

The Development of an Intellectual Tracking App System based on IoT and RTLS

Hak-Jun Lee¹, Ju-Su Kim¹, Umarov Jamshid¹, Man-Kyo Han², Ryum-Duck Oh^{1*}

¹Dept. of Software, Korea National University of Transportation, Korea,

² Q-Sentech. Co. Ltd R&D Center, Korea

{dorek99, jsy3589}@naver.com, umarovjamshid88@gmail.com,
mankyohan@naver.com, rdoh@ut.ac.kr, *Corresponding Author

Abstract. Existing tracking systems are insufficient to provide services that customers can be satisfied with. Competition between logistics companies is increasing and customers of such logistics services are increasing requiring more. But at present, the response to such requests can hardly be seen as timely or appropriate. Since customers of logistics services not only wish to receive their ordered products but also check where their item is and how the delivery is being processed, companies provide location information over the internet. But updates on such information is hardly in real time, leading to a discrepancy between information online and actual location. Existing systems cannot address such issues perfectly, nor are there technologies that can meet such needs. As such, this paper suggests a system that can improve customer services and convenience, work efficiency and profitability for the logistics company. The system was designed and developed as a high-functioning intellectual App Multi Tracking System that is based on IoT and RTLS, which sets it apart from existing tracking systems.

Keywords: Tracking System, IoT(Internet of Things), RTLS(Real Time Location System), App, Smartphone

1 Introduction

According to ‘the survey on usage of courier services’ (conducted on February 17, 2013), the total volume handled increased at an annual rate of 17% on average, starting in 2002. Revenue also increased almost five-fold from 61.8 billion Won in 2002 to 323 billion Won in 2012. [1,2]

Tracking systems are used in various fields including for transport and military purposes. With recent developments of the tracking system and IoT technology, a ubiquitous approach to human life has been undertaken. IT is now being applied to check and manage what is going on on-site and monitor the social environment. [3,4]

This paper suggests a Tracking System that can meet the complicated needs and requests of customers of logistics services and strengthen the competitiveness of the logistics company by taking advantage of IoT and RTLS technologies.

2 Related Research

This paper suggests the development of an intellectual Tracking App System to track in real time the location of items. To develop this system, a development plan was established and data investigation and research was conducted. The research showed that there is no related system that has been commercialized and in use. The paper thus suggests an IoT and RTLS-based Intellectual Tracking App System to resolve existing issues in the system.

There is a preceding study on the establishment of a system to use GPS to identify the location of an item by attaching to it an RFID-based RTLS tag and monitoring the progress in real time. [5] According to Kim [6], there are also related studies on tracking systems that use RTLS (Real Time Location System) and not GPS to attach a tag to the item and track it in real time.

3 The Configuration of an Intellectual Multi Tracking System for Delivery

This system can be categorized into four types: a tracking application for the customer to check the progress on his delivery, a delivery personnel viewer application that allows the personnel to check on the order of delivery, a back ground application that tracks the movement of the delivery team, and an M/W that controls and overviews the application. The three Android-based applications use Socket communication to access the M/W that has been developed in del phi language. Each has a different protocol applied to distinguish themselves in the M/W and receive different response data.

The Back Ground Application System sends information such as the current location of the delivery personnel, transmission time and delivery personnel every five minutes to the server. The M/W analyzes this data and stores it in the DB. The saved data is then sent again to the Android-based employee delivery Viewer Application and the package Tracking Application for customers. Fig. 1 shows the configuration of the intellectual Multi Tracking System for delivery.

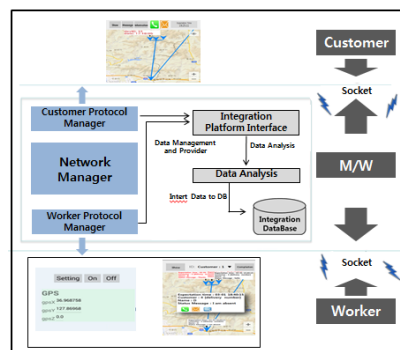


Fig. 1. Configuration of the intellectual Multi Tracking System for delivery

4 Application Configuration for Tracking System

The Android-based employee delivery Viewer Application is a program provided for the convenience and accurate work flow of delivery personnel. It has an algorithm that automatically calculates the shortest distance for delivering items and the order of delivery. A day's work starts by sending the customer an estimated time of delivery. After that, GPS is used to re-measure the anticipated delivery time every 5 minutes, updating the estimated delivery time on the customer's app. The delivery personnel, when a delivery is completed, inputs the customer's signature and presses the 'complete' button. This shows which areas have completed delivery by marking them in different colors, and then synchronizing this information with the customer system and work system. The delivery personnel can check the customers' data with just one click and can take advantage of the function that allows one to send text messages or phone calls. Fig. 2 shows the UI configuration of the employee delivery viewer application.

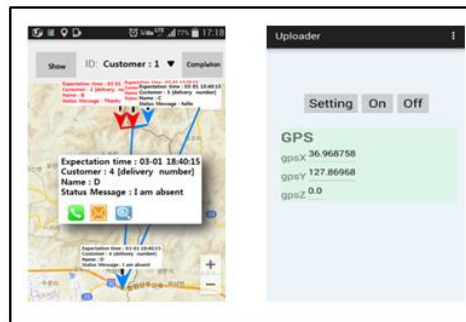


Fig. 2. UI of the Viewer Application for delivery personnel

The Tracking Application for customers operates on the app as a program catering to better convenience and services for the customers. Using the customer information and the shipping invoice information, the system allows the daily work process of the delivery personnel who is in charge of the customer's package. The customer can check the estimated delivery time and track the delivery. In the customer app, the status message can be input to show the delivery personnel in real time one's own status.

To operate the package tracking application for customers, the Show button should be clicked. This will show in real time the location of the delivery personnel in charge, and up to where the delivery has been completed. The Message button allows the customer to leave a message about his status, which is synchronized in real time with the application for the delivery personnel. The Information button allows the customer to see the information on the delivery personnel, and by clicking on the telephone icon or the message icon, the customer can reach the delivery personnel. Fig. 3 shows how the UI of the package tracking application for customers is configured.



Fig. 3. UI of the package tracking application for customers

5 Conclusion

While the environment for the logistics business is currently undergoing rapid change and there has been a drastic increase in annual volume of packages handled by courier services, the existing package tracking system leaves a lot to be desired in terms of meeting customer satisfaction.

This system has developed a highly efficient, highly functional system based on IoT and RTLS to introduce new technology to the logistics market. This enables the provision of improved customer services and convenience, higher work efficiency and more opportunities for profit. The new system is an intellectual logistics system that supports reliability in real-time location using complex sensors.

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