ARIA,
A Browser for the Internet of Everything

Provisional Patent

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1. Fields of Invention

Internet/Augmented Reality/ Blockchain technologies

2. Background

Vannevar Bush devised the Memex , which inspired Ted Nelson to create HyperText. Then Tim Berners Lee connected the Hypertext concept to the rising Internet to create the World Wide Web. In all these developments, nodes are the key element: may they be images or words, or URLs associated to sites that include images and words.

Mosaic, created by Mark Andreessen, and others at U. Illinois, was the first graphic browser which enabled navigation in this new network of nodes. Mosaic became Netscape Navigator, the first commercial Internet browser.

Browsers like Netscape Navigator facilitated the emergence of companies that classified nodes into directories (i.e., Yahoo), or used network algorithms to facilitate search for specific images, words and/or sites (i.e., Google). Later on, the Internet browsers enabled the creation of other Web platforms and products.

The World may be divided conceptually into a Real World and the Data World. In the last two decades, most efforts have been directed towards the transformation of the Real World activities into Data World representations. Artificial Intelligence has accelerated that transformation, providing analytics that increase the efficiency of Web based business models from advertising to e-commerce.

The Real World of physical things has been approached by what is called the Internet of Things (IoT) . The idea is that things can become smarter by adding sensors, processors, and/or actuators.

The Electronic Product Code and associated work to bring RFID to market have been landmarks in the development of IoT. The underlying work established not only the basic structure of a RFID tag, but also attempted to create the foundations for manufacturing it at low costs, developing an information infrastructure (including a programming language), and driving adoption.

There is now an IoT ecosystem of companies with well established business models. But this IoT view is misguided on three grounds:

- It ignores that in most cases, Augmented Reality (AR) will be enough to add intelligence to objects and their environments. AR is a bridge connecting the Real World to the Data World, being an essential component for IoT. Plain AR can be used for most “things”. If these are somehow “sensored” (i.e., using RFID or any other smart labeling system), we will also use an (enhanced) AR system to interact with objects ;

- It does not take into account that the traditional Internet (represented at least by its infrastructural companies such as Google, Facebook, Amazon) should be seamlessly connected to IoT;

- The dominant IoT view ignores that we are experiencing a decentralized revolution where anyone in the Globe can have an idea, prototype it, and fund its development into a product, using “crowdfunding” platforms. We are building a distributed world of craftsmen working for the global market, competing and/or complementing the traditional broadcast World.

What is being created is what Cisco calls the Internet of Everything (IoE), including both the traditional Internet to the upcoming IoT.

There is the need for a tool that enables navigation in the Internet of Everything. A tool that enables us to explore the Real World, bridge it to the Data World, and still use the conventional Internet infrastructure.

ARIA, intends to be such a browser as described below. ARIA will use Real World images (synchronous or asynchronous) as its interface. Those images will be “tagged“, and will include “buttons”. “Tags” will be the key nodes for exploration of the Real Word, and also of the Data World. “Buttons” will provide linkage to Google, Facebook, Amazon, and others.

3. Brief Summary of the Invention

"Tags" are identifiers in the Real World: we are privately "tagged" by our ID and driver's license; streets are "tagged" in name plates; cars are "tagged" by their plates; stores are "tagged" by ads; products have "price tags" and "labels"; products can have "bar codes" and "RFID" tags; and utility meters "tag" our consumption levels. But "tags" may be windows to further information about Real World places, objects or experiences.

Despite the widespread use of "tags", most places, objects and experiences in the Real World are still "untagged". Existing "tags" are also not structured to be handled in the Data World.

Everyone has a camera (in his/her smartphone, glasses or tablet) and generates images. These images can be automatically "tagged" (in most instances) with "space" and "time" referencing.

They can be also further "tagged" with extended labeling (i.e., place, product or experience features, recommendations, prescriptions, manuals). In addition, it is possible to open two way communication channels between the "image" owner and any user (i.e., product promotions; comments and "likes" by the users; orders and purchases of products). "Sensored" objects also relay information that can feed digital "tags" representing their state

Places, objects and experiences can then be associated to "tagged post-its" (or simply "tags") that can be consulted by anyone. Due to improvements in image recognition, indoor positioning, and sensors available on smart-phones, it is now possible to browse those "tags" associated to places, objects and experiences, in the Real World, with precision. These "tags" can also be browsed remotely.

"Tags" then become "information vectors" associated to places, objects and experiences Those "vectors" can be manipulated, using trivial network and other heuristic algorithms to provide, among others: way finding; product finding; place and product selection; and ordering and purchase.

By digitally "tagging" places, objects and places and using an augmented reality interface, one can develop a bridge between the Real World and the Data World. That bridge can lead to the development of a "browser for the Internet of Everything (Real World+Data World), that we name ARIA.

ARIA will be supported by hypergraph data base structures. Hypergraph representations are isomorphic of the Real World. They are also convenient to extract "tags" from the Data World, and thus create a consistent representation of the Internet of Everything based on Real World and Data World tags. Moreover, hypergraphs based algorithms facilitate partition, clustering, machine learning and other operations that may be associated to ARIA.

The development platform associated to ARIA enables anyone to "tag" places, objects and experiences, outdoors and indoors. It may be also used by programmers that may enrich ARIA's user experience. This platform is based on a core that controls image recognition, positioning, tagging, and virtual simulation modules.

ARIA also relies on blockchain based smart contracts to manage “taggers”, developers, and “miners” around the World. It also enables the registration of “absolute tags” (those that cannot be changed) in the blockchain.

ARIA is global, but relies on hyper-local information. It is geared to attract governments, companies, media, and citizens to create local communities of knowledge and economic opportunity, based on augmented environments through “tagging”. “Tags” become the new atomic units of the IoE and, as such, are valued like other Internet entities such as sites, or apps. Thus, they can facilitate traditional business models associated to the Internet such as advertising and e-commerce at a hyper-local scale. ARIA will apply part of these revenues to stimulate local tagging, mining, and media by using a token system.

4. Brief Description of the Drawings

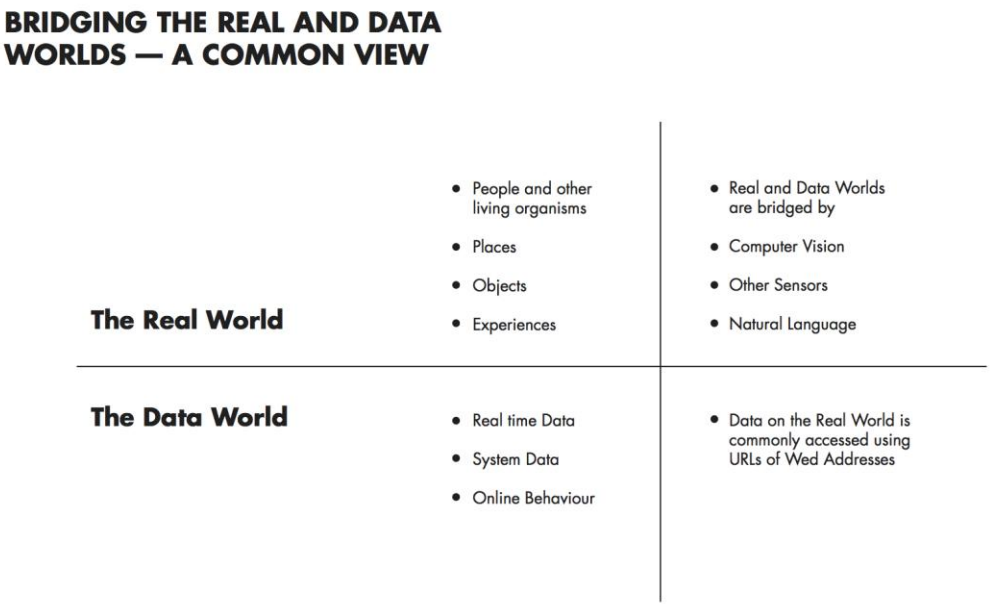
1. Bridging the Real and Data Worlds- A Common View

The Real World is inhabited by people and other living organisms. It is a collection of natural and manmade places, which include objects and where humans have assorted experiences.

The Data World is where you can find legacy and real time data on the Real World. Real and Data Worlds are bridged by computer vision and other sensors, and through natural language.

The Internet enabled the analysis of humans' online behavior in this Data World, providing the basis for the development of infrastructural companies such as Google, Facebook, and Amazon.

Data on the Real World is commonly accessed via URLs (Uniform Resource Locators) of Web addresses.



2. Bridging the Real and Data Worlds- A Hypergraph Based View

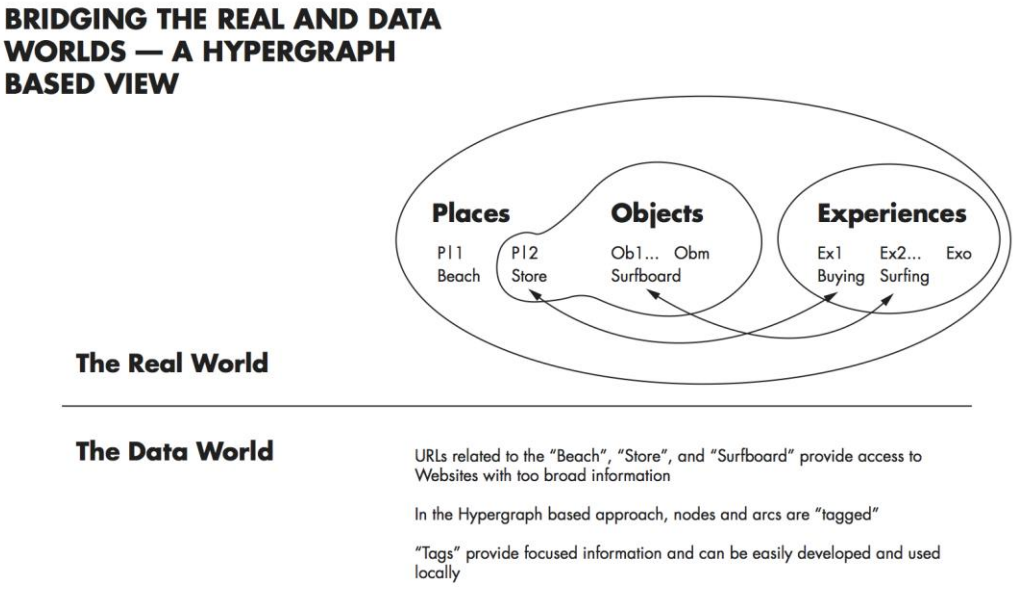
Imagine that the reader wants to buy a surfboard to be able to surf in a beach. He will use the Internet, which really is a Data World composed of URLs, some of them linked to the Real World.

You will search for beaches, stores and surfboards. You will end up with URLs leading to Web sites providing too broad information, which you will have to filter. The limiting factor will be the surfboard, so you will look to the offerings of the different stores. You will select the store with the most appropriate surfboard, closer to you and/or to the preferred beach. Then, you are ready to create an itinerary in a map application.

Note that the number of beaches, stores and surfboards in the area is limited. They can be represented by nodes. The relationships between those nodes, configure a graph representation that is a hypergraph (a concept developed by Claude Berge).

You can actually see that a hypergraph representation of these entities and relationships is isomorphic to what happens to the Real World. In addition, you can also see that the traditional Internet representation based on a network of URLs does not reflect the Real World, and leads to cumbersome operations as depicted above.

To complete the hypergraph representation, one has to associate atomic information entities to each node. These entities have also to include information on the relationships between nodes. We will call “Tags” to these atomic entities. They may be “Real World Tags”, but also “Data World Tags” as shown below. “Tags” provide focused information and can be easily developed and used locally or remotely.

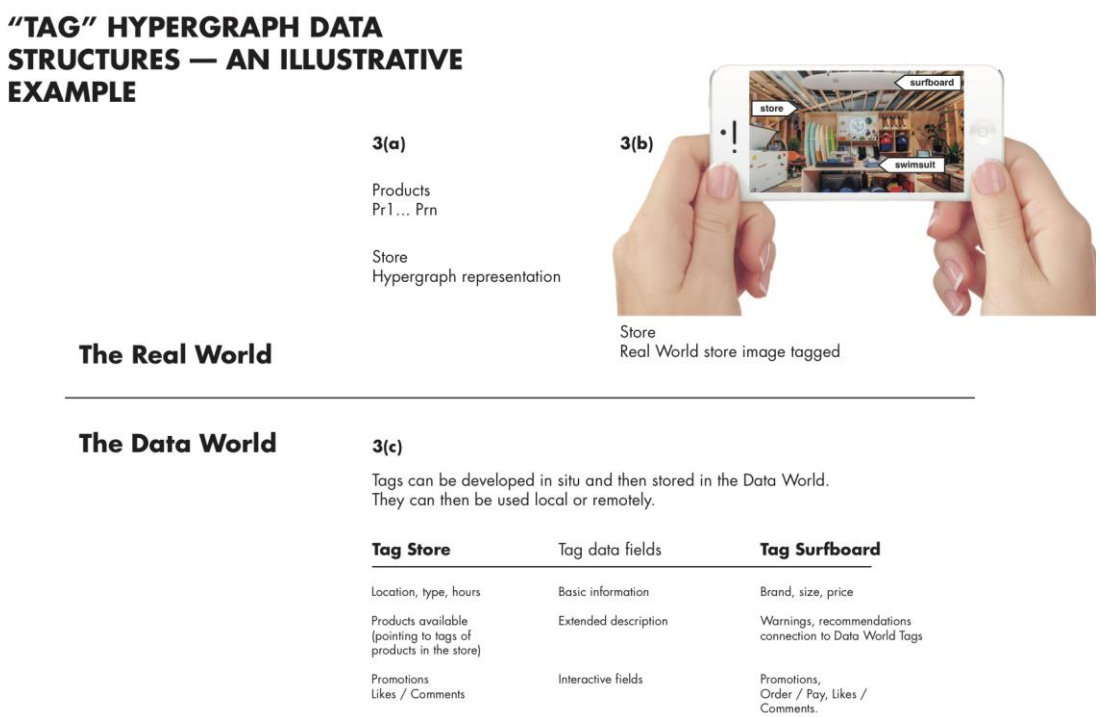


3. “Tags” Hypergraph Data Structures- An Illustrative Example

A store selling products for aquatic sports, can be represented as an “hypergraph”. The “store” will be a node in a city, containing a set of nodes that are its products, such as a “surfboard” (see 3.a)

These nodes (store, surfboard) can be “tagged”, to provide useful information. In the Real World, these “tags” can be filled and browsed” in situ” by using augmented reality (see 3.b). They may be also used for analytical purposes in place or remotely.

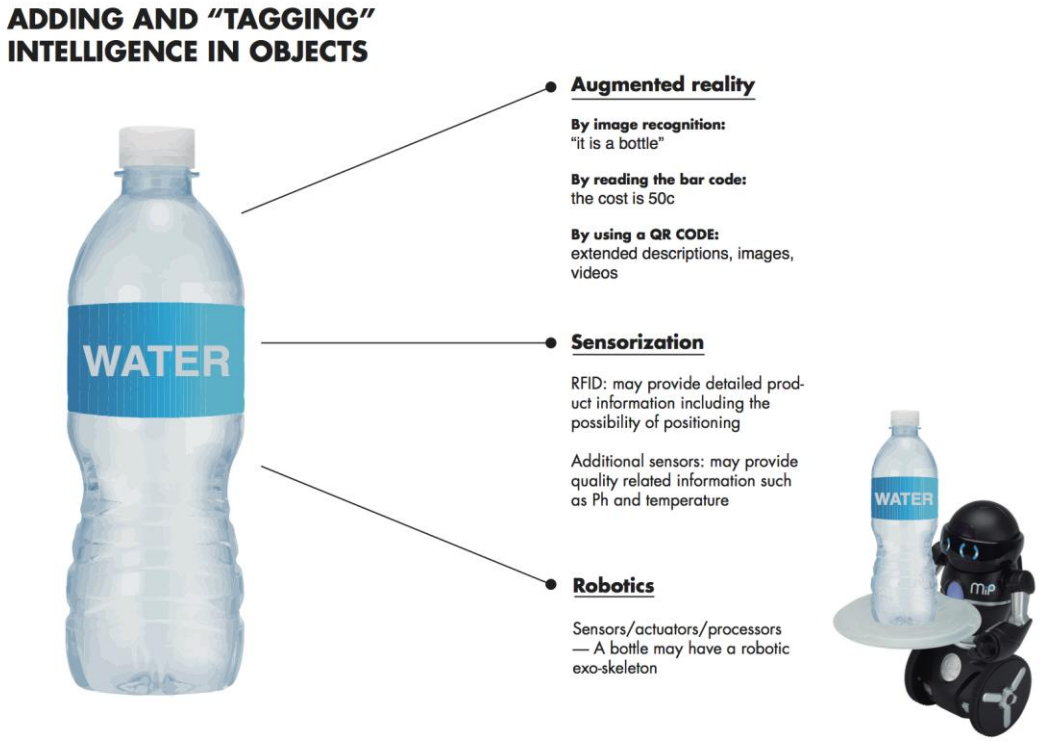
The tags will always include (see 3.c): basic data; extended description; and interactive fields.



4. Adding intelligence to objects

Intelligent objects are those that can be "tagged". ARIA looks to the World as an ecosystem of intelligent objects (including people, places, things, and experiences). This can be achieved by:

- Augmented reality (object recognition using image processing and previous knowledge, positioning; readings from object sensors);
- Sensors added to objects (conventional and printed electronics);
- Adding sensors. actuators and processors (robotics. vDrawing 4 uses a bottle of water as an illustrative example.

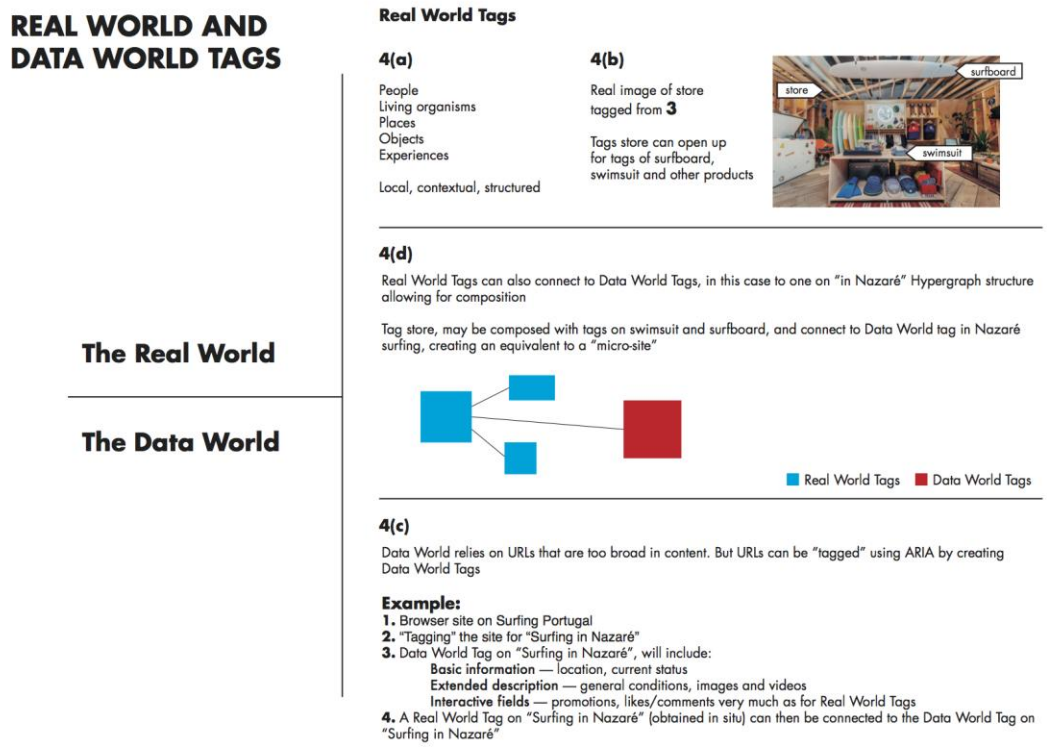


5. Real World and Data World Tags

Real World Tags will be associated to people, other living organisms, places, objects and experiences. They will be associated to nodes on a Real World hypergraph representation (see 5.a, and example in 5.b).

Data World Tags rely on Web sites that usually have content that is too broad. ARIA will allow its "tagging" as shown in 5.c

To respond to queries, one selects then the Tag or Tags that enable the answer. This may involve composition of both Real World and Data World tags as shown in 5.d.



6. Real World interactive movie experiences

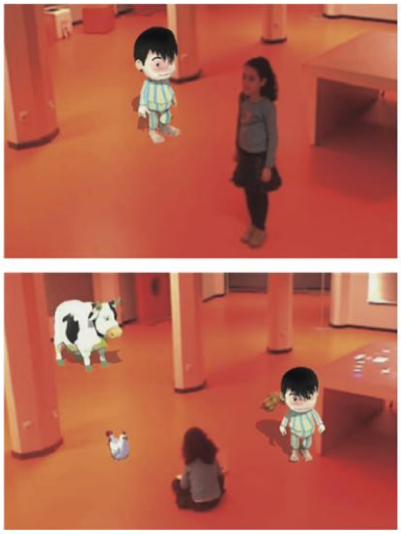
Drawing 6a shows a Real World real time experience whereby one can drive a virtual car competing against real cars. 6b illustrates how one can interact with a virtual character visiting our Real World in real time.

Both 6a and 6b illustrate the power of ARIA platform in bringing “tagged” virtual objects to the Real World, and enabling real time interaction with them.

REAL WORLD
REAL TIME GAMING

Realsim

A virtual car (remotely controlled by a user) introduced inside a real time broadcasted scene.
The virtual car will not affect the real ones but can be affected by them. If a real car “collides” with the virtual one it will be projected out of the track.

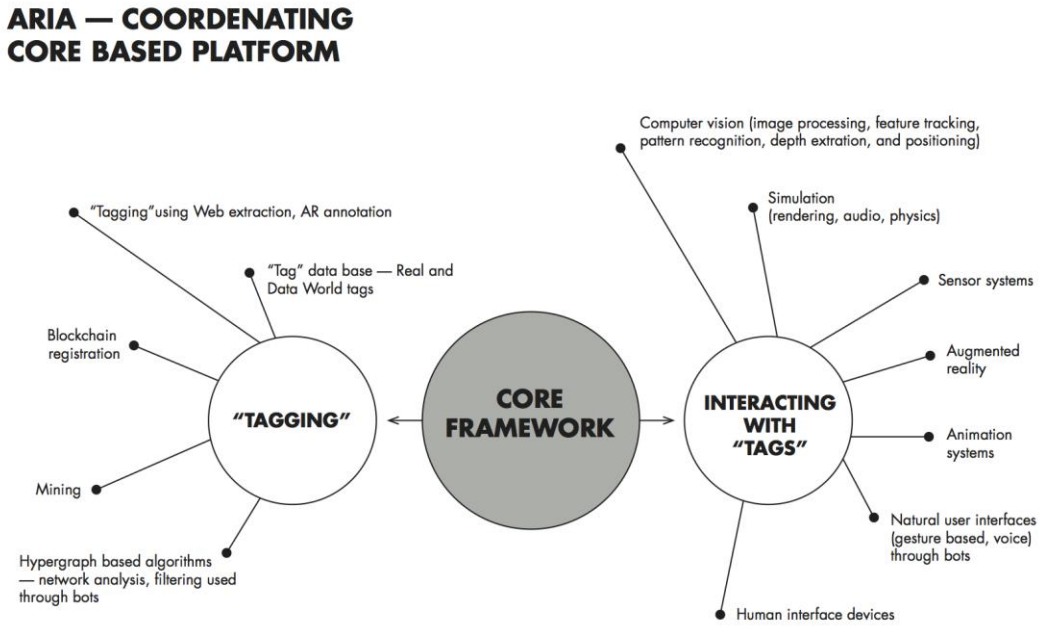


Flapy — Augmented Playground for childrens

Virtual characters real-time interaction with humans and physical spaces in a new seamless dimension

7. ARIA platform

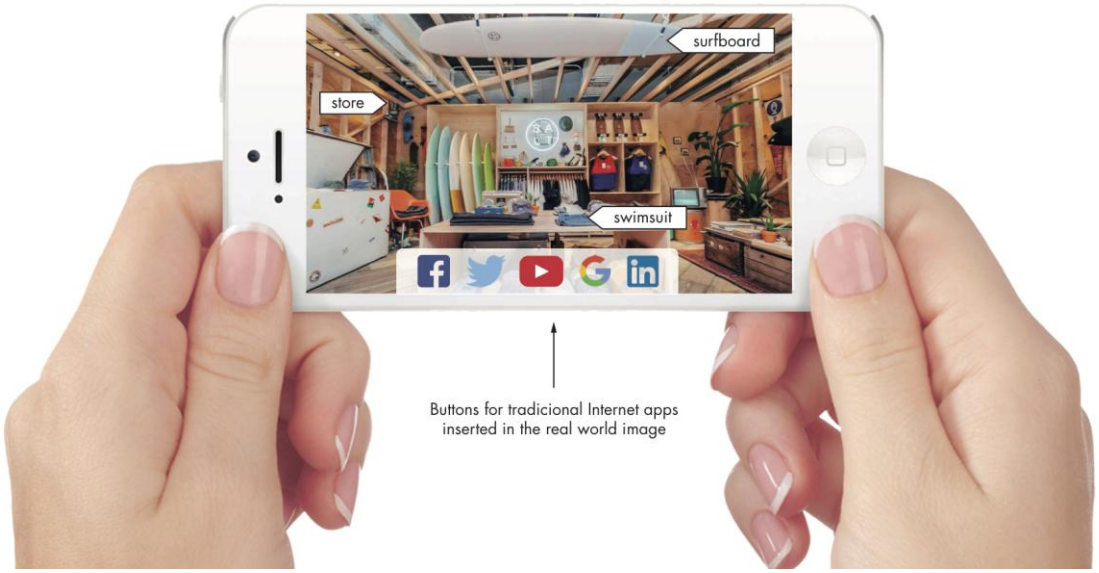
ARIA platform is based on a Core that coordinates the use of modules depicted on Drawing 7 that enable “tagging” and interact with “tags” in the Real and Data Worlds.



8. ARIA interface

Drawing 8 illustrates ARIA opening interface: an image of a “tagged” Real World captured by the device’s camera or seen through AR glasses; and “buttons” enabling the interaction with existing Internet apps.

ARIA — INTERFACE



5. Detailed Description of the Invention

Real World and Data World representations

The Real World is inhabited by people and other living organisms. It is a collection of natural and manmade places, which include objects and where humans have assorted experiences.

The Data World is where you can find legacy and real time data on the Real World. Real and Data Worlds are bridged by computer vision and other sensors, and through natural language.

The Internet enabled the analysis of humans' online behavior in this Data World, providing the basis for the development of infrastructural companies such as Google, Facebook, and Amazon. Data on the Real World is commonly accessed via URLs (Uniform Resource Locators) of Web addresses (see Drawing 1).

Imagine that you want to buy a surfboard to be able to surf in a beach. He will use the Internet, which really is a Data World composed of URLs, some of them linked to the Real World.

You will search for beaches, stores and surfboards. You will end up with URLs leading to Web sites providing too broad information, which you will have to filter. The limiting factor will be the surfboard, so you will look to the offerings of the different stores. You will select the store with the most appropriate surfboard, closer to you and/or to the preferred beach. Then, you are ready to create an itinerary in a map application.

Note that the number of beaches, stores and surfboards in the area is limited. They can be represented by nodes. The relationships between those nodes configure a graph representation that is a hypergraph (see Claude Berge, Graphs and Hypergraphs, 1973)).

You can actually see that a hypergraph representation of these entities and relationships is isomorphic to what happens to the Real World (see Drawing 2). In addition, you can also see that the traditional Internet representation based on a network of URLs does not reflect the Real World, and leads to cumbersome operations as depicted above.

Real World Tags

To complete the hypergraph representation, one has to associate atomic information entities to each node. These entities have also to include information on the relationships between nodes. We will call "Tags" to these atomic entities. They may be "Real World Tags", but also "Data World Tags" as shown below.

"Tags" provide focused information and can be easily developed and used locally or remotely.

A store selling products for aquatic sports, can be represented as an "hypergraph". The "store" will be a node in a city, containing a set of nodes that are its products, such as a "surfboard" (see Drawing 3.a). These nodes (store, surfboard) can be "tagged", to provide useful

information. In the Real World, these “tags” can be filled and browsed” in situ” by using augmented reality (see Drawing 3.b). They may be also used for analytical purposes in place or remotely.

Thus, ARIA will always open into our device camera to provide the base Real World interface. That interface will enable us to browse, explore, play, simulate, order and/or purchase things. These things may be Real World environments, objects, and, even, experiences. Images of things are to be captured by 2D, 3D and 360 cameras. These images will be annotated or open into other static or dynamic images, text and sound using Augmented Reality (using “smartphones, glasses or tablets). These annotation and linkage processes result on what we call “Real World Tags”.

” Real World Tags” will always include (see Drawing 3.c):

Basic data, including the identification of the space, object or experience, and space and time referencing;

Extended descriptions, including instructions, prescriptions, manuals and dependence relationships with other tags. But those descriptions can also delight and surprise by enclosing dazzling animations and location based games, such as Pokemon Go.

Interactive fields, including two way communication channels that may be used to the “tag” owner to send a and receive messages from the users, comments, likes, and the possibility of ordering and purchasing.

“Real World Tags” will be created by institutions or individuals. Their creators can register those “tags” in the blockchain, making them perennial. We can imagine that a municipality may want to formally tag its main monuments; and we also imagine that a pharmaceutical company will want to register a tag (including a prescription) associated to every drug it sells. These blockchain “tags” will require mining.

“Real World Tags” can be temporary, with validity deadlines depending on the will of their authors. Examples include time limited promotions, warning s, post-its and other messages. In addition, they may programmable to evolve over time and under pre-defined conditions.

A “Real World Tag” can also include “Sub Tags”, such as the case of a device with different buttons: there will be a tag for the device, and sub tags for the buttons.

We can consider different types of “Real World Tags”. The most common will include:

Navigational Tags

A hypergraph representation may also be used to create navigation tools using “tags”. While most “tags” will refer to a physical place (i.e., a store) a physical object (i.e, tooth paste), or an experience (i.e., surfing in Caparica), there will be “navigational tags” that will be virtual. They will be associated to physical anchors in both outdoor and indoor spaces, described by their location and spatial relationship to other anchor “tags”. They will show intermediate arrows that we should follow, if we want to go from point A to point B (way finding), or we want to find a certain product (product finding).

The physical location of “tags” will be determined outdoors via GPS. Indoors, we will use either SLAM, Google Tango, beacon based location, or “dead reckoning” methods.

Points of Interest

These include: monuments, hospitals, schools, restaurants, museums, governmental buildings, churches, shopping centers, stores, theatres, parks and gardens, music venues, sports venues, real estate, and offices. ARIA should allow for reservations/purchase using existing channels

Objects of Interest

Objects of Interest are found associated to Points of Interest or independently such as common objects like vehicles, home and personal devices

Infrastructure

Infrastructures can be tagged for many purposes, from construction management to operation and maintenance. They can include roads; electrical supply, water supply, gas supply and wastewater drainage networks; fiber lines; and phone line cables.

Industrial

Tags can be used to inform about factory layout, production lines, product inspection and maintenance, and warehouse management. They are particularly relevant as they are being used to help both humans and robots.

Home

Tags at home can be used to provide timely information about consumption levels (electricity, gas, Internet, water, food) in a simple scoreboard. These levels may be derived from existing digital measurement, or image processing.
Such information may be used in a number of ways, using apps already available that can be activated through ARIA. Generating recipes, based on the food available, is one of them.
At home, we may also tag or use available tags to interact with devices (i.e., AR based manuals), drugs (i.e., AR prescriptions), or simply find relevant belongings.

Note that ARIA looks to the Real World as an ecosystem where objects (including people, places, things, and experiences) can become smarter. This can be achieved by:

- Augmented reality (object recognition using image processing and previous knowledge, positioning; readings from object sensors);
- Sensors added to objects (conventional and printed electronics);
- Adding sensors. actuators and processors (robotics)

Drawing 4 uses a bottle of water as an illustrative example.

Thus, “Real World Tags” may be used by ARIA to reach common citizen, but they may be also developed for professional markets (utilities, real estate, industrial) within “private” versions of the browser.

Data World Tagging

Real World Tags will be associated to people, other living organisms, places, objects and experiences. They will be associated to nodes on a Real World hypergraph representation (see Drawing 4.a, and example in 4.b), and "tagged" as described above.

Data World Tags rely on Web sites that usually have content that is too broad. ARIA will allow its "tagging" as shown in Drawing. 4.c. The goal is to extract content on sports events, documentaries, films, music and other traditional media (newspapers, magazines, blogs nad books) to create individual "Data World Tags" with the same structure as the "Real World Tags": basic content; extended descriptions; and interactive fields.

This "tagging" will allow for search across the Real and Data Worlds. To respond to queries, one selects then the Tag or Tags that enable the answer. This may involve composition of both Real World and Data World tags as shown in Drawing 4.d, creating concatenated "Tags" that may be seen as "micro-sites", and that can be temporary.

"Data World Tagging" may also cover experiences to substantially enrich ARIA's offer:

- Real World experiences can that were referenced while experiencing them, or later recollection. Those experiences become then "Data World Tags".

- Virtual walk-overs and fly-overs of "tagged" spaces", and access to live events. Simulation can be added to these browsing activities (i.e., AR visualization of furniture from catalogs in your home), which will be also dealt as "Data World Tags".

ARIA will also allow for telepresence in "Real World Tagged events". Drawing 6a shows a Real World real time experience whereby one can drive a virtual car competing against real cars.

Finally, Drawing 6b illustrates how one can interact, in ARIA, with a "tagged" virtual character visiting our Real World in real time.

Both Drawings 6a and 6b illustrate the power of ARIA's platform in bringing "tagged" virtual objects to the Real World, and enabling real time interaction with them.

"Tags" as ARIA's Key Elements

ARIA bridges the Real and the Data worlds, introducing "tags", as new key elements in the Internet of Everything. The information associated to the "tags" will enable data collection and analysis at detail levels non-existing in current systems. "Tags" will enable also easy ordering and purchasing of "tagged" goods and services both physically and on-line.

Such data and facilitated transactions will improve local economies creating favorable logistics, increasing demand, and facilitating conversion into sales.

ARIA intends to rely on the blockchain to assure the fidelity of the most relevant "tags". Thus, it will include "taggers", but also "miners" that will verify the validity of such "tags".

The relevance of “tags” will be defined in three ways:

- ARIA promoters will reward both “taggers” and “miners” for tagging infrastructural information (i..e, the navigational tags”, key anchor sites);
- “Early adopters” will select a limited number of relevant “tags” in their area of influence;
- Owners of spaces, objects, and experiences that will compensate “taggers” and “miners”.

“Tag” verification may be formal and 0/1 for structural information. In many cases, we will rely on “tags” that will be based on user opinions in a scale 1-5, or simply “like/dislike”.

ARIA’s platform

ARIA development platform is composed of a Core coordinating modules that enable “tagging” and “interaction with tags” (see Drawing 7).

The modules that enable “Tagging” include:

- “Tag” extraction (identification and description) from Web information or sensor readings on places, objects or experiences;
- “Tagging” using in situ annotation (including sketching, typing, and voice);
- “Tag” information data base (hypergraph based), including “Real World and Data World Tags”;
- Hypergraph based algorithms including: partitioning (i.e., selecting relevant tags); clustering (i.e., enabling the creation of macro tags composed of other tags); place, object and experience finding; fencing; overlaying; filtering; decision trees, and machine learning. These algorithms may support “bots” to be used in ARIA’s interface;
- Blockchain registration of pre-defined “Tags”.

The modules that enable the interaction with “Real World and Data World Tags” include:

- Computer vision (image processing, feature tracking, pattern recognition, depth extraction, and positioning);
- Sensor systems;
- Augmented reality;
- Natural user interfaces (gesture based, voice) through bots ;
- Animation systems;
- Human interface devices ;
- Simulation and telepresence (rendering, audio, physics);
- Blockchain management system of interactive projects;
- Token management systems.

ARIA's platform modules will use open source and freely available software whenever possible. ARIA's will use its own annotation, indoor positioning, natural user interfaces, simulation and telepresence developments.

ARIA's platform development will rely on graphical based programming, which will progressively transition to coding using natural language instructions.

A system based on blockchain technology will fully automate the management of subscriptions, licenses and similar time-based permission periods through payments and/or micro-payments of ARIA's platform application in interactive projects to be developed by third parties.

ARIA will also use a token system to stimulate and reward local "tagging", "mining "(for the perennial "tags"), and development, that will be managed by the platform.

Drawing 8 illustrates ARIA opening interface in most devices: an image of a nearby "tagged" Real World captured by the smartphone or tablet's camera or seen through AR glasses; and "buttons" enabling the interaction with existing Internet apps. In larger screens, ARIA's interface will be based on "Real World Tags", "Data World Tags" and "Bots" selected by the users, in addition to those buttons.

6. Claims

1. ARIA hypergraph based data structure

ARIA will be supported by hypergraph data base structures. Hypergraph representations are isomorphic of the Real World. They are also convenient to extract “tags” from the Data World, and thus create a consistent representation of the Internet of Everything based on Real World and Data World tags. Moreover, hypergraphs based algorithms facilitate partition, clustering, machine learning and other operations that may be associated to ARIA.

Hypergraph representations and algorithms, ARIA’s foundations, are thus most appropriate for the Internet of Everything.

2. Real World and Data World Tags

To complete ARIA’s hypergraph representation, one has to associate atomic information entities to each node. These entities have also to include information on the relationships between nodes. We will call “Tags” to these atomic entities. They may be “Real World Tags”, and “Data World Tags”.

” Tags” will always be defined by Basic Data, Extended Descriptions and Interactive Fields, as depicted above.

“Real World Tags” will include Navigational, Points of Interest, Objects of Interest, Infrastructure, Industrial, and Home Tags.

“Data Tags” may be obtained by “tagging” relevant on-line content following the Tag structure mentioned above. They also include:

- Real World experiences can that were referenced while experiencing them, or later recollection. Those experiences become then “Data World Tags”.

- Virtual walk-overs and fly-overs of “tagged” spaces”, and access to live events. Simulation can be added to these browsing activities, which will be also dealt as “Data World Tags”.

- ARIA will also enable bringing of “tagged” virtual objects to the Real World, enabling real time interaction with them.

3. ARIA platform

ARIA is based on a distinctive platform to develop of a “tagged Word”, and tools that enable the interaction with “Real World and Data Word Tags”.

The modules that enable “Tagging” include:

- “Tag” extraction (identification and description) from Web information or sensor readings on places, objects or experiences;
- “Tagging” using in situ annotation (including sketching, typing, and voice);
- “Tag” information data base (hypergraph based), including “Real World and Data World Tags”;
- Hypergraph based algorithms including: portioning (i.e., selecting relevant tags) ; clustering (enabling the creation of macro-tags composed of tags); place, object and experience finding; fencing; overlaying; filtering; decision trees, and machine learning;
- Blockchain registration of pre-defined “Tags”.

The modules that enable the interaction with “Real World and Data World Tags” include:

- Computer vision (image processing, feature tracking, pattern recognition, depth extraction, and positioning);
- Sensor systems;
- Augmented reality;
- Natural user interfaces (gesture based, voice) through bots ;
- Animation systems;
- Human interface devices ;
- Simulation and telepresence (rendering, audio, physics);
- Blockchain management system of interactive projects;
- Token management systems.

4. Blockchain applications

ARIA bridges the Real and the Data worlds, introducing “tags”, as new key elements in the Internet of Everything. The information associated to the “tags” will enable data collection and analysis at detail levels non-existing in current systems.

ARIA intends to rely on the blockchain to assure the fidelity of the most relevant “tags”. Thus, it will include “taggers”, but also “miners” that will verify the validity of such “tags”.
The relevance of “tags” will be defined in three ways:

- ARIA promoters will reward both “taggers” and “miners” for tagging infrastructural information (i..e, the navigational tags”, key anchor sites);

- “Early adopters” will select a limited number of relevant “tags” in their area of influence;
- Owners of spaces, objects, and experiences that will compensate “taggers” and “miners”.

“Tag” verification may be formal and 0/1 for structural information. In many cases, we will rely on “tags” that will be based on user opinions in a scale 1-5, or simply “like/dislike”.

A system based on blockchain technology will fully automate the management of subscriptions, licenses and similar time-based permission periods through payments and/or micro-payments of ARIA’s platform application in interactive projects to be developed by third parties.

ARIA will also use a token system to stimulate and reward local “tagging”, “mining “(for the perennial “tags”), and development, that will be managed by the platform.

7. Abstract

The Internet of Everything includes both the Real World and Data World.

The Real World includes people, other living organisms, places, objects and experiences. They are not conveniently represented by Web addresses. By using augmented reality and existing knowledge, Real World Tags including basic data, extended description and interactive fields are more appropriate to describe and interact with those entities.

It is shown that one can derive Data World Tags that are more appropriate to represent data entities than the conventional Web, whenever one wants to have access to relevant virtual information on Real World entities.

Hypergraph based representations are isomorphic of Real World and Data Worlds. In these representations, “tags” are associated to nodes or arcs. These “tags” enable a speedy browsing of the Real World, and fast answers to Data World querying.

Hypergraph representations also facilitate interaction of users with “tags” including partitioning, clustering, machine learning, filtering and other network analysis such as place and product finding.

ARIA is a browser for the Internet of Everything that relies on Hypergraph representations and analytical tools, and “Real World and Data World Tags” that describe both the real and virtual worlds.

ARIA’s underlying platform was designed to facilitate “tagging” and the interaction with a “tagged” World. The goal is to create a multi-scaled Internet of Everything, where the hyperlocal knowledge is available at an high level of detail.