

Award Description

Frost & Sullivan's Technology Innovation Award is bestowed upon a company (or individual) that has carried out new research, which has resulted in innovation(s) that have or are expected to bring significant contributions to the industry in terms of adoption, change, and competitive posture. This award recognizes the quality and depth of a company's research and development program as well as the vision and risk-taking that enabled it to undertake such an endeavor.

Research Methodology

To choose the award recipient, Frost & Sullivan's analyst team tracks innovation in key hi-tech markets. The selection process includes primary participant interviews and extensive primary and secondary research via the bottom-up approach. The analyst team shortlists candidates on the basis of a set of qualitative and quantitative measurements. The analysts also consider the pace of research and technology innovation, and the significance or potential relevance of the innovation to the overall industry. The ultimate award recipient is chosen after a thorough evaluation of this research.

Measurement Criteria

In addition to the methodology described above, there are specific criteria used to determine the final rankings. The recipient of this award has excelled based on one or more of the following criteria:

- Significance of the innovation(s) in the industry, and across industries (if applicable)
- Potential of the products of innovation(s) to become industry standard(s)
- Competitive advantage of innovation vis-à-vis other related innovations
- Impact (or potential impact) of innovation(s) on company or industry mind share and/or company bottom line
- Breadth of intellectual property related to the innovation(s), that is, patents, scientific publications, and papers in peer-reviewed journals.

2007 North American Supply Chain Visibility Solutions Technology Innovation of the Year Award Award Recipient: Visible Assets, Inc.

The 2007 Frost & Sullivan North American Technology Innovation of the Year Award in the field of supply chain visibility solutions goes to Visible Assets, Inc. (VAI) in recognition of the company's efforts in developing RuBee, an innovative new magnetic frequency-based identification and tracking technology. RuBee is a significant advancement in supply chain asset identification and tracking as it represents a compact, low-power, lower-cost visibility solution in areas of high electromagnetic interference. The technology compares favorably to contemporary technologies such as RFID, and has some advantages over current RFID-based solutions. Unlike traditional RFID tags, which operate at high to ultrahigh frequency, Rubee tags are capable of transmitting data at a very low frequency that falls completely within the magnetic spectrum.

Introduction

VAI is a Miami, Florida-based privately held company that is engaged in developing solutions for product location through the supply chain. For over 20 years, the VAI technology group has been working toward designing and building visibility networks. The company specializes in using both RFID and magnetic induction to produce

visibility hardware and software systems for the healthcare, government, agriculture and other sectors with high value assets.

VAI specializes in providing end-to-end supply chain tracking as well as in facilitating visibility and visibility in harsh conditions. The goal of VAI has always been to provide customers with the ability to actively track their supply chain from point of manufacture to end-user.

One of the most notable advantages of VAI's visibility solutions is that their tags are able to function, without any interference, even in the most electromagnetically unfriendly environments. The technology behind VAI's tags is a protocol developed on-site and commercially known as RuBee. What makes VAI's tags unique is that they run on a noninvasive frequency, thus allowing them to be safely applied within or on the product package. For example, such tags can be attached directly to the motherboard or other components of computers and industrial or consumer electronics. The tag can record all manufacturing pedigree data and maintenance activity for easy access by a field technician.

Technology Overview

RFID, which has, till now, been the primary choice for asset tracking, has certain limitations in environments with metallic surroundings or near liquids. This occurs because the radio waves are absorbed by liquids and are attenuated by steel structures, which could lead to read errors.

To overcome such limitations, VAI has been engaged in developing a standard for a long wavelength wireless network protocol, 1902.1 (RuBee). The company has worked closely with the Institute of Electrical and Electronics Engineers (IEEE) to develop RuBee. The RuBee is a bidirectional, on-demand, peer-to-peer, radiating (as opposed to backscattering as used in RFID), and transceiver protocol system. It operates at a wavelength well below 450 kHz and typically at 132 kHz. At this frequency, the signal is almost purely magnetic (that is, only the H-field is present). As the signals communicated by RuBee are almost entirely magnetic, the protocol is virtually unaffected by harsh environments. RuBee networks can be made up of over thousand tags and have an area range of 10 ft. to 50 ft.

The advantages of long-wavelength technology are that radio tags are relatively inexpensive, very thin (1.5 mm), and fully programmable using 4-bit processors. RuBee has been pegged as a technology similar to RFID; in reality they are quite different. While RuBee functions at the LF range producing 99.99% magnetic and 0.1% electric energy, RFID operates at either HF or UHF frequencies, which translate to 99.99% electrical energy and 0.1% magnetic energy. RuBee fills the gap between the non-networked, nonprogrammable, backscattered RFID tags widely used for asset tracking and the high-bandwidth radiating protocols for IEEE 802.11 local area networks and IEEE 802.15 personnel area and data networks.

Innovative Features

RuBee is fairly robust and able to withstand adverse environmental conditions as it operates in the magnetic portion of the electromagnetic spectrum. This is because magnetic signals easily pass through liquids and metals without resulting in significant changes to the wave. The immunity of RuBee tags to RFID-unfriendly environments makes them an ideal choice in a number of applications and environments. In addition, since RuBee operates at a very low frequency, tags have a minimalist power requirement. RuBee tags typically have a battery life of 10 to 15 years and require only low-cost, coin-sized lithium-ion batteries.

RuBee tags can be coupled with sensors so that environmental information and storage conditions can also be determined at multiple points along the supply chain. RuBee tags and base stations produce only microwatts of radio energy and it is this low output that makes them ideal for hospital and operating room (OR) applications. These signals are of such low frequency that there is no biological interaction. Labeled as a non-significant risk, RuBee tags have no effect on cardiac pacemakers and automated external defibrillators (AEDs). RuBee has a field strength that is even lower than that of airport metal detectors and antitheft detectors in retail stores. The maximum range of a RuBee tag is approximately 100 ft., which is greater than the range offered by an equivalent RFID tag.

It is worth noting, however, that RuBee tags are not a replacement for RFID but rather represent a complementary technology. RuBee tags, due to their low frequency, cannot match the read rate of RFID and will not be suitable for high speed pallet level tracking, where the requirement is to read over a hundred tags a second, as they pass a reader. This, however, is not a concern for Visible Assets as its applications at eight (8) tags per second are aimed at providing visibility for high value assets such as electronic, medical devices, livestock, and pharmaceuticals products, as well as visibility of assets located in high security areas. Since RuBee is peer-to-peer, one unexpected advantage in many of these applications is a low cost base station. RuBee can therefore take the antenna to the asset, rather than take the asset to the antenna (e.g. reads carried out on a shelf, or storage area). This often gives a RuBee reader many hours to do a physical inventory.

RuBee is advantageous over RFID in terms of its ability to function under demanding conditions of high EM interference. This makes it ideal for applications such as tracking contents in shipping containers and storage shelves. Additionally, unlike RFID tags, VAI's RuBee-based tags can function without hindrance, in liquids, making them suitable for tagging medical and perishable goods.

VAI has been involved in the business of RF and visibility for over 20 years and holds over a 25 patents in areas related to providing supply chain visibility. VAI has a strong business partner in Seiko Epson Corporation (USA and Japan) with several new RuBee products and applications ready for market late this year. Both companies specialize in providing entire visibility solutions incorporating RuBee tags,

compatible readers (Woot, Blaster, Sidewinder) and visibility software (Dot-Tag, SNIP) for seamless integration. VAI has developed readers for every type of application: from handheld devices to in-vehicle readers; from smart shelves to entire facilities employing low-cost loop antenna. Unlike RFID, which can identify a tag when passed through the portal, VAI's RuBee tags could provide end users with the ability to 'visibly' monitor, in real time, the location of the tagged asset. This is achieved with the help of large loop antennae, which can be concealed in the floor, walls, or ceiling.

As mentioned above VAI has an extensive intellectual property portfolio consisting of over hundred patents in the domain of tracking. Some of the most recent ones include US Patent 7,170,413 for tracking animals and US Patent 7,164,359 for freight tracking, both of which were granted in January 2007. VAI has the support of a number of retailers and technology vendors and has a number of solutions for healthcare and security applications, for whose implementation and deployment it is collaborating closely with a number of corporate partners.

Conclusion

Visible Assets, Inc. is recognized for its demonstrated efforts in the advancement of RuBee, an innovative technology that could fill gaps with contemporary RFID technology. RuBee appears to be a technology complementary to RFID and could be used in conjunction with it, rather than as a replacement. Each technology has its certain advantages and when combined into a single solution, they could provide comprehensive tracking in all environments and at all levels: from cartons to palettes to finally to item level tracking.

Visible Assets, Inc. began work in a method of wireless identification and tracking nearly twenty years ago, and is now working on the fourth generation of RuBee with promising results. Visible Asset's RuBee technology is now in the product development stage and the company is developing specialized solutions for targeted supply chain applications, which would go toward establishing a visible supply chain network. Because of such efforts, Frost & Sullivan bestows upon Visible Assets Inc. the prestigious Award for Technology Innovation of the Year Award.

About Best Practices

Frost & Sullivan Best Practices Awards recognize companies in a variety of regional and global markets for demonstrating outstanding achievement and superior performance in areas such as leadership, technological innovation, customer service, and strategic product development. Industry analysts compare market participants and measure performance through in-depth interviews, analysis, and extensive secondary research in order to identify best practices in the industry.

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