

5. RESULTS

To evaluate the proposed system regarding the fact that jewellery retail is an expensive business, accuracy of the system in inventory management is an important issue. Therefore to evaluate the performance of system, 7 plates each one contain 40 jewellery were read 10 times with an RFID reader. The duration of reading for each plate was 5 sec. The number of detected tags for each time epoch are presented in table 3. As displayed in the table, just in two cases all tags were read. Thus, with moving RFID reader normally on top of each plate in 5 sec 37 tags were detected in average which is not provide the 100 % accuracy needed for such an expensive business.

Plate 1	Plate 2	Plate 3	Plate 4	Plate 5	Plate 6	Plate 7
38	38	38	33	38	34	37
37	33	36	35	36	38	33
35	36	34	38	36	36	38
35	39	37	40	38	38	38
38	36	37	36	39	39	35
35	37	36	39	38	38	38
38	39	38	38	38	38	34
38	39	37	37	37	38	36
38	37	37	35	35	38	37
37	35	37	37	37	39	40

Table 3. Number of detected tags for each plate

Therefore another test were designed to identify the time needed to detect all tags in each plate. The results are presented in table 4. The test was performed 10 times for each plate. These results illustrate that to read all tags in each plate 8.45 sec needed in average. It means for a gallery with about 3000 pieces of jewellery and 75 plates 10-11 minutes needs to read all tags.

Plate 1	Plate 2	Plate 3	Plate 4	Plate 5
8.13	6.03	5.25	7.24	7.82
11.54	14.01	7.89	4.63	7.41
9.61	6.47	8.97	8.38	9.34
12.13	6.61	6.61	7.51	7.56
11.77	7.92	5.71	6.01	7.46
6.21	7.11	5	11.84	5.74
13.7	6.31	5.87	12.55	12.83
11.65	6.61	8.91	10.6	17.24
7.94	6.83	7.36	7.37	6.41
6.89	10.81	9.57	7.55	7.65

Table 4. The time to read all tags in each plate.

6. CONCLUSION

This paper has discussed geolocation which is about finding a meaningful location for objects in the environment instead of using only raw coordinates. In indoor spaces cellular and symbolic space approaches are usually used for addressing and geolocation. In this paper, a symbolic RFID based inventory management system for jewellery industry was proposed. The system also included a GIS representation of tray and jewellery locations. The proposed system would solve a lot of problems related to retail and inventory management and monitoring in the context of jewellery industry. The evaluation of accuracy of the system is a challenging issue, so the future works will focus on ways to evaluate and improve accuracy of the system.

REFERENCES

- Beal, JR, 2003. Contextual Geolocation-A Specialized Application for Improving Indoor Location Awareness in Wireless Local Area Networks, *College of Graduate Studies and Research*, Minnesota State University–Mankato .
- Gaukler, G. M., and R. W. Seifert, 2007. *Applications of RFID in supply chains*. In Trends in supply chain design and management, Springer 29-48.
- Irlbacher, K., A. Kraft, S. Kehrer, and S. A. Brandt, 2014. Mechanisms and neuronal networks involved in reactive and proactive cognitive control of interference in working memory. *Neuroscience & Biobehavioral Reviews*.
- Kim, S.-C., Y.-S. Jeong, and S.-O. Park, 2013. RFID-based indoor location tracking to ensure the safety of the elderly in smart home environments. *Personal and Ubiquitous Computing* 17 (8).
- Ko, C.-H, 2010. RFID 3D location sensing algorithms. *Automation in Construction* 19 (5), pp.588-595.
- Li, N., and B. Becerik-Gerber, 2011. Performance-based evaluation of RFID-based indoor location sensing solutions for the built environment. *Advanced Engineering Informatics* 25 (3), 535-546.
- Nasser, G. G, 2007. Using RFID for risk mitigation and location assuredness of high-value goods. *Paper read at RFID Eurasia, 1st Annual*.
- Neubert, G., I. Zaoui, C. Dominguez, and B. Ageron, 2010. RFID implementation and supply chain alignment: the case of jewellery in the retail industry. *Paper read at 8th International Conference of Modeling and Simulation*.
- Sood, E. S., and E. M. Malik. Benefits and applications of RFID based inventory system.
- Venkatesh, D, 2014. Usage of RFID in retailing- a pervasive technology application. *Journal of Radix International Educational and Research Consortium (RIJEB)*, 3 (1).
- Wyld, D. C, 2010. 24-Karat protection: RFID and retail jewelry marketing. *International Journal of UbiComp (IJU)*, 1 (1).