
Integrated RFID Sensing and Localization Architectures for Intelligent Cyber Physical Systems in Healthcare, Transportation, Retail, Agriculture, and Industrial Environments

Adrian Kovacs

University of Debrecen, Hungary

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KEYWORDS

RFID sensing, indoor localization, smart healthcare, intelligent transportation, Industry 4.0, smart agriculture, retail analytics.

ABSTRACT

Radio Frequency Identification technologies have evolved far beyond their original role as simple identification tools and have become a foundational pillar of modern cyber physical systems. Across healthcare, transportation, agriculture, retail, and industrial automation, RFID systems now serve as distributed sensing, localization, and decision support infrastructures that interconnect physical objects with digital intelligence. This article develops a comprehensive and theoretically grounded synthesis of how RFID based sensing and localization architectures are shaping the emergence of intelligent environments. Drawing exclusively on the provided literature, it integrates research on RFID enabled health monitoring in aircraft landing gear, smart hospitals, IoT based smart farming, food quality monitoring, indoor and vehicular localization, retail analytics, industrial moisture detection, gate control systems, and Industry 4.0 incident management. The article argues that RFID should be understood not merely as a tagging or tracking technology but as a socio technical sensing fabric capable of supporting safety critical operations, resource optimization, and contextual awareness across diverse domains. A detailed examination of signal processing, interference based localization, angle of arrival estimation, spatial diversity, convolutional neural networks, and support vector regression reveals how RFID infrastructures have achieved increasingly fine grained spatial and environmental awareness. The paper further explores how these capabilities align with broader trends in artificial intelligence driven agro industry, smart supply chains, energy efficiency in buildings, and multimodal data verification. By situating RFID within these wider technological and organizational transformations, the article identifies persistent challenges including reliability, scalability, data interpretation, and system integration. Through deep theoretical elaboration and critical discussion, it demonstrates that RFID based cyber physical systems represent a unifying framework for future intelligent infrastructures, enabling continuous monitoring, automated decision making, and resilient operations in complex environments.

INTRODUCTION

The last two decades have witnessed a profound transformation in how physical environments are monitored, interpreted, and managed through digital technologies. At the heart of this transformation lies Radio Frequency Identification, a technology that originally emerged as a simple means of identifying and tracking objects but has progressively evolved into a sophisticated sensing and localization

platform. The references provided for this article collectively illustrate how RFID has become deeply embedded in a wide range of intelligent systems, from aircraft landing gear health monitoring and hospital logistics to smart farming, food quality control, vehicular localization, and retail analytics. When examined together, these works reveal a common conceptual trajectory: RFID has shifted

from being a passive identifier to an active participant in cyber physical systems that connect the physical and digital worlds.

One of the most compelling demonstrations of this shift is found in the work on RFID enabled health monitoring for aircraft landing gear. Yang et al. showed that RFID tags can be integrated into mechanical components to continuously report structural and operational conditions, thereby enabling predictive maintenance and enhanced safety (Yang et al., 2018). This application alone challenges the traditional view of RFID as a simple tracking tool, because it positions RFID as a sensor network capable of operating in harsh, safety critical environments. The implications of this transformation are far reaching. If RFID can function reliably in the extreme mechanical and environmental conditions of aircraft landing gear, then it can be adapted to a wide array of industrial and infrastructural contexts where continuous monitoring is essential.

The healthcare domain offers another powerful illustration of RFID's expanded role. Fuhrer and Guinard described how RFID technologies could be used to build a smart hospital in which patients, staff, equipment, and medications are continuously tracked and managed (Fuhrer and Guinard, 2006). In such an environment, RFID is not simply about locating objects; it becomes a backbone for workflow optimization, patient safety, and real time decision making. The hospital becomes a cyber physical system in which digital representations of physical entities enable automated alerts, reduced errors, and more efficient care delivery. This vision of ubiquitous sensing and identification aligns closely with the broader concept of smart environments, in which information flows seamlessly between physical and digital layers.

Agriculture, traditionally seen as a low technology sector, has also been profoundly affected by RFID based systems. Bothe et al. demonstrated how RFID assisted continuous user authentication can be applied in IoT based smart farming environments,

ensuring that only authorized users interact with agricultural equipment and data systems (Bothe et al., 2019). This application underscores a critical but often overlooked dimension of RFID: its role in security and identity management. In smart farms, where sensors, automated machinery, and data driven decision making converge, maintaining the integrity of user access becomes as important as monitoring crops or livestock. RFID thus becomes part of a broader trust infrastructure that supports the reliability of agricultural cyber physical systems.

Food quality monitoring represents yet another domain in which RFID has been transformed into a sensing platform. Saggin et al. developed a flexible biopolymer based UHF RFID sensor capable of detecting changes related to food quality, thereby enabling continuous, non intrusive monitoring throughout the supply chain (Saggin et al., 2019). This application connects RFID to the long standing challenges of food safety, spoilage, and waste. By embedding sensors directly into packaging or storage systems, RFID based solutions make it possible to track not only where food is but also in what condition it exists. This has profound implications for supply chain transparency and consumer trust, as well as for sustainability through reduced waste.

Localization has become one of the most intensively researched aspects of RFID technology. Liu et al. introduced a three dimensional indoor localization method for both tags and tag free targets based on signal interference (Liu et al., 2019). Their work reflects a broader trend in which RFID is increasingly used to derive spatial information with high precision. This trend is further reinforced by studies on vehicular localization for intelligent transportation systems, angle of arrival estimation, spatial diversity in reader antennas, and machine learning based gate control systems (Zhang et al., 2019; Zhou et al., 2011; Shao and Burkholder, 2013; Alvarez Narciandi et al., 2019). Together, these works demonstrate that RFID has become a versatile platform for spatial awareness, capable of supporting applications ranging from traffic management to

automated access control.

Retail and industrial applications further highlight the breadth of RFID's evolution. Farhat et al. explored alternative approaches to item characterization in retail using RAIN RFID, emphasizing the added value of detailed item level information (Farhat et al., 2018). Anssens et al. described a sensor network based on RFID inventory for retail, showing how distributed tags and readers can provide real time insights into stock levels and product movement (Anssens et al., 2011). In industrial contexts, Melià Seguí and Vilajosana demonstrated how standard UHF RFID tags could be used for ubiquitous moisture sensing in the automaker industry, providing early detection of conditions that might compromise product quality (Melià Seguí and Vilajosana, 2019). Cao and Zhang extended this industrial perspective by designing an RFID based equipment incident management system for Industry 4.0, in which real time identification and tracking enable rapid response to equipment failures (Cao and Zhang, 2016).

These diverse applications converge on a single, powerful insight: RFID has become an infrastructural technology for intelligent environments. Yet, despite this convergence, much of the existing literature remains fragmented along application specific lines. Healthcare researchers often focus on patient safety and workflow, transportation researchers on localization and traffic, and industrial researchers on automation and quality control. What is missing is a unifying theoretical and methodological framework that explains how RFID based sensing and localization architectures function as a coherent cyber physical system across domains. This article addresses that gap by synthesizing the provided references into a comprehensive analysis of RFID as a cross domain sensing and intelligence platform.

The broader technological context reinforces the importance of such a synthesis. Recent work on artificial intelligence in the agro industry highlights how digital technologies are transforming

agricultural production, logistics, and sustainability (Aker et al., 2024). Studies on supply chain management in Indian agriculture emphasize the persistent challenges of coordination, transparency, and efficiency that could be addressed through better sensing and tracking technologies (Ali, 2008). Research on building energy efficiency, such as the impact of window to wall ratio on energy consumption, underscores the need for fine grained environmental data in managing complex systems (Rana et al., 2020). Even in the domain of information integrity, multimodal fact checking of out of context images relies on the integration of diverse data sources to establish trust and authenticity (Abdelnabi et al., 2022). In all these cases, the underlying challenge is the same: how to connect physical reality to digital representation in a reliable and actionable way. RFID based cyber physical systems offer one of the most mature and scalable solutions to this challenge.

METHODOLOGY

The methodology of this research is grounded in a systematic and integrative analysis of the provided references. Rather than treating each study as an isolated contribution, the approach taken here is to interpret them as components of a broader technological ecosystem. This involves identifying common conceptual themes, technological architectures, and application patterns that recur across different domains. By doing so, it becomes possible to construct a coherent picture of how RFID based sensing and localization systems function as an integrated cyber physical infrastructure.

The first methodological step is thematic categorization. The references can be grouped into several overlapping but distinct themes: health and safety critical monitoring, smart healthcare and human centric environments, agriculture and food systems, localization and positioning, retail and logistics, and industrial automation. Within each theme, the specific technical and organizational challenges addressed by the authors are identified and compared. For example, the health monitoring

of aircraft landing gear and the moisture sensing in automaker industries both involve safety critical detection of environmental or structural conditions, even though they occur in different sectors (Yang et al., 2018; Melia Segui and Vilajosana, 2019). By comparing these cases, it is possible to extract general principles about RFID based sensing under demanding conditions.

The second step involves architectural analysis. RFID systems typically consist of tags, readers, antennas, and backend information systems. However, the way these components are configured varies significantly depending on the application. In indoor localization, for instance, multiple reader antennas and sophisticated signal processing algorithms are required to estimate the position of tags or even tag free targets (Liu et al., 2019; Shao and Burkholder, 2013). In smart hospitals, the emphasis is on integrating RFID data with hospital information systems to support workflows and patient safety (Fuhrer and Guinard, 2006). In retail, distributed RFID inventories must be linked to enterprise resource planning systems to provide real time stock visibility (Anssens et al., 2011; Farhat et al., 2018). By analyzing these architectures, the methodology reveals how RFID infrastructures are tailored to different operational contexts while maintaining a common underlying logic.

The third methodological component is the examination of data processing and intelligence. Several of the references highlight the use of advanced computational techniques to extract meaningful information from RFID signals. Xu et al. applied support vector regression to improve indoor positioning accuracy (Xu et al., 2018). Zhou et al. used angle of arrival estimation to achieve two dimensional localization (Zhou et al., 2011). Alvarez Narciandi et al. employed convolutional neural networks for RFID based gate control, demonstrating how machine learning can enhance the interpretation of RFID data (Alvarez Narciandi et al., 2019). These techniques illustrate how RFID systems increasingly rely on sophisticated data analytics to transform raw radio frequency signals

into actionable insights.

The fourth step is contextual integration. RFID based systems do not exist in a vacuum; they are embedded within broader organizational, economic, and technological environments. The methodology therefore considers how RFID interacts with supply chain management, energy efficiency, agricultural productivity, and information verification. For instance, RFID based food quality monitoring has implications for supply chain transparency and waste reduction, which are central concerns in agricultural economics and sustainability (Saggin et al., 2019; Ali, 2008). Similarly, RFID based localization in transportation systems intersects with broader efforts to create intelligent transportation infrastructures (Zhang et al., 2019; Belenguer et al., 2019).

Finally, the methodology involves critical synthesis. Rather than simply aggregating findings, the analysis seeks to identify tensions, limitations, and opportunities for future development. This includes examining issues such as signal interference, scalability, privacy, and system integration, all of which are discussed to varying degrees across the references. By synthesizing these perspectives, the article constructs a nuanced and theoretically informed understanding of RFID based cyber physical systems.

RESULTS

The integrated analysis of the provided literature reveals several key findings about the role and potential of RFID based sensing and localization systems. These findings are not presented as numerical outcomes but as conceptual and functional insights derived from the collective body of research.

One of the most significant results is the demonstration that RFID has matured into a reliable platform for safety critical monitoring. In the context of aircraft landing gear, RFID enabled health monitoring allows continuous observation of mechanical conditions, enabling predictive maintenance and reducing the risk of catastrophic failure (Yang et al., 2018). This is a profound shift

from traditional inspection based maintenance regimes, which rely on periodic checks and can miss early signs of degradation. By embedding RFID sensors directly into mechanical components, the system creates a continuous stream of data that reflects the real time state of the equipment. This principle is mirrored in industrial moisture sensing, where RFID tags detect environmental conditions that could compromise product quality (Melia Segui and Vilajosana, 2019). Across these applications, RFID based sensing enhances safety, quality, and reliability by making invisible processes visible.

In healthcare, the results point to RFID's capacity to transform organizational workflows. The smart hospital envisioned by Fuhrer and Guinard relies on RFID to track patients, staff, and equipment, thereby reducing errors, improving efficiency, and enhancing patient safety (Fuhrer and Guinard, 2006). For example, the ability to automatically verify that the right medication is administered to the right patient at the right time can significantly reduce adverse events. The RFID infrastructure becomes an invisible layer of accountability and coordination, aligning physical actions with digital records. This finding underscores RFID's role as a socio technical system that shapes human behavior as much as it tracks objects.

Agriculture and food systems benefit from RFID in both security and quality assurance. RFID assisted continuous user authentication ensures that only authorized individuals can interact with smart farming systems, thereby protecting sensitive data and automated equipment from misuse (Bothe et al., 2019). At the same time, RFID based food quality sensors enable continuous monitoring of products as they move through the supply chain, providing early warnings of spoilage or contamination (Saggin et al., 2019). Together, these applications illustrate how RFID supports both the integrity of operations and the quality of outputs in agro industrial contexts, aligning with broader trends in artificial intelligence driven agriculture (Akter et al., 2024).

Localization emerges as a particularly rich area of

innovation. The literature demonstrates multiple approaches to using RFID signals to determine the position of tags and even tag free objects. Interference based three dimensional localization provides a way to track objects in complex indoor environments without requiring them to carry tags (Liu et al., 2019). Angle of arrival estimation enables two dimensional localization with relatively simple hardware configurations (Zhou et al., 2011). Spatial diversity in reader antennas enhances item level location sensing by exploiting variations in signal strength and phase (Shao and Burkholder, 2013). Support vector regression further refines indoor positioning by learning the relationship between signal characteristics and spatial coordinates (Xu et al., 2018). These techniques collectively show that RFID has become a powerful tool for spatial intelligence, capable of supporting applications ranging from warehouse management to smart transportation.

In transportation systems, RFID based vehicular localization and identification provide a foundation for intelligent traffic management and access control. Zhang et al. demonstrated how RFID can be used to locate vehicles within intelligent transportation systems, enabling applications such as automated tolling, parking management, and traffic flow optimization (Zhang et al., 2019). Belenguer et al. showed how RFID cards and magnetic loops can be combined to identify vehicles, enhancing the reliability and flexibility of transportation infrastructure (Belenguer et al., 2019). These findings indicate that RFID is not limited to static environments but can also support dynamic, high speed contexts such as vehicular movement.

Retail and logistics benefit from RFID's ability to provide granular, real time visibility into inventory and item characteristics. Farhat et al. highlighted the added value of detailed item characterization in retail, showing how RAIN RFID can support more sophisticated analytics and decision making (Farhat et al., 2018). Anssens et al. demonstrated how an RFID based inventory network can function as a distributed sensor system, continuously updating

stock levels and locations (Anssens et al., 2011). These capabilities address long standing challenges in retail, such as stock outs, overstocking, and theft, by providing accurate and timely information.

Finally, the integration of machine learning and RFID emerges as a crucial result. The use of convolutional neural networks for gate control illustrates how RFID signals can be interpreted by advanced algorithms to enable automated decision making (Alvarez Narciandi et al., 2019). This approach moves beyond threshold based or rule based systems and allows for adaptive, context aware responses. In combination with other learning based techniques such as support vector regression, this suggests that the future of RFID lies in its integration with intelligent data processing frameworks.

DISCUSSION

The results of this integrated analysis have significant theoretical and practical implications. Theoretically, they support the view that RFID should be conceptualized as a foundational layer of cyber physical systems rather than as a standalone identification technology. In a cyber physical system, physical processes are monitored and controlled by computational elements, creating a feedback loop between the digital and physical worlds. RFID based sensing and localization provide the sensory input for this loop, enabling digital systems to perceive and respond to physical conditions.

This reconceptualization helps explain why RFID has found such diverse applications. In aircraft maintenance, RFID sensors provide the data needed for predictive analytics, allowing maintenance schedules to be optimized based on actual equipment condition rather than fixed intervals (Yang et al., 2018). In hospitals, RFID provides the situational awareness needed to coordinate complex workflows and ensure patient safety (Fuhrer and Guinard, 2006). In agriculture, RFID supports both the security of digital systems and the quality of physical

products (Bothe et al., 2019; Saggin et al., 2019). In transportation and retail, RFID enables real time tracking and decision making in dynamic environments (Zhang et al., 2019; Farhat et al., 2018). In each case, RFID acts as a bridge between physical reality and digital intelligence.

However, this integration also raises important challenges. One of the most persistent technical issues is signal interference. Interference based localization techniques, while powerful, are sensitive to environmental conditions such as multipath propagation, reflections, and noise (Liu et al., 2019). In cluttered or metallic environments, RFID signals can behave unpredictably, complicating the task of accurate positioning. Similarly, angle of arrival estimation and spatial diversity rely on precise calibration and stable signal characteristics, which may be difficult to maintain in real world settings (Zhou et al., 2011; Shao and Burkholder, 2013). These limitations highlight the need for robust algorithms and adaptive systems that can cope with variability.

Scalability is another critical issue. As RFID systems expand to cover entire hospitals, farms, or retail networks, the volume of data generated can become overwhelming. Backend systems must be able to process, store, and analyze this data in real time, which requires substantial computational and organizational resources. The integration of machine learning techniques such as convolutional neural networks and support vector regression adds further complexity, as these models require training, validation, and ongoing maintenance (Alvarez Narciandi et al., 2019; Xu et al., 2018). Without careful design, the benefits of intelligent RFID systems could be undermined by data bottlenecks and system fragility.

Privacy and security also emerge as important concerns. RFID based tracking and authentication systems collect detailed information about the movements and activities of individuals and objects. In healthcare, this includes sensitive patient data; in agriculture and industry, it includes proprietary

operational information (Fuhrer and Guinard, 2006; Bothe et al., 2019). Ensuring that this data is protected against unauthorized access and misuse is essential for maintaining trust and compliance with ethical and legal standards. The challenge is to design RFID based systems that provide transparency and accountability without creating new vulnerabilities.

From a broader socio technical perspective, the adoption of RFID based cyber physical systems also has organizational implications. Implementing a smart hospital or an RFID based retail network requires changes in workflows, training, and management practices. Staff must learn to interact with new technologies, and organizations must adapt their processes to take advantage of real time data. Resistance to change, lack of technical expertise, and integration with legacy systems can all pose barriers to successful deployment. These challenges underscore the importance of viewing RFID not just as a technical solution but as part of a complex organizational ecosystem.

The connections between RFID and other digital technologies further enrich the discussion. The rise of artificial intelligence in agriculture, for example, depends on the availability of reliable, fine grained data about crops, soil, and environmental conditions (Akter et al., 2024). RFID based sensors can contribute to this data ecosystem, enabling AI driven decision making. Similarly, efforts to improve supply chain management in Indian agriculture could benefit from RFID based tracking and quality monitoring, which would enhance transparency and coordination (Ali, 2008). In building energy management, environmental sensing technologies can inform strategies to optimize energy consumption, complementing studies on building design and efficiency (Rana et al., 2020). Even in the domain of information verification, the integration of physical and digital data sources, as explored in multimodal fact checking, reflects a broader trend toward contextualized, data driven trust (Abdelnabi et al., 2022).

Looking to the future, RFID based cyber physical systems are likely to become even more integrated with other technologies. The increasing use of machine learning and data analytics will enable more sophisticated interpretation of RFID signals, supporting predictive and prescriptive applications. The expansion of the Internet of Things will create new opportunities for RFID to interact with other sensors and actuators, forming dense networks of interconnected devices. At the same time, advances in materials science, such as biopolymer based sensors, will expand the range of conditions that RFID tags can monitor (Saggin et al., 2019).

Yet, these opportunities also demand careful consideration of ethical, legal, and social implications. As RFID systems become more pervasive, questions about surveillance, data ownership, and accountability will become more pressing. Addressing these issues will require not only technical solutions but also regulatory frameworks and public engagement.

CONCLUSION

This article has presented a comprehensive and theoretically grounded analysis of RFID based sensing and localization architectures across healthcare, transportation, retail, agriculture, and industrial environments. By synthesizing the provided references, it has shown that RFID has evolved into a foundational technology for cyber physical systems, enabling continuous monitoring, spatial awareness, and intelligent decision making. From aircraft landing gear health monitoring to smart hospitals, from food quality sensors to vehicular localization, RFID systems provide the sensory infrastructure that connects physical reality to digital intelligence.

The analysis has highlighted both the transformative potential and the challenges of these systems. On the one hand, RFID enables unprecedented levels of visibility, safety, and efficiency. On the other hand, issues of signal reliability, scalability, privacy, and organizational integration must be addressed to fully

realize this potential. By situating RFID within broader trends in artificial intelligence, supply chain management, energy efficiency, and information verification, the article has emphasized the central role of sensing and identification in the future of intelligent systems.

Ultimately, RFID based cyber physical systems represent a unifying framework for understanding how diverse domains can be integrated through digital technologies. As research and development continue, the insights derived from the studies analyzed here will remain crucial for guiding the design of resilient, ethical, and effective intelligent environments.

REFERENCES

1. Abdelnabi, S., Hasan, R. and Fritz, M. (2022). Open Domain Content Based MultiModal Fact Checking of Out Of Context Images via Online Resources. Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition, New Orleans.
2. Akter, J., Nilima, S.I., Hasan, R., Tiwari, A., Ullah, M.W. and Kamruzzaman, M. (2024). Artificial Intelligence on the Agro Industry in the United States of America. AIMS Agriculture and Food, 9, 959 979.
3. Ali, J. (2008). Issues in Supply Chain Management in Indian Agriculture. In Mittal, S. and Mukherjee, A. Food for Policy. Foundation Books, 195 225.
4. Alvarez Narciandi, G., Motroni, A., Pino, M.R., Buffi, A. and Nepa, P. (2019). A UHF RFID Gate Control System Based on a Convolutional Neural Network. Proceedings of the IEEE International Conference on RFID Technology and Applications, Pisa.
5. Anssens, C., Rolland, N. and Rolland, P. (2011). A Sensor Network Based on RFID Inventory for Retail Application. Proceedings of the IEEE International Conference on RFID Technologies and Applications, Sitges.
6. Belenguer, F.M., Martinez Millana, A., Salcedo, A.M. and Nunez, J.H.A. (2019). Vehicle Identification by Means of Radio Frequency Identification Cards and Magnetic Loops. IEEE Transactions on Intelligent Transportation Systems, 1 9.
7. Bothe, A., Bauer, J. and Aschenbruck, N. (2019). RFID Assisted Continuous User Authentication for IoT Based Smart Farming. Proceedings of the IEEE International Conference on RFID Technology and Applications, Pisa.
8. Cao, J. and Zhang, S. (2016). Research and Design of RFID Based Equipment Incident Management System for Industry 4.0. Proceedings of the International Conference on Electrical and Electronics Engineering and Computer Science, Jinan.
9. Farhat, H., Iliev, P., Marriage, P. and Rolland, N. (2018). An Added Value Alternative to RAIN RFID Items Characterization in Retail. IEEE Access, 6, 32430 32439.
10. Fuhrer, P. and Guinard, D. (2006). Building a Smart Hospital Using RFID Technologies Use Cases and Implementation. Department of Informatics, University of Fribourg, Switzerland.
11. Liu, M., Wang, H., Yang, Y., Zhang, Y., Ma, L. and Wang, N. (2019). RFID Three Dimensional Indoor Localization for Tag and Tag Free Target Based on Interference. IEEE Transactions on Instrumentation and Measurement, 68, 718 732.
12. Melia Segui, J. and Vilajosana, X. (2019). Ubiquitous Moisture Sensing in Automaker Industry Based on Standard UHF RFID Tags. Proceedings of the IEEE International Conference on RFID, Phoenix.
13. Rana, J., Hasan, R., Sobuz, H.R. and Tam, V.W.Y. (2020). Impact Assessment of Window

- to Wall Ratio on Energy Consumption of an Office Building of Subtropical Monsoon Climatic Country Bangladesh. *International Journal of Construction Management*, 22, 2528-2553.
- 14.** Saggin, B., Belaizi, Y., Vena, A., Sorli, B., Guillard, V. and Dedieu, I. (2019). A Flexible Biopolymer Based UHF RFID Sensor for Food Quality Monitoring. *Proceedings of the IEEE International Conference on RFID Technology and Applications*, Pisa.
- 15.** Shao, S. and Burkholder, R.J. (2013). Item Level RFID Tag Location Sensing Utilizing Reader Antenna Spatial Diversity. *IEEE Sensors Journal*, 13, 3767-3774.
- 16.** Xu, H., Wu, M., Li, P., Zhu, F. and Wang, R. (2018). An RFID Indoor Positioning Algorithm Based on Support Vector Regression. *Sensors*, 18, 1504.
- 17.** Yang, S., Crisp, M., Penty, R.V. and White, I.H. (2018). RFID Enabled Health Monitoring System for Aircraft Landing Gear. *IEEE Journal of Radio Frequency Identification*, 2, 159-169.
- 18.** Zhang, Y., Ma, Y., Liu, K., Wang, J. and Li, S. (2019). RFID Based Vehicular Localization for Intelligent Transportation Systems. *Proceedings of the IEEE International Conference on RFID Technology and Applications*, Pisa.
- 19.** Zhou, J., Zhang, H. and Mo, L. (2011). Two Dimension Localization of Passive RFID Tags Using AOA Estimation. *Proceedings of the Instrumentation and Measurement Technology Conference*, Beijing.