

Editorial

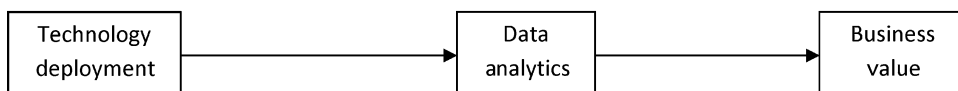
Welcome to the first issue of the *International Journal of RF Technologies: Research and Applications*. The idea for this journal started more than two years ago and we are glad to see the first issue become a reality!

It is an understatement to say that the world of radio frequency (RF) technologies has changed dramatically in the past few years. Although RF technologies have been around for many years, they have only recently received a surge in use and are quickly moving to become a ubiquitous, rather than niche, suite of technologies. Much of this recent interest started with requests from Wal-Mart, Metro, and others for their suppliers to use passive ultra-high frequency (UHF) RF identification (RFID) tags on products moving through the fast-moving consumer goods supply chain. From this, other industries, such as aerospace, automotive, pharmaceuticals, and apparel and fashion began to adopt RFID for uses in manufacturing, asset management, and authenticity management, among others. Soon, the movement spread beyond passive UHF RFID to many other forms of RF technologies such as environmental sensors and active tags.

Journal scope

Much of the work on RF technologies has originated in academia. For example, the Auto-ID labs at MIT are largely responsible for the positioning of passive UHF and architecting the ‘internet of things’ for supply chain use, as later adopted across various industries. Interestingly, though, there were very few research grants (early on) driving the research and no real academic outlets specialising in RF research. Instead, research was driven by industry and research output appeared in a variety of journals or in magazines/periodicals intended for practitioners. One of the pioneering practitioner publications, *RFID Journal*, has done a great job of reporting on the important findings in primarily the RFID space. We appreciate and believe in the strong link between RF research and practice and acknowledge the important contribution of industry in driving the field. Accordingly, *the purpose of this journal is to provide an outlet for RF-related research focusing on the use of RF technologies to improve businesses*. The journal will serve both academia and practice.

The journal is guided by the following simple framework as it relates to the appropriateness of articles:



As suggested by the framework, the journal will consider articles that address: (1) technology deployment, (2) data analytics, and (3) business value.

For technology deployment, articles should be focused on how to deploy the technology to ultimately create business value. Potential technologies to be covered in the journal include:

- Radio frequency identification (RFID)
- Real-time locating systems (RTLS)
- Near-field communication (NFC)
- RF-based sensors

The journal is not appropriate for technical articles that are focused on technology only. For example, an article that details the development of a new RFID reader or provides a new communication protocol for RF would not be considered. All articles must be focused on driving toward business value. Examples of articles that would be considered include: using passive RF technologies for RTLS in a warehouse, decision rules for determining the deployment of static versus mobile readers, etc.

For data analytics, articles should be focused on how to capture, filter/cleanse, manipulate, and ultimately use RF data. This portion would include RF-related:

- Middleware/edgware
- Business intelligence
- Data mining

The topic of RF data is largely misunderstood and understudied. The journal provides an excellent forum for articles that focus on how and where to capture the data (e.g. real time, at the device, on the server, etc.), and approaches for finding patterns in the data which may reveal process anomalies or areas for improvement, among others. The journal also allows articles that examine the development and use of software related to RF technologies.

Finally, for business value, the journal welcomes articles that investigate how RF technologies are used to create business value. Research may be aimed at many different industries, such as:

- Retail, including, but not limited to, fast-moving consumer goods and apparel/fashion
- Automotive
- Aerospace
- Logistics and CEP (Courier, express and parcel)
- Food and beverage
- Cold chain
- Pharmaceuticals
- Public administration
- Manufacturing

Examples of articles that would be appropriate for the journal (under the heading of business value) include: how RF technologies reduce out of stocks in a retail setting, the use of RF technologies to improve food quality, reducing maintenance costs in aerospace manufacturing, among others.

Ultimately, all articles should have a clear link to the creation of business value.

Although the journal will publish primarily scientific research papers concerning application of RF technologies to create business value, review articles will also be entertained.

Getting started

In 2007, the Global RF Lab Alliance (GRFLA) was formed, after more than a year of planning. The idea was originally hatched between the three of us (Antonio, Dieter, and Bill) in response to the growing need for RF labs across the globe to collaborate. What better way to start than with leading RF labs from Italy, Germany, and the United States? Our goal with the Lab Alliance was to create a consortium of labs that would collaborate on projects that required multi-national involvement. In addition to the geographic diversity provided, each lab also differed in its core strengths. Thus, by forming an alliance whereby we agreed to collaborate on projects, the synergies created by forming teams based on geography and/or core strengths were illuminated. We immediately began to look for the best labs to form the charter group. Ultimately, the charter labs included: University of Parma (Italy), University of Bremen (Germany), Pusan National University (South Korea), Hong Kong University of Science and Technology, Chinese Academy of Sciences (China), Georgia Institute of Technology (USA), University of Florida (USA), and the University of Arkansas (USA). Before the formation of GRFLA was official, we began exploring the idea of a journal. Essentially, the journal would serve as a tangible repository for the growing population of RF labs and others doing RF research. As an organised body (i.e. GRLFA), one of our key goals is to inform and educate – a leading journal, dedicated to RF technologies, is not only needed, it is essential to the growth of the field. Subsequently, we identified Taylor & Francis as the best publisher for this journal.

Launching a new journal has not been easy. Although we heard from many researchers their frustrations at not having a ‘true’ RF-focused journal, getting submissions for a new and unproven journal has proven to be a formidable task. Essentially, a new journal is faced with the classic ‘chicken and egg’ situation: a new journal needs good submissions and articles to establish itself as a quality journal; researchers want to submit their work to quality, established journals. Thus, getting started is hard. However, as we think you will find with this first issue, our intention is to provide a quality outlet for RF research. The five articles in this first issue represent a diverse set of quality research projects.

In this issue

In this inaugural issue you will find five articles, representative of both the type of work we hope to continue to see in the journal and the type of research being conducted at RFID labs across the globe.

Article 1: ‘The impact of RFID technology and EPC system on stock-out of promotional items’ by Bottani, Montanari, and Rizzi.

In this article, Bottani *et al.* examine the problem of stock-out of products on the shelf during sales promotions and propose a mathematical model to quantify the economical benefits of implementing RFID technology and EPC network to address this issue. The model is applied to a retail store of a major Italian distributor of fast-moving consumer goods (FMCG). Results of the application suggest that RFID and EPC have the potential to substantially reduce economical losses due to unavailability of promotional items, thus proving the profitability of their implementation in the FMCG field.

Article 2: 'Performance increase and benefit compensation in supply chains by partial information sharing and billing based on identification of returnable transport items' by Uckelmann, Hamann, and Zschintzsch.

In this article, Uckelmann *et al.* explore the hypothesis of performance increase and benefit compensation within supply chains by partial information sharing and billing based on RFID. The concept has been evaluated in a pilot project within the beverage industry. Thus, RF-related research, application and business value have been combined. Returnable transport items (RTI) are identified as the appropriate level to track material flow. The applicability of ultra-high frequency transponders is approved, even though beverages have shown a strong negative effect on reading distance. Quantitative and qualitative simulations have been used to prove the benefits of information sharing on the basis of logistical values. Further research will focus on integration of billing systems and RFID-based visibility, thus providing new services and added value.

Article 3: 'Does RFID improve inventory accuracy? A preliminary analysis' by Hardgrave, Aloysius, and Goyal.

In this article, Hardgrave *et al.* present the results of a recent study with Wal-Mart Stores, Inc. (USA) in which they investigated the potential improvement to inventory accuracy with the use of RFID at the case level. In this study, several Wal-Mart stores using RFID automatically adjusted their inventory counts based on RFID reads from cases moving into the backroom and out to the sales floor. Findings suggest that RFID can improve inventory accuracy. Inventory accuracy (or rather, inaccuracy) is the root of many problems in the retail environment. Previous research has shown that inventory counts are wrong more than 50% of the time. Thus, decisions about restocking, ordering, replenishment, etc. are based on a number that is wrong more often than it is right. If inventory accuracy can be improved, retailers, suppliers and consumers will benefit through reduced stock-outs and less unnecessary holding stock. If inventory accuracy can be improved by using RFID at the case level, as proven by Hardgrave *et al.*, imagine the potential improvement when RFID is used at the item level.

Article 4: 'Autonomously controlled storage management in vehicle logistics – applications of RFID and mobile computing systems' by Böse, Piotrowski, and Scholz-Reiter.

Locating cars in an open space is a common problem for all car manufacturers and automotive logistic suppliers. While there have been several approaches based on active RFID within the industry, Bose *et al.* favour a hybrid solution based on mobile data entry, passive RFID and GPS. The low costs of passive *vs* active RFID are a strong advantage for the proposed solution. Together with E.H. Harms, a major automotive logistics provider, new RFID-based concepts of autonomous controlled storage management in vehicle logistics have been introduced and strengths and weaknesses have been identified.

Article 5: 'A new methodological framework to implement an RFID project and its application' by Battini, Faccio, Persona, and Sgarbossa.

In this article, Battini *et al.* address the problem of conducting proper RFID feasibility studies. Far too often, projects fail because they were not properly

managed. In this case, the danger is that an RFID initiative may be abandoned due to poor project management rather than lack of fit or performance from RFID. Thus, the purpose of their paper is to create a methodological framework to be used in the feasibility study portion of an RFID project. The proposed framework allows management to consider all variables and conditions of an RFID project and guides the decision makers through the steps of the feasibility study. To illustrate the use of their framework, they apply it to four case studies. The case studies demonstrate the utility of the framework and show the importance of various variables depending on the project itself.

Acknowledgements

This journal – and especially the first issue – would not be possible without the tremendous support (and prodding) from Meloney Bartlett and her staff at Taylor & Francis. We appreciate the faith they placed in us to produce a quality journal. Ultimately, the fate of the journal rests with the editor-in-chief, associate editors, and editorial board. Without the efforts of the associate editors and the editorial board, the journal would not be possible. The current associate editors include:

- Gisele Bennett, Georgia Institute of Technology (USA)
- Jean-Pierre Emond, University of Florida (USA)
- Bonghee Hong, Pusan National University (South Korea)
- Antonio Rizzi, University of Parma (Italy)
- Dieter Uckelmann, University of Bremen (Germany)

The editorial board includes:

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- Dale Thompson, University of Arkansas (USA)
- Junfang Zeng, Chinese Academy of Science (China)

On behalf of the associate editors and editorial staff, we hope you enjoy the first issue of the *International Journal of RF Technologies: Research and Applications!*

Bill Hardgrave, Antonio Rizzi, and Dieter Uckelmann