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BAGGAGE TRACING USING IOT IN AIRPORTS

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ABSTRACT- We discuss our experience from helping an airport operator and their team of airport operations analysts to introduce discrete-event simulation along side their existing system improvement/development toolkit. Our project looked at improving the existing baggage handling system of a major European airport run by our partner organization. This paper is divided into two separate but related discussions. First, we collate recent reflections from this project together with those from similar airport projects we have been involved in for the past decade. We discuss a few observations that we believe should help to convince airport operators to develop more in-house skills around both analytical and simulation modeling and analysis, with a focus on the latter. Secondly, we describe one of the simulation components of our baggage handling project and demonstrate the effectiveness of various possibilities to improve the availability and reliability of these systems when operating under tight capacity constraints.

KEYWORDS – Tracking of baggage, internet of things, RFID.

I.INTRODUCTION

Recently, an airport operator we were working with revealed to us their intention to introduce simulation, potentially in combination with other OR methodologies, in their business development and operations analysis teams across the airports they operate. The opportunity came with the need to redevelop the BHS at an airport they had recently acquired, which at the time was experiencing dramatic capacity constraints whilst undergoing a major expansion programme of their terminal facilities. While the longer-term goal was to develop the future BHS for the considered airport, in the shorter term they aimed at making the current system viable for peak operations of the following summer season. This was some nine months away, including all needed system modifications, deployment and testing before 'going live'. The project team included us, as an academic partner, the airport operator, and two prospective system solution providers. It was immediately self-evident that an interesting mix of simulation approaches were being made available from around the table, from which the airport operator wanted to exploit created within this project to develop a comprehensive simulation modeling and analysis approach to be adopted in the future. The airport operator brought to the table their direct experience from recently acquiring a package for three-dimensional (3D) modeling and simulation of airport operations. At the same time, each of the vendors showcased their system solutions by using various simulation tools, ranging from general purpose simulation software to their own, in-house developed simulators

The rest of this paper reports more specifically (unless otherwise stated) on one of these projects we recently completed, where we worked with the operations analysis unit at a major European airport. Our improvement project was centred around enhancing the operational resilience of their baggage handling system (BHS). The following pages have a twofold purpose: (1) to discuss the learnings in terms of simulation methodology and practice generated by this and related experiences and deemed transferable to other realities where simulation modeling and analysis of airport operations is required and not yet adopted; and (2) to discuss the learnings from this particular project that are related more in detail to the operation of airport BHSs and have not been reported yet by the research community. Section 2 provides a high-level background context. Section 3 discusses how simulation modeling and analysis skills and toolscan enhance the typical airport improvement/development project, especially when either carried out or at least largely controlled by the airport operator. This section is intended for practitioners from airport operations analysis teams who have little familiarity with simulation/analytic modeling and analysis. Section 4 addresses both researchers and practitioners, and discusses the results from one of the phases of our simulation work, where we developed and tested the first elements of a Java library for discrete event simulation of airport operations. Specifically, we discuss a number of possible avenues to improve availability and reliability of existing BHSs in the face of tight capacity constraints. Section 5 concludes the paper.

II. . METHODOLOGY

Supplies a real time and accurate view of the baggage along the transportation and enormously enhances the ability for baggage sorting, baggage matching and baggage tracking. The RFID tags are attached to the baggage after security checks. The baggage information such as the owner, the origin, the destination and the airline number is stored in the tag the same information is stored in the server at the airport. All the servers at different airports are connected to a central server which facilitates the sharing of specific information of the passenger details. Readers have wired or wireless Gigabit Ethernet over which they report their RFID data to a server. All readers run custom software that processes RFID data before sending it to the central server. This software continuously checks the reader hardware for newly detected RFID tags and generates one tag-read event per tag with the format (tag ID, time). For example, if tag A is detected, then the custom reader software will generate and send the following information to the server: (tag A, t). When the baggage is loaded in the airplane it will pass through a checkpoint where the reader will read information and will promptly send the message to the local Server. The information about the baggage on RFID labels is shared with the destination airports through IoT cloud. When the baggage arrives at the destination it will be sent to different counters from the conveyer belt following certain sorting criteria. The baggage by passing through a gate of the RFID readers will read the information and through server and SMS Gateway will send a message to the passenger that the baggage is arrived. Now, the passenger will have to enter the unique identification number on the keyboard located at the counter gate. The entered code on the keyboard will verify the same code in RFID tag that was saved previously at location

1. Once the identification number is matched, the bags of that code will be sorted out on that counter. A. Process on arrival at the Airport. This RFID and IoT system at Airports uses UHF RFID passive tags for storing information and identifying baggage.

1) **Input and Registration of Information:** When passengers arrive at the Airport they first head to the check-in section to deliver their luggage. At check-in section, the information of each and every passenger is taken and stored in information bank (server). The information bank consists of four important items including the name of the Airline, flight number, bag nature and mobile number of the passenger along with the identification number which is peculiar to each person. This identification number is stored in the memory of the RFID tag along with the other details of the passenger for any further investigation and referral to the information about the person and their luggage. The same identification number is sent to the passenger through SMS in order to keep it personal. After completing all the security protocols the baggage is headed to the conveyor belt for further handling.

***2) Control* System of Baggege Handling (CSBH):** After the making of tags and sticking them on baggage, it is passed through a gate including four RFID readers. In the case of the specifications related to the baggage not confirmed in the system, such baggage is returned to the previous stage and its tag is studied and a new tag is stuck to it if necessary. All the baggage is passed through EDS (Electronic Data System) to observe their content and sort them according to their flight number. The baggage is then loaded to the respective flights and for conforming that the baggage is being loaded on the flight, baggage is again passed through RFID readers at the time of loading and the information is stored at the local server.

III. BLOCK DIAGRAM

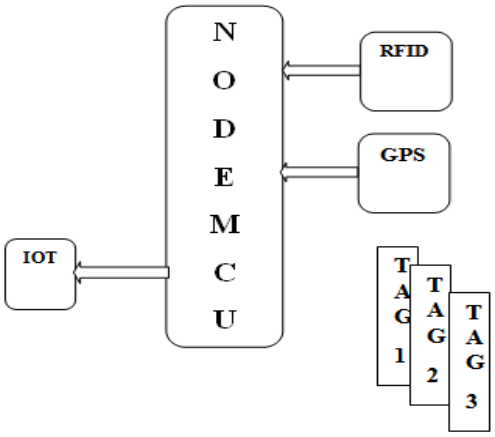

FIG 3.1: AIRPORT DEPATURE SECTION

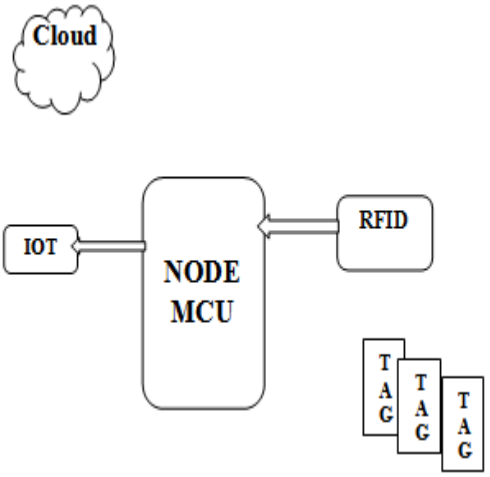

FIG 3.2: AIRPORT DESTINATION SECTION

IV.PROCESS FOR CHECK-IN

When the passengers arrived at the location 1 their basic information like number of items, their contact number, the serial number of RFID attached at each baggage, destination, identification code was stored on a local sever. The passengers were provided with a unique identification code under which the details of all their bags was stored and which they needed to claim all their baggage once they reach the destination(or else they can also use the SMS containing Identification number). The information about passengers was stored on local server and was uploaded to a cloud in which the server's of location 2 is connected with the help of IoT. When the baggage was ready to be loaded on airplane it was passed through RFID cards, the card read that particular serial number and sent it to the Raspberry Pi via Ethernet; Raspberry Pi sends it to local server which will note that the baggage was loaded. If the serial number was not read by the reader cards then the baggage was sent back to the starting point and checked for any problems.

V. PROCESS FOR CHECK-OUT

After the passengers arrived at their destination their baggage was loaded on the conveyer belt at airorts, which will keep on rotating the baggage until someone calls for it. The passengers will receive a unique identification code when they give their luggage during boarding which will be sent in the form of message. The conveyer belt is given four counters for collecting the baggage. The passengers went at one of the gates and entered the unique identification code given to them on the keypad installed on the gate. An independent reader is installed on each gate, as soon as the passenger enters his identification code the identification code will go to server where it will check the number of baggage and their serial number under that particular identification number entered by passenger, the serial numbers will then be sent to the reader card and the reader will sort out the bags of that particular serial numbers accordingly. When the serial numbers of the baggage is detected by reader the servo motor opens the gate and a push mechanism installed on conveyer belt pushes the baggage out of the gate, this functioning will be achieved with the help of Raspberry Pi. The baggage of a passenger is thus separated from the other baggage on the conveyer belt at airports. In this way the passenger get convenience to retrieve their baggage as they will have to enter only one code on the keypad.

VI. APPLICATION AREA

More than 80 percent of airports and airlines are focusing passenger's personalization according to the airline IT trends survey. For this, internal and external airports provide to customer service via mobile application. And then, More than 60% of worldwide airlines will offer to mobile service adding baggage tracking to 2017. So, this paper suggests an IoT based real-time system for baggage managing and tracking. In this study system, it presents utilizing the semi-permanent RFID tag rather than tag of paper bar- cord type, and provides the services in real-time baggage route based on collected location data, the arrival time on the conveyor belt at airports. So using this study system, passengers can check their baggage position in real time related information as route, location moving process and time to get. In addition, the system is expected that the airports will be used it to great effect for managing airport, missing baggage decreasing and saving the cost because it can be possible to check in real time monitoring by administrator.

VII. CONCLUSION & FUTURE SCOPE

In conclusion will fins the exact bag inside the airport and also find exact location of the bag. Make counting and maintain the no of bags inside the airport, at finally make the database maintenance. The main advantage of the system is that it consumes less time as the passengers don't have to wait for their baggage to turn up on the conveyer belt instead they are routed to different counters and ensures high security due to the unique identification number. It is following the current trend as it is environment friendly, as it is paperless, no printing and paper are needed which is a very important issue currently in the aviation industry. With this design we tend to make the air travel more customers friendly, less time consuming, hassle free, with less queuing and greater security of the passenger. The economic benefits and customer satisfaction results achieved by extensive deployment of RFID in baggage handling are furnished.

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