	
Intuitive Thought	4-7	Children can use symbols and words and can distinguish reality from fantasy. In the latter part, they can take into account the viewpoint of others.
Concrete Operations	7-11	Children can classify things and understand the notion of reversibility and conservation. They can think logically but not abstractly.
Formal Operations	11+	Thinking is about ideas. They can consider various solutions without having to act them out and can deal with hypothetical situations.

Table 1.2
*Piagetian Stages
of Development*

Interactive Products for Children (2)

- Children as players
 - Child sees the interactive product as a plaything
 - It is expected to muse or entertain the child
- Children as learners
 - Child sees as a substitute school or teacher
 - It is expected to instruct, challenge, and reward
- Children as users
 - Child sees the interactive product as a tool
 - It is expected to be useful, and enable the child to make things easier to do

Interactive Systems in Electronic Arts



Bongers, B. (2000). Physical Interfaces in the Electronic Arts – Interaction Theory and Interfacing Techniques for Real-Time Performance. In M. M. Wanderley and M. Battier (eds.) Trends in Gestural Control of Music. Paris: IRCAM-Centre Pompidou.



Pleo

Pleo is a cute little robot dinosaur that acts like a living pet. It explores, learns, makes dinosaur noises, munches on (plastic) leaves, and demands that you give it your total, exclusive, unfettered attention.

CREATOR

Invo Labs [↗](#)

COUNTRY

United States us

YEAR

2006

TYPE

Consumer

Save

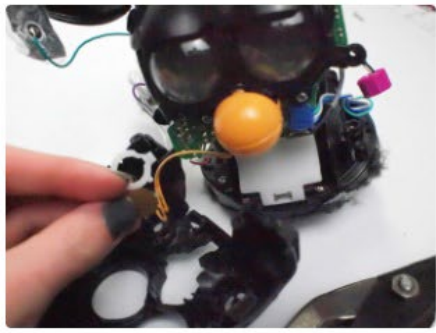


Pleo's body has seven processors and 14 motors.
Photo: Randi Klett.



<https://robots.ieee.org/robots/pleo/>

https://youtu.be/BOba_zGoZq8?t=838



Overview

Like



Furby 2012 Teardown

By Becky Stern

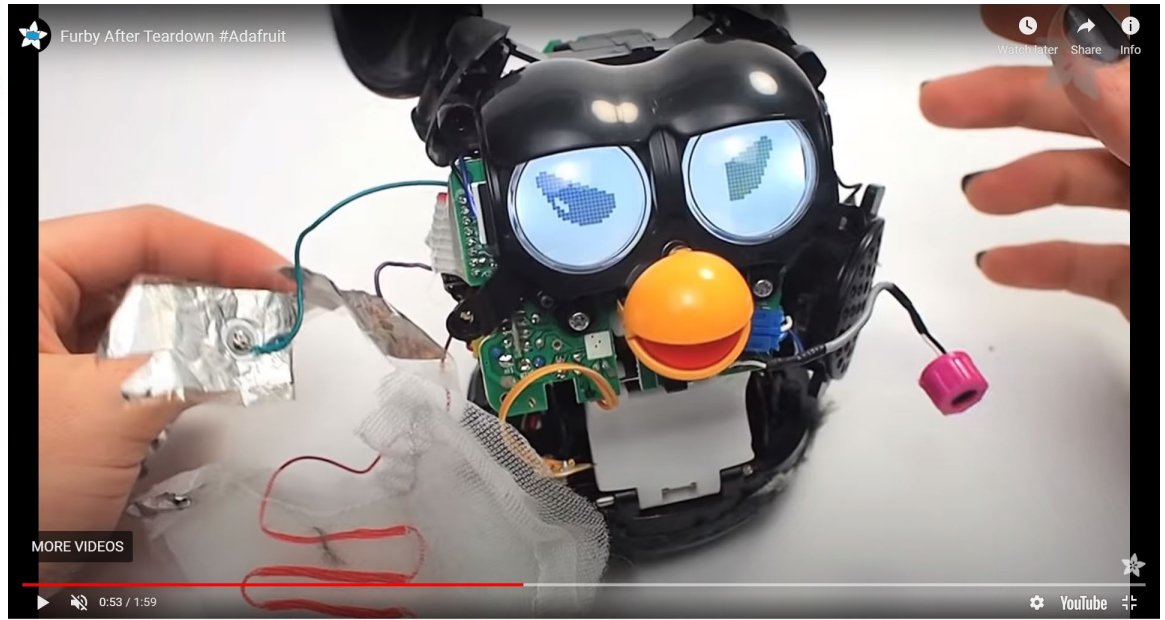
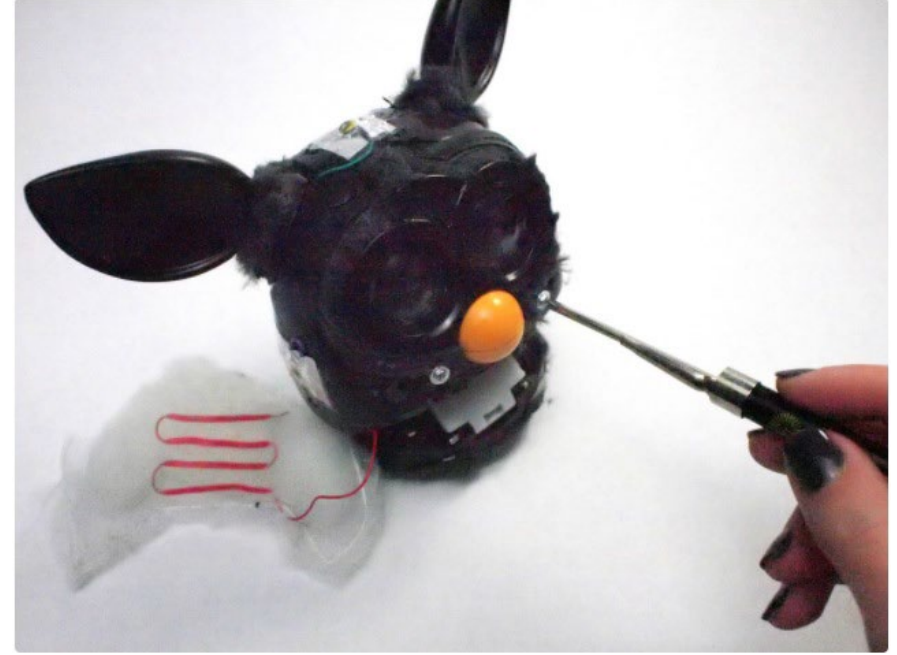
What's inside this hot toy?

- Overview
- Remove Back and Fuzzy Parts
- Unplug wires
- Remove Face Plate

- Featured Products
- Single page
- Download PDF



<https://learn.adafruit.com/furby-2012-teardown>



https://youtu.be/qX0_YwA1KTc?t=53

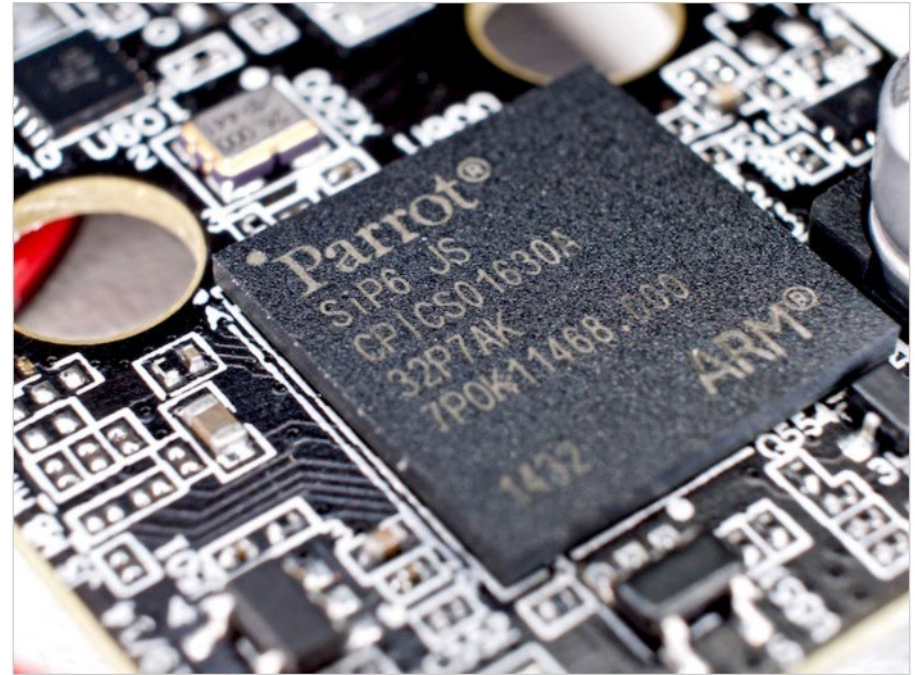
What's inside the 2023 Furby?



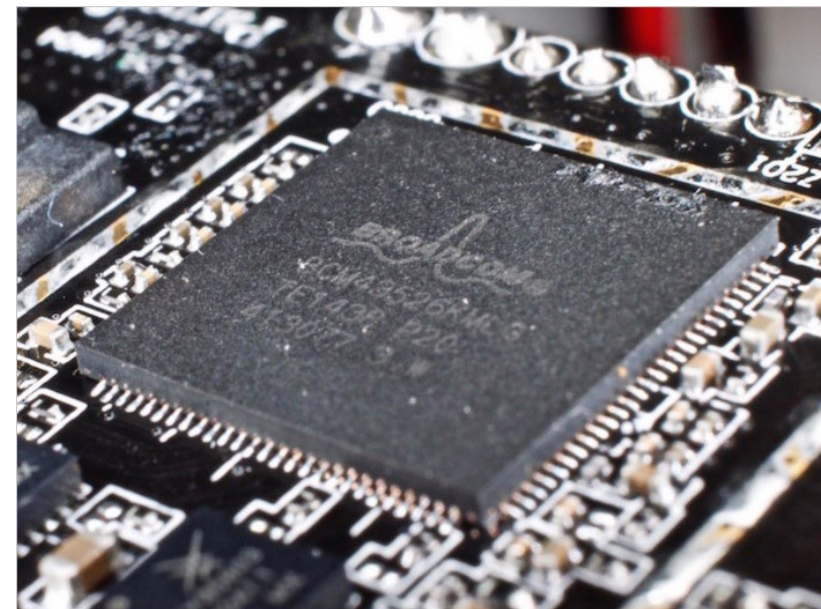
<https://www.digikey.hk/en/maker/blogs/2023/furby-2023-teardown>
https://youtu.be/dhDybS_7pg0?t=77



https://youtu.be/JFXnKToa7_s?t=30



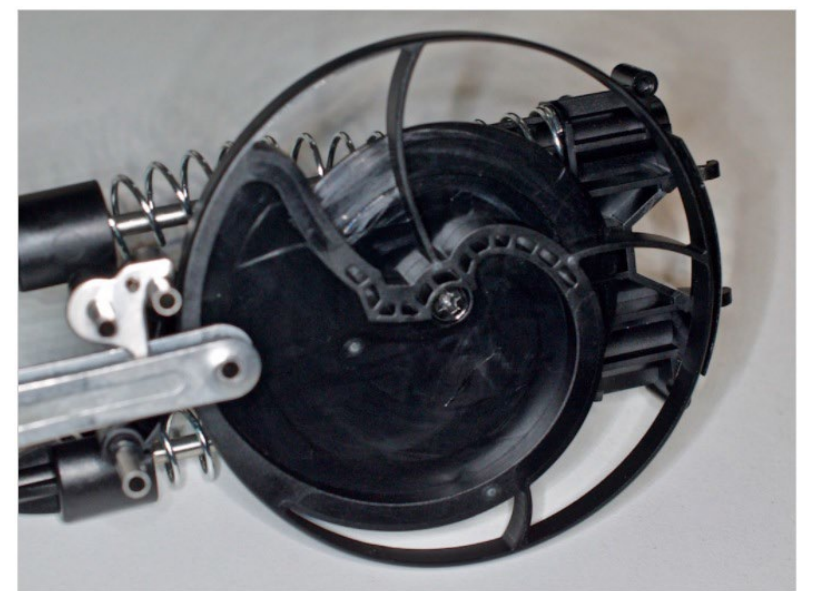
The custom processor



The Wi-Fi transceiver



The VGA camera



The cam in the jumping assembly

<https://www.allaboutcircuits.com/news/teardown-tuesday-sumo-jumping-robot/>



(a)



(b)

Figure 1. (a) Card game and (b) garbage truck toy.

You, Z., et al (2023) Interactive Educational Toy Design Strategies for Promoting Young Children's Garbage-Sorting Behavior and Awareness (<https://www.designandmake.org/x/LQFvD>)

Things to do

- How are you going to apply the above knowledge/principles to design for your final project?
- Try to look for inspirations on interactive toys, not only from existing commercial products but also from research articles
- Also, look for how they are constructed (from “teardown”), or perform a teardown yourself