

idAnimate - sketching animations to support conceptual design

During the early stages of the design process designers need to illustrate their ideas so that these can be visualized, shared and discussed within the design team and with end users to collect feedback. However, creating such visualizations can be a cumbersome and time-consuming activity, especially when the design concepts contain dynamic elements such as user interaction, behaviour, or time-dependant events. Prototyping tools such as Axure or uVision require a substantial amount of effort and level of commitment, while static sketches can be too limiting in the information they convey. idAnimate helps designers bridge this gap by allowing them to rapidly create animated sketches in a simple and intuitive way, enabling them to quickly show their concepts, even those that include dynamics. Thanks to idAnimate, designers can reduce the amount of labour required to iterate by quickly externalizing, sharing and discussing their ideas without the need for expensive prototyping. This paper presents idAnimate, discusses it in relation to existing design tools, and guides the reader through an example to illustrate how it may be utilized in a design scenario.

Javier Quevedo-Fernández, MSc and prof. dr. ir Jean-Bernard Martens

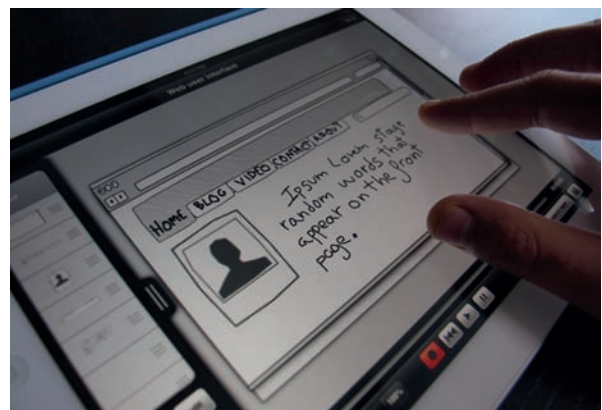
Information about the authors

Javier Quevedo-Fernández, MSc in Computer Science, is a PhD Candidate in the Department of Industrial Design of the Eindhoven University of Technology. Javier's research interests are in tools to support creativity and communication in multidisciplinary design teams, as well as with end users.

Jean-Bernard Martens is a prof. dr. ir., at the Department of Industrial Design of the Eindhoven University of Technology. His research focuses on design tools, visual interaction and applications of statistical methods for HCI research.

Address of correspondence

Javier Quevedo-Fernández
Eindhoven University of Technology
Den Dolech 2
5612 AZ Eindhoven
j.quevedo.fernandez@tue.nl



idAnimate is an application for iPad® devices that helps designers sketch interactive products and services (Quevedo-Fernández, J. Martens, J.B.O.S, 2013). Designers can describe the behavior of products and services, as well as how users interact with them, through animations.

Figure 1 shows how idAnimate can be used to complement existing design tools in the early stages of the design process. The effort required to build design artifacts grows as the complexity of the artifacts and tools increase through the phases of the design process. idAnimate introduces a

design activity between sketching on paper and building wireframes and mockups, where the designer can describe with little effort the concept, its behavior and its dynamics by creating animated sketches. Simplifying such phase can enable designers to carry out more iterations in shorter time before committing to a particular solution.

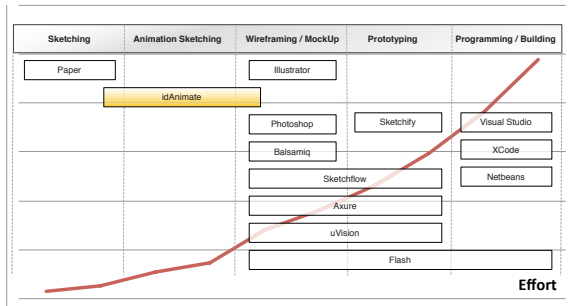


Figure 1. idAnimate in relation to existing design tools

In a nutshell, idAnimate is designed to complement paper sketches by providing designers with the ability to introduce time-related events. Since these animated visualizations convey additional information, it makes it easier for multiple stakeholders to be involved effectively, discussing the dynamics of the concepts, collecting feedback and rapidly modifying the ideas. Thus, idAnimate is ideal for:

- increasing the information conveyed in the design artifacts exchanged at a conceptual stage;
- increasing the awareness and shared understanding of the design proposals;
- supporting participatory design in workshops and brainstorming;
- allowing designers to more easily communicate and discuss early-stage concepts with a broad range of stakeholders such as marketing people and end users;
- collecting insights and feedback already at a stage where no high-fidelity prototypes are available yet;
- involving end-users early in the design process by providing them with representations of the design proposals that are easily accessible and interpretable.

Background

In the early stages of the design process when ideas are vague and imprecise, designers usually work with paper sketches to explore their imagination and articulate their ideas (Purcell & Gero, 1998). The reason behind this is that sketches are easy, fast and cheap to create, while they provide a very flexible medium for expression (Buxton, 2007). In general, sketches are used for:

- exploring and expanding the space of alternative solutions;
- communicating design concepts;
- discussing and refining the core ideas behind the concepts with a team of stakeholders.

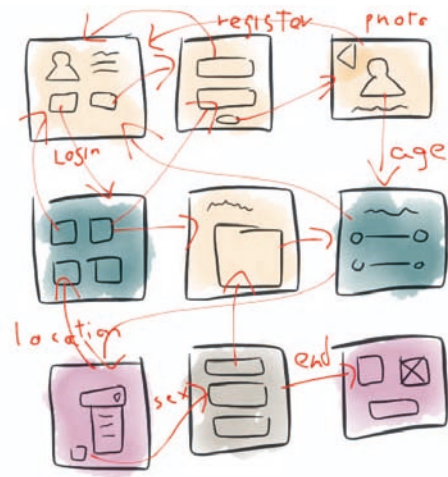


Figure 2. Description of a web-based registration form using a static sketch

Not surprisingly, sketches are less ideal for describing highly dynamic concepts. This is due to the fact that most of the behavior and time-related aspects that are to be conveyed are either left implicit, or roughly described through arrows and annotations (see figure 2). This implies that the understanding of the information transported within the sketch heavily relies on the imagination of the interpreter (Stacey et al., 1999) (see figure 3). Thus, sketches can give rise to misunderstandings and misconceptions, especially when they are used to express highly dynamic concepts.



Figure 3. The problem of miscommunication in the early-stages of the design process

Theories about creativity and design (Schön, 1983) support the idea that the thoughts evoked by reflecting on the visual artifacts that are created during the creative process determine for a large part the quality of the outcome of this design process. In essence, the materials that are used during the creative activity enable, but also limit the creative capabilities of the practitioner. Consequently, working with static visualizations may not always help the designer to foresee unexpected events, or more in general, enable the designer to adequately explore the space of solutions.

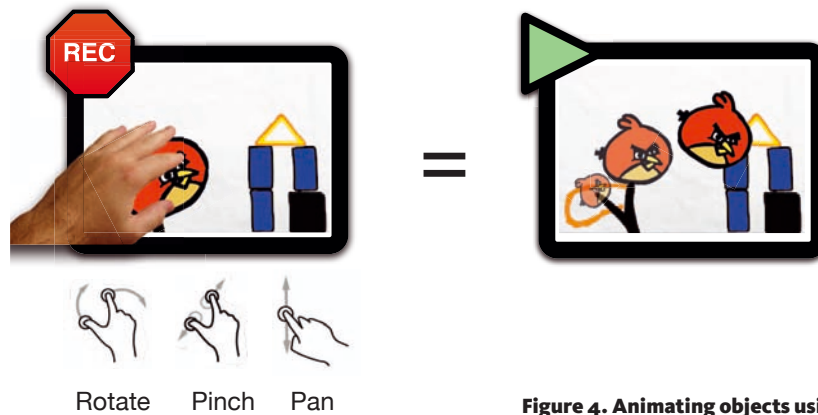


Figure 4. Animating objects using hand gestures

Thus, using static sketches to explore the space of solutions of highly dynamic concepts may lead to incomplete design solutions, while using them to communicate behavior and time-dependent ideas may lead to misunderstandings. As a result sketches are normally only used for a limited time during the design process, generally only at early stages. Using high-fidelity prototypes can resolve most of the aforementioned issues. However, creating such prototypes is time consuming and expensive. As a result, high-fidelity prototypes are mostly used at later stages of the design process, when a commitment to a particular solution has already been made.

Creating or modifying high-fidelity prototypes usually requires a set of skills that is present only in a subset of the members in the design team, which limits the possibilities to provide input by other members of the team, as they do not possess the technical skills needed to modify or alter the prototype. As a result, design teams increasingly find themselves in a situation where there is a need for tools that allow them to go beyond the expressive capabilities of paper sketches, i.e., by augmenting them. The cost and time involved in creating such new forms of visualizations can however not increase significantly, as the threshold for using them within early stages of the design process would otherwise be exceeded.

We propose that creating animations in a way that resembles sketching could be an interesting approach towards more effectively exploring and communicating the dynamic aspects of concepts. In order to investigate and test this idea more concretely, idAnimate was designed and created.

The Tool

The goal of idAnimate is to allow designers to more interactively explore and communicate design solutions by increasing the capabilities of a conventional sketchbook, i.e., allowing designers to create meaningful animations in a sketch-like way, while avoiding spending large amounts of time in doing so.

idAnimate is inspired by the metaphor of a digital sketchbook animator. Users start by sketching or displaying graphical objects on the sheet of digital paper. It is possible to interact with the objects using multi-touch gestures that transform the object by translating, pinching and rotating them. While the user moves and transforms an object on the digital paper (acting out the interactions and behavior), the system records what happens, creating an animation that can be replayed at a later stage (see figure 4). In essence, with idAnimate the user generates animations by interacting with digital objects in a natural way.

To illustrate how idAnimate can be used for the aforementioned purposes, we will follow an example utilizing it to generate design solutions for an exemplary design brief.

A practical example: a smartphone payment system for gas stations

Suppose an assignment about a gas station payment system for mobile devices has been provided, which includes the following requirements:

- payments are conducted using a mobile device (smartphone);
- payment initialization relies on proximity, i.e., bringing the mobile device close to the payment artifact;
- the selection of the type of product (type of gas), amount to fill (volume or money) is accomplished on the smartphone;
- payments need to be confirmed on both the gas pumping device, and the smartphone.

Preparation for Illustrating with idAnimate

Collecting material

Animations and storyboards are generally composed of three core elements: (1) the place or setting where the situation occurs, (2) the object(s) involved, and (3) the actor(s) who carry out the interactions (usually, as some form of dialogue).

idAnimate users are recommended to start by creating a collection of images related to the design brief. This can be



Figure 5. A sketchy looking gas station scenario



Figure 6. A hand (actor) interacting with a mobile device (prop)



Figure 7. Gas pump screen

done in multiple ways: by sketching on the built-in sketchpad, by preparing collections of PNG images in a computer, by taking pictures with the iPads® built-in camera, or by pulling images from internet sources.

In our particular example we combine a specific sketching application for the iPad® (Paper by FiftyThree¹) with idAnimate in order to create the visual elements.

Places

Places constitute the setting and context for the product, the user and the interactions. While it is an optional element in an animation, situating the interaction in a specific place usually helps to better understand how and why things happen (see figure 5).

Object(s)

Props are the objects that have relevance in the story; mainly those that the actor will interact with. For our particular example the selected props are a smartphone, the gas pump and the screen of the gas pump, as well as a collection of user interface elements for the application on the mobile device (see figure 6 and 7).

Actor(s)

The actor interacts with the environment and the props, providing them with an essential role in the animation. The actors will carry out the interactions with the objects, triggering the product behaviors and responses. In our example the actor is a hand of the user of the smartphone device (figure 6).

Setting up the scene

Casting the objects

The first step to set up a scene is to cast the elements previously created. Since the images of our example were

sketched with a different application, we will bring them into idAnimate by exporting and importing them to/from the device's gallery of images, which is shared across the two applications.

In order to do so, we select the 'create a new object' inside idAnimate, and import the desired sketch into it by selecting the import button.

Placing the objects

On the left side of the screen we can find the object selector (see left side of figure 7), which allows the user to choose which object to move, scale or rotate at any specific time on the digital paper. Doing this repeatedly for every object allows the user to define the initial placement of all the elements in the animation. Additionally, the user can define the layered order of the objects by swapping their position inside the object selector.



Figure 8. Animation editor of idAnimate. Exploring solutions for the gas station payment system with idAnimate

Defining the motions

Everything is prepared to start defining how the action develops, which is achieved by animating the objects. The approach to follow is simple: first we select the desired

¹ <http://www.fiftythree.com/paper>.

object to animate from the object selector, and then we tap on the record button (see figure 8). A countdown will be displayed, giving us time to prepare for acting out the motion. After this, whatever movements and transformation are carried out on the object will be recorded as part of the animation until the user decides to stop recording. This can be repeated for each of the objects in the animation, making it possible to record new motions while others are being replayed, allowing the user to synchronize the movement of different objects.

In our example, the interaction starts by bringing the mobile phone close to the gas pump screen. When both elements are sufficiently close, the screen of the phone shows the interface for selecting the product and amount to refill, while the gas pump turns on an orange light (see the defining visual appearances of objects ahead for more details). Once we have recorded the motion of the device, we can start defining how the actor interacts with the user interface, selecting the type of gas and the product. Having done this, we can act out the gas hoax to show what happens while the gas is being pumped into the car's deposit, until completion.

Defining multiple visual appearances

Objects may have multiple visual appearances (see figure 9), i.e. multiple images that can represent their visual state. Think of visual appearances as different outfits, which can be changed for instance to show two stages of a light bulb (On or Off), or two different facial expressions of a character. As shown in figure 9, the sketch editor helps the user create these distinct appearances in a way that resembles using an onionskin notebook.

In the animation editor, the user can proceed to a particular moment in time and select the desired visual appearance to display from that moment on. This selection is done using the object inspector as shown in figure 10. Users may hide and show objects during the course of an animation by



Figure 9. Example of sketching multiple visual appearances of a character

switching between visual appearances with content and visual appearances with empty content.

Creating alternative scenarios

Once we have an initial animation it is easy to make small variations to show alternative scenarios or use cases. What happens when the user pulls the hoax before the gas has been fully loaded? What happens if the tank is full earlier than expected? How does the system display errors or react to different circumstances? To show this, users can duplicate a project and then rapidly make the appropriate changes to it.

Storyboards

idAnimate's storyboards (see figure 11) are composed of a sequential collection of animations with textual captions. Storyboards can be used to illustrate a story with multiple scenarios, or to show a particular element in more detail. In our specific example, the screen becomes cluttered when introducing all the elements. We can improve this by separating the story in four different animations. The first one shows the car arriving to the gas station, placing the gas hoax inside the car's deposit, and the first reaction of the gas pump screen. The second and third storyboards show the interaction between the user and the displays of the



Figure 10. The object inspector allows the user to select the visual appearance to be displayed from a particular moment in time

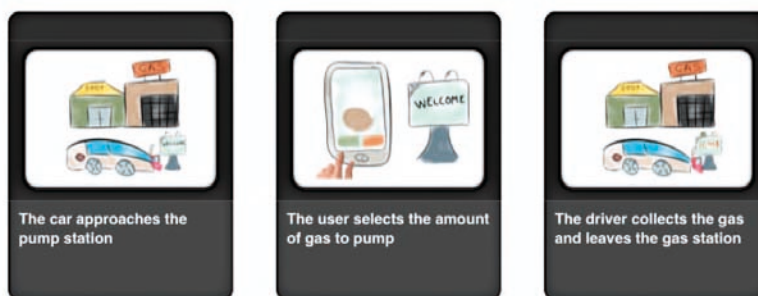


Figure 11. A storyboard showing the different steps of the gas pump scenario in detail

smartphone and the gas pump to select the amount of gas to fill, and to confirm the payment. Finally, the last animation shows the car leaving the gas station.

Similarly to animations, storyboards can be duplicated to create modifications describing alternative scenarios.

Sharing and discussing animations

Once the animations or storyboards have been created, they can be easily shared with team members. Other members cannot only watch them, but can also propose modifications to the ideas, quickly creating and sharing alternatives of the concept or scenario.

In addition, it is possible to export movie clips to embed them in a Powerpoint presentation, or share them on Facebook.

Conclusion

Tools for sketching animations can help designers narrow the gap between sketching and prototyping. We have shown how the idAnimate tool can be utilized at an early phase to support designers to be creative, and enable them to communicate their ideas to other designers or end-users to collect feedback and input for the next design iteration.

Where to find additional information

A research version of idAnimate can be downloaded for free from its website (<http://www.idanimate.net>), and from the Apple® App Store™. To do so, you can use the link on the site, or simply search for 'idAnimate' in the Apple® App Store™ with your iPad® device. The idanimate.net website also includes a series of video tutorials to help users learn the basic features of the tool, as well as the more advanced functionalities.

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Samenvatting

Het visualiseren van productideeën stelt ontwerpers in staat om in de vroege stadia van een ontwerpproces deze ideeën te delen en te verifiëren binnen het ontwerpteam en met eindgebruikers. Het creëren van visualisaties kan echter een moeizame en tijdrovende bezigheid zijn, zeker als de productconcepten dynamische aspecten bevatten als gevolg van intelligent gedrag of interactie met gebruikers. Prototyping tools als Axure of uVision vereisen een hoge mate van inspanning en toewijding, terwijl met statische schetsen de gewenste informatie dikwijls onvoldoende kan worden weergegeven. Met de hulp van idAnimate kunnen ontwerpers deze kloof overbruggen doordat geanimeerde schetsen op een snelle en intuïtieve manier gerealiseerd kunnen worden. Dankzij idAnimate kunnen ontwerpers dus snel en eenvoudig hun ideeën (zelfs diegenen die dynamisch gedrag vereisen) delen, bespreken en verbeteren, zonder dat daarvoor uitgewerkte prototypes nodig zijn. Dit artikel presenteert idAnimate, maakt een vergelijking met bestaande tools en laat aan de hand van een ontwerp-scenario zien hoe idAnimate kan worden ingezet in het ontwerpproces.



Dit dossier REPAR: design through exploration is samengesteld door Mascha van der Voort