# The Junior Director: Taking animations into the real world

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## Abstract
In this paper we discuss the design of the Junior Director: This is a portable device that enables a child to record its environment along with animations that can be added and controlled in real-time. The device is suitable for children of different ages and for both independent and social play: Younger children are more likely to record interactions between animations and the environment, while older children can use their friends as actors in their movies. Important aspects relating to design for children, such as storytelling and imagination are discussed. Apart from the device itself we also describe parts of the evaluation.

## Keywords
animation, augmented reality, storytelling, design for children, interactive toys, imagination, embodied interaction

## Introduction
The current range of video-editing and animation software offers its users many possibilities for creating complex animated movies. This software is generally too complex for children, but moreover misses the spontaneity of play. Most animation software for children in essence does not differ much, and merely tries to make well-known slow animation methods such as frame-by-frame animation and key-framing more accessible and attractive. There are many opportunities for interaction designers for providing children with more playful animation methods. Many lie in improving software and input devices, but probably many more lie in bridging the gap between the virtual and the real world. The latter can be very inspirational, providing props, scenes and actors. Inspiration can be drawn here from fields such as embodied interaction [1], tangible interaction [2], and augmented reality.

The opportunities regarding designing an embodied animation system for children were explored in a student project coached by the first author. Four Bachelor students (the latter four authors) conducted the project during the first semester of their second year, in approximately nine project weeks (converted to fulltime). The physical result of this project is the Junior Director, a fully functional prototype of a portable device that enables a child to record its environment along with animations that can be added and controlled in real-time.

In the next section we will first discuss related work. In section 3 we will discuss the concept of the Junior Director, and in section 4 we will discuss the evaluation of early prototypes and the final prototype. We end with considerations for future work and our conclusions.

## Related work
A classic example of software that uses a more playful approach to animation than frame-by-frame or key-frame animation is the game My Make Believe Castle [3]. In this game children have to draw paths in pre-illustrated scenery, drop objects on these paths, and finally place characters to start the animation. The children do not have to worry about a time-line, but mainly about the story that they want to be told. A child can for example aim to make a character slip over a banana skin while it walks over the bridge. A more exotic example is MOOVL in which children draw vector shapes that can be playfully animated using elements of physics such as gravity, friction and springs [4]. A more spontaneous way of computer animation that is closer to our concept, is the recording of computer game characters that are controlled in real-time using computer input devices. This is an important part of an art form generally referred to as Machinima [5].

For interaction designers there are many opportunities for creating new interfaces that allow animations to be used in a more embodied way. An example is the Puppet UI project in which on-screen characters can be controlled using hand gestures [6]. Other interesting things can happen when the virtual and physical world are combined. Except from the fact that the body is a natural interface, it is also magical for children to see themselves in an animation. Different contemporary examples are Sony's Eye-Toy games [7] and the Shadow Monsters project [8], which were preceded by the pioneering work of Krueger [9]. Our concept, the Junior Director, is not bound to a fixed setup and therefore compatible with a multitude of play situations. Its portability allows children to use it in different play settings, drawing inspiration from parts of the environment such as toys, friends or even buildings. It also enables children to play in different roles: Actor or director. We will elaborate on the concept in the next section.

## The Junior Director
The final physical result of our project is a functional prototype called the 'Junior Director'. This is a portable device, including a camera, a screen and several controls, that enables a child to record its environment along with animations that can be added and controlled in real-time (figure 1). For example, a child can make a video of an animated dragon flying over the LEGO-castle that he or she has just built, or a video of King-Kong hanging from the real church in the street. Our current focus is not on image recognition (e.g. King-Kong will not automatically hold on to the church). The child is in control: He or she controls the actions of the animated character.



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Also more complex play situations can arise: A child (the director) can record movies that include one or more friends (actors) interacting with an animation. An example is a fight between a friend and an animated dragon. Since the system does not project graphics in the real world, the actor cannot see the animation. Therefore the director has to explain what is happening or what the actor should do. For example, the director can make the dragon spit out a ball of fire and at the same time s/he can ask the actor to dodge. The first time that the actor sees the recorded movie is very exciting, because now s/he can see his/her interaction with the animation for the first time. Actor and director can practice to become more skilled at making movies in which the interaction between animation and actor looks seamless. Eventually this example can lead to online contests for the most realistic or funniest dragon-fight.

*Figure 1. The final Junior Director prototype being tested at an elementary school. At the left of the device is a joystick for moving the animated character. At the right are an action button, and a dial for choosing which animated character to use.*

## Ideation and evaluation

Ten illustrated ideas, ranging from magic mirrors to augmented puppetry systems, were developed into three concepts with illustrated scenarios. From these concepts the Junior Director was selected based on a Must-Should-Might analysis using requirements that were partly defined in the project description and partly by the students. Examples of strong points of the Junior Director are that it still challenges the children to dress up and create their own props and environments, and that it supports different ways of play (social or independent) for children of different ages.

After this choice a range of explorative prototypes was made, including amongst others a device that has to be operated by two children together and a device operated like binoculars (figure 2). These prototypes were tested at an elementary school with 1st graders and gave a first idea about the children's understanding of the concept and ability to create simple stories, related to the specific ways of interacting with the prototypes. For these young children the director-actor interaction seemed to be too difficult, but they liked making (very) simple stories of the characters moving through the environment. Especially the binoculars were a success, since they really afforded aiming (and recording) to the children. The design of the binoculars was however not used in the final concept because it can cause problems for the director in terms of moving around and communicating with the actor.

*Figure 2. Explorative prototypes with paper characters that can move along translucent plastic instead of animations on a screen.*

The final prototype was later tested with 6th graders. First impressions show that the children have lots of fun playing with the final prototype. There was much interaction between the actor(s) and director. They were actively discussing the play/scene before, during and after recording.

## Future work

Extensive usertests were not possible within the timeframe of the project. Longer tests with more participants has to be done to get more insight in the richness of stories and interactions that children of different ages create with the device. It is important to test the device in different play settings, such as social play at school or independent play in a child's room.

It will be necessary to investigate the different kinds of actions that the animations allow for, and how to improve the interface for controlling these actions. This is extra important because the director should not only be able to control the animations, but at the same time also film the scene and communicate with the actor.

Finally, different kinds of animations can be developed allowing for a wider range of interactions and stories. Eventually it can also be considered that children create their own animated or non-animated characters.

## Conclusion

An important learning point from this project is the inspiration that the real environment has to offer, not only for the children for storytelling, but also for us as designers in coming up with innovative concepts. We encourage interaction designers in general to consider their designs within real-world contexts. When designing for children, their natural play settings, props and roles can be used as an important part of a design concept. By considering different scenarios that require different amounts of imagination and social interaction, a design can be made suitable for children of different ages.

What surprised us was that it was hard to find examples of closely related work. There are lots of examples of augmented reality applications (also for portable devices) in which animations adapt automatically based on detecting features or movement in video images, but not of cases in which the 'director' has more precise control over what happens. We are definitely not arguing that children do not like animations that react automatically (we are sure they do), but do think that it can be worthwhile to explore more augmented video concepts that trade some system intelligence for more creative control.

## References

1. Dourish, P.: Where the action Is: the foundations of embodied interaction. MIT Press, Cambridge, MA (2001)

2. Ullmer, B., Ishii, H.: Emerging frameworks for tangible user interfaces. IBM System Journal
39(3-4), 915–931 (2000)

3. My Make Believe Castle. Computer game. Published by LCSI. URL: http://www.microworlds.com/solutions/mmb.html

4. MOOVL. Interactive web application by Ed Burton. URL: http://www.moovl.co.uk/

5. http://www.machinima.com

6. Fatland, E. and Li, X.: The Puppet UI: Tools for nonverbal communication in virtual environments. Available online at: http://www.efatland.com/portfolio/puppetUI/PuppetUIpaper.pdf

7. Sony EyeToy. URL: http://www.eyetoy.com

8. ShadowMonsters by Philip Worthington. URL: http://www.worthersoriginal.com

9. Myron W. Krueger , Thomas Gionfriddo , Katrin Hinrichsen, VIDEOPLACE—an artificial reality, Proceedings of the SIGCHI conference on Human factors in computing systems, p.35-40, San Francisco, California, United States (1985)

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