Automated Ticket Vending System Using RFID Tags

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Abstract – In present situation, the ticketing system is more tedious. People are standing in long queues for getting tickets especially in public mode of transportation. This leads to unnecessary time wastage and energy waste. Some people use automated ticket vending machine., but then ATVM machines are not so successful in all the places in which they have been implemented. Some travels without taking tickets causing huge loss to the transport department. This paper attempts to provide an feasible solution for this problem of manual ticketing by the use of Radio frequency identification tags. This paper also presents the details on the architecture, integration and different design aspects of RFID based automated systems. wide operating range, low cost of equipment and reliability are some of the major advantages of this project. It is envisioned that the RFID based automated systems shall eventually replace the manual ticketing systems and hence provide a feasible way for better transportation facilities.

Keywords: RFID tags, ATVM, Automated systems, Transportation.

I. INTRODUCTION

Radio-frequency identification (RFID)[6] is the use of a wireless non-contact system that uses radio-frequency electromagnetic fields to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. Some tags require no battery and are powered and read at short ranges via magnetic fields (electromagnetic induction). Others use a local power source and emit radio waves (electromagnetic radiation at radio frequencies). The tag contains electronically stored information which may be read from up to several meters away. Unlike a bar code, the tag does not need to be within line of sight of the reader and may be embedded in the tracked object. The major components in any RFID reading module is as follows,

1. Transponder
2. Transceiver
3. Data Accumulator
4. Software
5. Data Warehouse/Management

Fig.1: BASIC BLOCK DIAGRAM OF AN RFID SYSTEM

II. PASSIVE COMPONENTS

The simplest component of an RFID[8] system is the passive tag. Passive RFID obtains its name from the method in which the RFID tags communicate with the RFID readers. Passive RFID tags[5] do not contain a battery or radio in which to communicate, limiting them to the energy available from the reader's radio signal. RFID readers make up the sensory network; they translate information from the RFID tags[2] and transfer it to the back-end intelligence systems. In our proposed system we use passive type of RFID tags.
III. COMPOUND SOLUTIONS (RFID/WAN)

In addition to the basic architectures found within RFID systems, compound architectures can link several complex and complimentary technologies together to assist in developing highly functional solutions. These robust solutions can operate independently and share information via the back-end systems. Or they can combine several components at the tag level to provide a high level of intelligence to the RFID device so that it can display appropriate location information to users.

Typically, mobile solutions requiring real-time information access will utilize a compound architecture including a wireless wide-area network (WWAN). An example of this type of solution could involve product deliveries that require verification of quantities and items delivered. An RFID reader could be installed at the back door of a truck or van. When merchandise is removed from the vehicle, the RFID reader reads the RFID tags upon exit. This information is sent via the vehicle's GPS/WWAN black box back to a back-end system. The information is immediately available and can be sent to the retailer in the form of an invoice or EDI transaction.

IV. AUTOMATED TICKETING

Our proposal is to implement RFID technology[4] in ticketing system[9]. For this system each commuter must an RFID tag unique ti their identity. That particular persons personal details like name, visiting address, contact number and other details will be stored before hand in a data base. There will also be an bank account related with that particular persons RFID tag from which the traveling charges may be taken directly via the latest technology such as google wallet or net banking.

We place RFID scanners[7] namely ID-INOVATIONS scanners such ad ID-2,ID-12 or ID-20 at the entrance and exit of public transport services eg. Bus. These scanners basically scan the RFID tags . at the same time with the help of the global positioning system (GPS) we find the place where the person has boarded the bus .When that person exits at his preferred location the scanner once again scans the RFID tag and it notes the place where disembarks. Then it directly takes the appropriate fee for that particular RFID tag wielding person travel from his bank account or a separate account created for the purpose of traveling.
V. PRACTICAL SETUP

For practical implementation of our proposed idea we use the following components:

1. Atmega 328 AVR chip[10]
3. RFID Tags
4. Laptop
5. EXTERNAL POWERSOURCE
6. Interfacing cable
7. Bread Board
8. LED AND BUZZER
9. ARDUINO SOFTWARE

A. Design Outline

We can detect tag presence by connecting the reset pin (2) to the Arduino. Taking the reset pin LOW, then HIGH for at least 150ms will force the reader to rescan and re-post if a tag is present. So you can set a timer for 250ms, or so, and if the tag is not scanned during that time, you know the tag has been removed. With how this is wired, Pin9 (Data 0) is going to output 9600 Baud serial every time it reads a tag, so we just connect this to Digital 0 (RX) on the Arduino.

We connect the GND of ID-12 and ARDUINO together. Similarly we connect the VCC of ID-12 and ARDUINO[3] together. After the reader reads the tag it will send it through the serial communication based on UART

B. Sensing Tag Presence

With the way the reader is hooked up in the product’s spec sheet, the reader will only scan a tag once, and will not rescan until the tag is moved out of, then back into range. But a lot of what I do with these requires knowing when a tag is present, not just when it was scanned.

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With how this is wired, Pin9 (Data 0) is going to output 9600 Baud serial every time it reads a tag, so we just connect this to Digital 0 (RX) on the Arduino. And… other than Ground, this is the only connection needed with the Arduino.

C. Limitations

There are a few limitations I wanted to point out quickly. Sadly, the ID-2 / 12 /20, as with most readers, can only read one tag at a time. In fact, having 2 or more tags in the readers range will cause it to not read any tags at all. The range, even on the ID-20 is less than 4in real world.

VI. APPLICATIONS

1. Access management
2. Tracking of goods
3. Tracking of persons and animals
4. Toll collection and contact less reading
5. Machine readable travel documents
6. Tracking sports memorabilia to verify authenticity
7. Airport baggage tracking logistics

A. ADVANTAGES
1. Higher than expected uptake rates, and a more modern, efficient public transport system.
2. Reduction in the level of fraud through direct fare evasion or misuse of the wrong ticket.
3. Reduces the hassles faced by commuters
4. Reduction in paper consumption
5. The RFID tag does not need to make any electrical contact with reader
6. The RFID Tag is an active device which has a chip and antenna but does NOT need any power and are low cost.

B. DISADVANTAGES
1. Dealing with a vast network of PT operators, stakeholders, technology suppliers, funding bodies, legislative procedures etc., just to get the smart-ticket scheme off the ground
2. The timeframes required to deliver complex, technological products, particularly when third party suppliers were involved and technological delays pushed back full implementation
3. The financial investment and human resources required from the outset.

VII. CONCLUSION
The RFID tags reduce the hassles the commuter faces by a big way. Yet there are many problems the implementation faces like commercial, financial and technical hindrances. We need to develop a method that can successfully meet the proposed system which can be used in real time applications.

VIII. FUTURE IMPLEMENTATIONS
Some future implementations include the following:
1. A plastic card
2. Can be used across all operators and modes
3. Option of zones/modes
4. Option of registration to minimize misuse
5. Transaction records
6. Reader to show remaining balance
7. Flexible (both pay as you go and season tickets)
8. No expiry of card

IX. REFERENCES
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