

Integrating Augmented Reality in the Web

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Introduction

With the improved capabilities of newer smartphones, Augmented Reality (AR) applications are now reaching a broad audience. However, AR applications are generally based on dedicated browsers and proprietary formats. This limits the number of devices that can benefit from these applications as well as the scope and reusability of these applications data. Would web technologies be able to enrich and push the limit of AR applications? Which technologies are needed to enable their integration in the Web?

Augmented Reality Today and Tomorrow

Metadata Overlay

Several AR browsers do display data associated to a location over a live scene captured through a camera (Layar, Junaio, Wikitude...). The most frequent technology is based on geolocation information: it consists in adding overlays to live scene with information such as sightseeing places or restaurant reviews. Another interesting ability of AR already available in some applications is object recognition: Google Goggles or Kooala provide this feature to get, for instance, information about a book from its cover.

Data Insertion

Less common technologies perform insertion of data in displayed images. As demonstrated by Microsoft with their Bing Maps demo at TED¹, videos may be precisely positioned inside map images to show what happens at that location at a given time. Virtual objects, such as buildings or characters, may also be added, and users can interact with them.

Future Interfaces

Future display and interface technologies will enable new types of AR: Head Mounted Display can make AR socially possible everywhere, while portable projector can enable interaction with real objects, as illustrated by Sixth-sense project². The field of AR technologies is very broad, and technology innovation is expected in some of those areas that will also significantly impact the Web.

¹ http://www.ted.com/talks/blaise_aguera.html

² <http://www.pranavmistry.com/projects/sixthsense/>

Relation to the Web

The Browser Issue

Though most current AR applications require Web connectivity to retrieve the data to display, AR applications are currently not well integrated in the Web as they tend to be available as dedicated applications, for instance Android or iPhone native applications. A wide range of existing mobile devices with Web connectivity cannot use AR applications. Web technology would enable reaching a much wider audience at a lower development cost.

The Data Issue

As there is no standard format for AR data today, various technologies do coexist. This leads to a lack of interoperability. The insertion of information inside web data in an interoperable manner would enable enhanced user experience, as any web data would then become a potential resource for AR applications. Geo-tagging of e.g. HTML documents is already achievable using Geo Microformat³ for instance, but improvements are still needed to fulfill AR applications needs.

Web Standards

Current Standardization Work

A good reason for AR applications to be delivered today as native applications is the lack of standard APIs for obtaining the required information. Device APIs (geolocation, media capture) are of prime importance for AR applications. The W3C is conducting an important activity in that area by defining how to access devices' sensors data through interfaces like Geolocation API⁴, Capture API⁵, Compass API⁶ and System Information API⁷. Therefore, it can be considered that some key technologies for using Web browsers as AR platforms will soon be made available.

Opening AR Data

The full integration of AR in the Web may go beyond enabling Web browsers to be used as AR platforms. By applying the principle of Open Data and mash-ups, one can imagine using distributed databases in order to create new and richer services. Instead of having data silos, some organizations (cities, regions, museums, brands...) may be interested in publishing their own information, which would then be aggregated by other websites. For such a scenario, W3C and AR community could determine lists of good practices, dedicated formats describing metadata associated to precise 3D spatio-temporal locations, and common ways of gathering and querying these metadata databases.

Virtual Objects Representation

Additional work on AR may be pursued, such as better rendering virtual objects in real scenes. Some browsers already have 3D object rendering capacities. Existing 3D file formats like X3D may also be good candidates for describing 3D contents.

³ <http://microformats.org/wiki/geo>

⁴ <http://dev.w3.org/geo/api/spec-source.html>

⁵ <http://www.w3.org/TR/2010/WD-capture-api-20100401/>

⁶ <http://dev.w3.org/2009/dap/system-info/compass.html>

⁷ <http://www.w3.org/TR/2010/WD-system-info-api-20100202/>

Research should be conducted to analyze how these technologies do interact and how they fill in existing and future AR application needs.

Conclusion

Augmented Reality covers very diverse fields. The Web being a very rich data place, AR applications and technologies would benefit from being fully integrated into the Web. W3C and AR communities may work on determining how to enable Web browsers to be used as platforms for rich AR applications. The community may also consider how existing standards could apply to AR and whether new standards would be required to achieve AR's full potential on the Web.