

Interactive Print – Developing with Layar Vision

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ABSTRACT

Layar Vision is a relatively new addition to the Layar Reality Browser, an application for augmented reality (AR) on mobile devices. This report focuses on the background and context of the technology, the way Layar Vision works and how a developer can start creating interactive print with it. We will also give examples of possible applications, like interactive magazines and advertisements, and alternatives to Layar that also offer the possibility of AR. This report concludes that, although the interface of Layar Vision is very developer-friendly, it has some significant drawbacks in that it is a paid service and proposed content has to be approved by Layar before being published. Future developments have interesting potential though, as technologies like Google Glass can revitalize the popularity of augmented reality based applications.

1. PURPOSE, CONTEXT AND HISTORY

Technological possibilities and public availability of augmented reality applications have increased greatly over the past few years. There is a broader understanding amongst users of the emerging potentials of the technique.

Augmented reality (AR) can be defined as a technology that adds layers of digital information unto the real environment [1]. It has become more prominent with the advent of mobile hand-held devices [2]. Currently, the usage of smart-phones increases rapidly [3] and mobile AR has reached over 2.5 billion installs [4]. The development of mobile AR has entered a new stage.

Launched in 2009, Layar [5] foresaw the potential of AR and created an augmented reality platform for mobile devices. Using the GPS location of the user, the Layar Reality Browser displays location based data such as contact information for local businesses, restaurant reviews, or traffic updates. [6] Layar has grown over the years from being a young and promising platform for mobile devices to a more established service, causing a shift in customer demands.

Layar introduced Layar Vision in 2011. Layar Vision introduced interactive print to the possibilities of the Layar application; it expands it to be triggered by visual recognition, rather than relying only on GPS location. Layar Vision allows a browser application to be triggered solely by the detection of an image, and enrich that image with associated augments. [Fig.1.]



Figure 1. An example of an image that can be scanned with the Layar Application, and is then enriched with augments. In this case, the user can choose between a few buttons, among which one that lets them share the picture on social media, and one that adds lasers coming out of the kittens eyes.

We present here a time-line of technologies that revolutionized the development of systems like Layar Vision:

- 1994: The QR code system is invented by Denso Wave [7]
- 1999: Hirokazu Kato and Mark Billinghurst present ARToolKit [8], a pose tracking library with six degrees of freedom, using square fiducial's and a template-based approach for recognition.
- 2000: 3D Modeling Softwares are emerging; examples are Google Sketch Up (2000) [9], 3DS Max R4 (2000) [10], Blender (2002) [11]
- 2004: Rich Media is reaching out [12]; HTML Widgets and 3D objects become common.
- 2006: Reitmayr et al. [13] presents a model-based hybrid tracking system for outdoor augmented reality in urban environments enabling accurate, real-time overlays on a hand-held device.

- 2007: HIT Lab NZ and Saatchi and Saatchi deliver the world's first mobile phone based AR advertising application for the Wellington Zoo.[14]
- 2011: Layar Vision is introduced [15]
- 2014: Layar launches an end-to-end augmented reality creative service [16]
- 2014: Google Glass goes public [17]

2. OPERATING PRINCIPLES [18]

Layar Vision is based on detection, tracking and computer vision. It uses so-called 'target-objects', physical or digital visual entities that contain enough detail to be recognized as unique by the application. These unique details are stored as 'fingerprints' that are pre-loaded based on the selected layer. A matching 2D or 3D model, called a virtual augment, is then rendered on the target object seen through the phone's camera lens.

To connect a target object with a virtual augment, the developer has to upload a reference image of the target object. This image is called a page. The page is analyzed by Layar, using the details to create an unique fingerprint called a key. With this fingerprint, the object depicted in the page can be used as a target object. For best results, the reference image needs to be clear and sharp, and resemble the way the customer will encounter the image as good as possible. More information of how to connect a target object to a virtual augment in practice can be found in section 6 of this article.

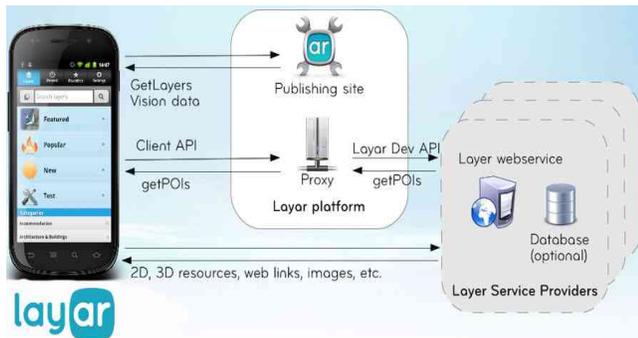


Figure 2. The main components of the Layar platform.

There are five main components constituting the Layar platform. [Figure 2] The Layar Reality Browser is simply the client on the mobile device of the user. It knows what target objects to look for and scans for those. The Layar Server ties all components together, providing the interface to the Reality Browser, the Layar Publishing site and the external Layar Service Providers. The Server analyzes and extracts the details of each uploaded page and creates a unique fingerprint. It also analyses the target object scanned by the client and loads associated augments and actions when applicable.

The Layar Publishing Website offers the developmental interface – it is an environment in which one can create new layers, plus manage existing Layers and accounts. Image keys are then defined by the Server. The Layar service providers will be created by third-party developers, providing the possibility for Layers based on Funda of Flickr. Flickr for example can then be a Content Source, not necessarily separated from the Service Provider but usually existing as separate entities. Existing GPS-coded databases and web services generally don't support the Layar Developer API, so specialized sources need to be created. A third-party server responds to a call for 'points of interest' with the corrects augments for that layer and image.

The Developer API is the interface between the Layar server and the Service Providers. It is used to get live data about the layer being viewed. It can be accessed through the Publishing Website. The second important interface is the Layar Client API, connecting the Layar Server to the Layar Application. This interface is not open to developers.

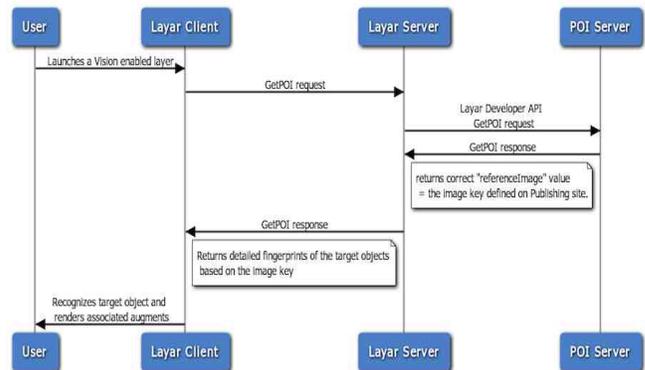


Figure 3. The flow of information in the system.

A general flow of use is as follows: the user launches the Layar Reality Browser on a mobile device. The client will send a request to the Layar Server. The server retrieves layer definitions from the Publishing Website and sends them to the client. The client can then launch a layer. A getPOIs (points of interest) request is send to the Server and forwarded to the correct Layer Service Provider. The latter returns AR content via the same path, causing the client to display the augments on top of the object as viewed through the phone's camera lens.

3. STRENGTHS AND WEAKNESSES

Layar has put itself on the map by promoting the application as the world's first AR browser. After its promising startup in 2009, customer demands have shifted with the years and although companies still created GPS-based layers, Layar slowly fell of the grid. There was a need for interactive print and Layar therefore added this service to their product.

The incorporation of Layar vision, in which the augments are triggered solely by the detection of an image, answer to

users requests. Its strength lies in the fact that an image now is recognized individually and is therefore not dependent on its users location, or special markers like QR codes. This allows for instance a magazine to tell the readers about the possibility of scanning on the cover, and leave the rest of the pages free of ugly logo's and markers.

An additional new feature and one of Layars core strengths is the Laya Creator, a self-service web application for activating print pages with digital AR content. Anyone can upload images or PDF documents, drop any number of augments or digital buttons onto them and publish them on the Laya platform. For the simplest augments, no coding work is needed. This launches a new way for brands, advertisers, publishers and agencies to plan, create and execute AR and interactive print solutions. Laya also directs publishers to several 3rd party content management tools and hosting companies to help publishers create their own content and publish channels. [5]

Although the Laya Creator is available for everybody, its weakness lies in the fact that it's not fully free of charge, as advertisements will be placed when making free use of the application. This makes Aurasma an important Laya competitor [19]. Aurasma is a web-based application that makes use of advanced image recognition techniques to augment the real-world with interactive content such as videos, 3D objects or animations associated to trigger images or Geo-based information. Aurasma delivers this application for free and without ads for non-commercial use.

Another one of Layars weaknesses is that images need to be reviewed and approved by Laya after submission. Their exact rules are unclear, but it seems mainly to make sure that created layers are not full of bugs. However, it leaves the door open for censoring content. This is not the case with for instance QR codes as they use open source technology. Therefore, someone who want to keep control over their images and associated augments might want to use QR-codes instead.

One last weakness is that Laya works best with high end technology. There are certain requirements needed to get the full potential out of the Laya application. Tracking quality is for instance dependent on the camera quality and lighting conditions and the fluidity of tracking when in motion is affected by processing power. If a phone has limited processing power, lag will occur when you or the target object moves. Furthermore, an Internet connection is needed to connect augments to target objects via the image keys.

4. TYPICAL APPLICATIONS

Laya Vision seems mainly focused on businesses. Interactive advertising and easy customer feedback are its main selling points. Intended applications include advertisements that offer extra information or the

possibility to buy the product when scanned, or flyer's that allow customers to vote on a certain special or rate a restaurant. [20] However, magazines also can and have been made interactive using Laya Vision. This is especially suitable for magazines with lots of pictures, because Laya doesn't work that well with only text.

As discussed earlier, Laya adds the advantage of not necessarily having to have a marker on every page. The dutch magazine Linda has used Laya this way – scanning the cover gave you a video of the creation process of the magazine [Figure 4].



Figure 4. The cover in question of the magazine 'Linda'.

Laya has also been used to offer an audience extra content when viewing a promotional poster for a movie or video-game. One example of this is the movie 'We're the Millers'. Scanning the poster gives you the option to click through to reviews, ticket sellers and the movie-trailer [Figure 5].

Also in the realm of advertising, FoldAR enhanced a product catalog with 3D models of items that could then be viewed from all sides. [15] This gives the user a better perspective on the item than a 2 dimensional picture.

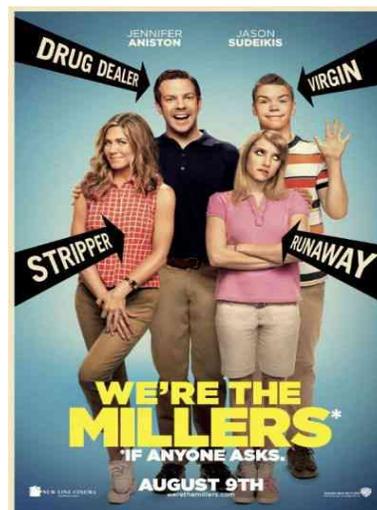


Figure 5. The promotional poster for 'We're the Millers'.

5. SURPRISING APPLICATIONS

Some surprising applications surfaced in the Layar Creation Challenge of 2011 [15]. Although many finalists had focused on more general applications like posters, on-line purchases, and other augmented advertising, some relatively new ideas were offered by the others. 3rd place went to 'Food2You', a interactive menu offering options on ingredients and delivery. Also quite original was 'Who Killed Guido?', a murder mystery where users had to figure out a crime searching for AR clues in a picture.

Some people who work for Layar use business cards that can be scanned and then show you buttons to automatically call the person in question or befriend them on LinkedIn. This shows also a very practical but still largely unexplored side of Layar; offering you a method to transfer physical information fast and easy to your mobile device.

Money has been augmented a lot, which is interesting because it is a ubiquitously available target object and there are already several available layers for it. If you scan a 20 Euro note with Layar, you can choose which augment you want to see as several have been made by different people. [Figure 6]



Figure 6. A 20 Euro note. Depending on the layer you choose it is either overlapped by a 50 Euro note or a little stick figure marches in and interacts with the note.

Another interesting application was singing postage stamps. The Flemish radio choir made stamps in 2014 that could be scanned by Layar, upon which a video would start showing the choir singing a song. The four different stamps each have their own song and group of choir members. Apart from drawing attention to the choir, it also provided a fun way to make letters interesting. [Figure 7]



Figure 7. The postage stamps that start to sing.

6. GETTING STARTED [21]

In this section we introduce a short step by step guide on how to create an interactive print document using Layar Creator.

Having a Layar account is necessary in order to create and edit interactive print projects. Signing up process is straightforward and takes only a few minutes [Figure 8]. Within a couple of minutes after submitting the details, you will receive an email from Layar with a verification code. After clicking on the link you will be asked to provide your real name and your account will be verified.

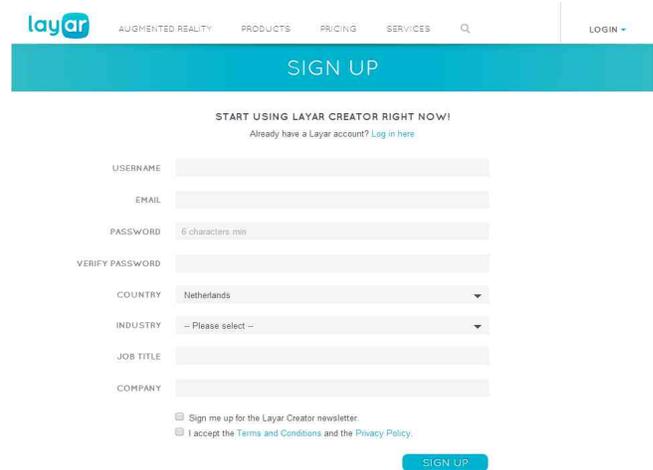


Figure 8. Sign up screen of Layar

After verifying your account, your name will appear on the top right corner of the screen. If you hover over your name, you will see a drop-down menu table with 5 options: 'Go to creator', 'my Layers', 'Messages', 'Account' and 'Log out' [Figure 9].

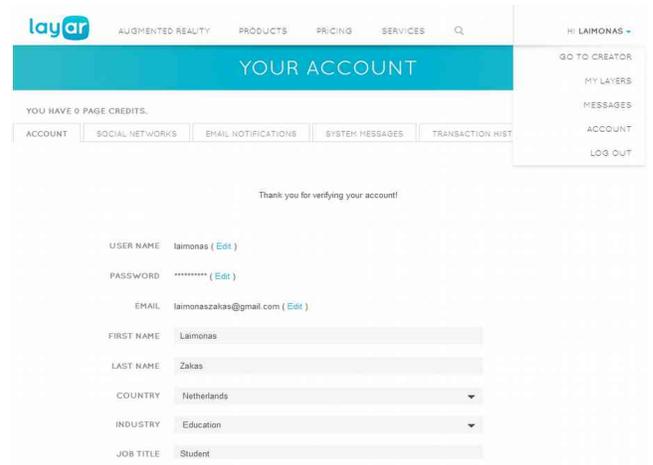


Figure 9. Drop-down menu

When you click on 'Go to creator', you are shown a welcome screen with 5 steps to create and publish your interactive content [Figure 10].

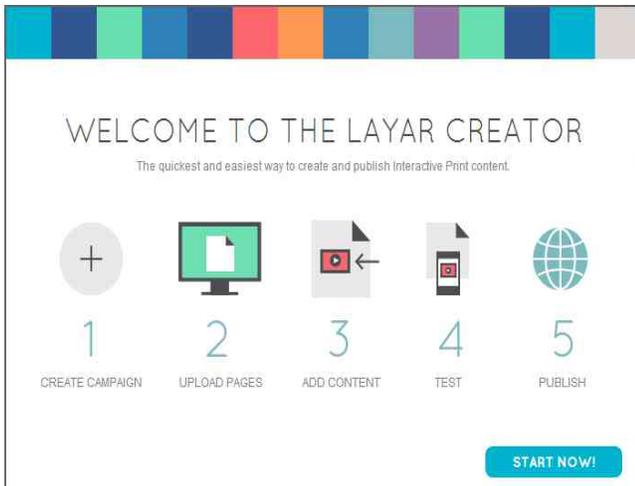


Figure 10. Step by step menu

On the first step you will be asked to give your campaign a title and to choose its type from a list:

- Magazine
- Newspaper
- Print advertisement
- Catalog/folder
- Business card
- Greeting card
- Packaging
- Direct marketing
- Billboard/outdoor advertising
- Letter
- Poster
- Other

After choosing the type and clicking on the ‘Create campaign’ button, you will be brought to the page manager where you are asked to add a page in either jpg, png, pdf or zip format [Picture 11].

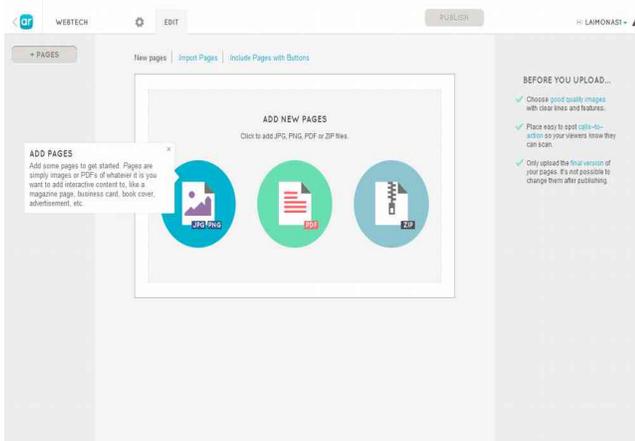


Figure 11. Page manager

After uploading, each page will be analyzed for a few minutes and can be either rejected or confirmed. For interactive print to work the best, your page should avoid symmetry, large blank areas, repetitive patterns and large areas of text. Pages that have not enough detail to construct a unique fingerprint are rejected. If the page is confirmed, you will be allowed to change the campaign name, type and visibility and submit more details about the campaign like the in-app display name and an icon.

In edit mode, you will see the current page with uploaded image in the center with page list on the left side and button list on the right side [Figure 12]. Possible buttons to add as augments are the following: website, video, carousel, audio, call, like on Facebook, send an email or share on Twitter. Custom buttons with your own design are available if you upgrade to a premium account. These include html frame, and launching a GEO-layer or an application.

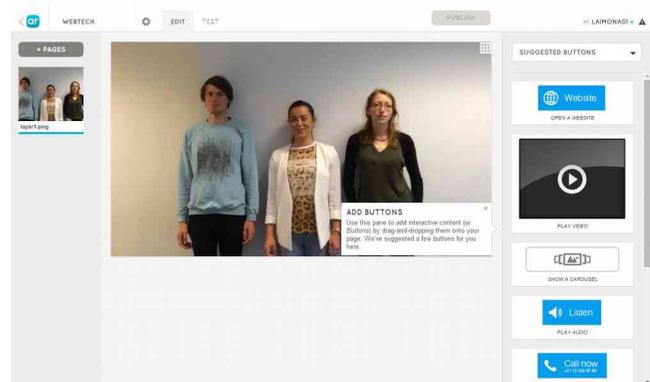


Figure 12. Page edit mode view

In our example, we want to have an animated gif playing when the target object is detected. For this too happen, we choose the ‘Show an image’ button and upload the animated gif. After it loads, we save it and resize it to fit the screen. [Figure 13].

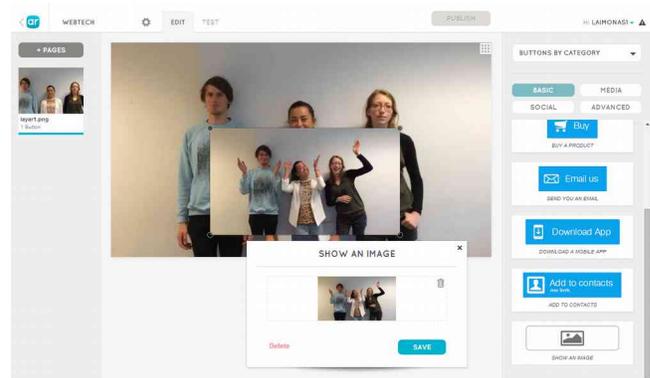


Figure 13. Adding a button to a page

The next step is to test the campaign and make sure everything is working correctly. This is done by clicking on the TEST tab on the top of the page. In order to test your campaign, you’ll need to have the Layar Application

installed on an iOS or Android device. To get Layar, visit get.layar.com on your device or search for *Layar* in the App Store or Google Play. Once you've downloaded the application, point it to the image on the test page [Figure 14] and tap the screen of your smart-phone to scan it. It is advised to test it on both iOS and Android platforms as there might be small differences.

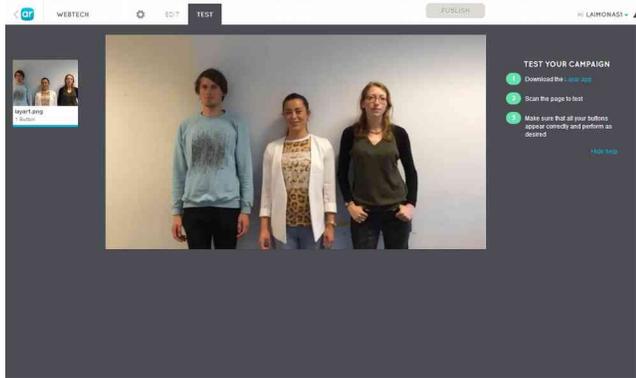


Figure 14. Test page

If the content appears correctly on the screen after scanning the image, you are ready to publish it. To do that just press the 'Publish' button on the top of the screen. For publishing each page of your campaign you will be asked to pay 45 Euro per year. However, you will also be offered a free service, but it will contain ads and will be on-line for only 60 days.

7. FINAL THOUGHTS

Layar Vision seems like a valuable addition to the existing, mainly GPS-based Layar application. It lowers the bar for developers to create interactive print and try their hand at augmented reality.

However, an easy building tool for developers comes at the price of having to pay for an ad-free product and not being 100% free in the content that is created. Although alternatives do exist, Layar is pretty popular which makes it interesting for the potential target audience it offers. It also offers a good developer interface.

We suspect that the real take-off of augmented reality will have to wait a bit still. Devices like Google Glass will bring the technology closer to the average user, but we are barely in early adopter stage when it comes to specialized AR devices like that. In the world of mobile devices, AR still seems to be in the stage of a 'gimmick', funny and interesting to most users, but not yet universally applied.

REFERENCES

1. Azuma, R. T. (1997). A survey of augmented reality. *Presence*, 6(4), 355-385.
2. Butchart, B. (2011). Augmented reality for smartphones.

3. Duggan, M., & Rainie, L. (2012). Cell phone activities 2012. Pew Research Center.
4. Miller, G. (2012). The smartphone psychology manifesto. *Perspectives on Psychological Science*, 7(3), 221-237.
5. The Layar Platform: <https://www.layar.com> (retrieved June 2014)
6. P. Curet, K. Govaart, H. Sperber (2010) Web-based mobile Augmented Reality: Developing with Layar (3D). *Web Technology Report*
7. Wave, D. (2010). QR Codes. QR Code. com.
8. Kato, H. (2002). ARToolKit: library for Vision-Based augmented reality. *IEICE, PRMU*, 79-86.
9. <http://www.sketchup.com/products/sketchup-pro> (retrieved June 2014)
10. <http://www.autodesk.com/products/autodesk-3ds-max/overview> (retrieved June 2014)
11. <http://www.blender.org/> (retrieved June 2014)
12. Byron, A. (n.d). (2004). Rich media enriching PC ads
13. G. Reitmayr, T. Drummond, "Going Out: Robust Model-based Tracking for Outdoor Augmented Reality", *Proceedings of 5th IEEE & ACM Symposium on Mixed and Augmented Reality (ISMAR 2006)*, 2006, pp. 109-118.
14. Augmented Reality at Wellington Zoo: <http://theinspirationroom.com/daily/2007/augmented-reality-at-wellington-zoo/> (retrieved June 2014)
15. Layar introduces Layar Vision: <https://www.layar.com/news/blog/2011/08/02/introducing-layar-vision-and-a-55000-creation-challenge/> (retrieved June 2014)
16. Layar launches AR creative service: <https://www.layar.com/news/press-releases/layar-creative-studio/> (retrieved June 2014)
17. Google Glass goes public – No invitation needed. TakeAClick: <http://www.takeaclick.com/google-glass-publicly-available/> (retrieved June 2014)
18. Developer documentation on Layar website: <https://www.layar.com/documentation/browser/> (retrieved June 2014)
19. <http://www.aurasma.com/> (retrieved June 2014)
20. Promotional movie for Layar Vision with intended applications: <https://www.youtube.com/watch?v=AsD0DuPT1GI> (retrieved June 2014)
21. <https://www.layar.com/creator/> (retr. June 2014)