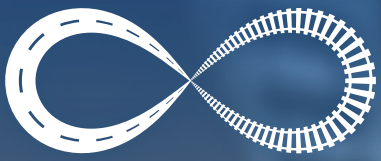

CETRA 2018

5th International Conference on Road and Rail Infrastructure
17–19 May 2018, Zadar, Croatia

Road and Rail Infrastructure V

Stjepan Lakušić – EDITOR

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BIOMETRICS FOR SEAMLESS URBAN PUBLIC TRANSPORTATION

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Abstract

The era of internet and digitalisation has made everyone's life easier but has created significant challenges. For instance, online transport ticketing or plastic cards with top-up money provision could be a convenience for many people, but the same thing is a source of difficulty and terrible experience for others. These difficulties are mainly the following: necessity of carrying the plastic card along with many other cards, possibility of loss or theft of these cards and consumption of paper and plastic. The use of developing such a ticketing solution which caters to many people but creates troubles for others is fiercely debateable. This paper will first discuss the evolution of transport ticketing modes. Next, it will discuss the currently prevalent trend for urban ticketing (such as Oyster for Greater London public transport in the UK), and challenges associated with it. Subsequently, the paper will discuss a solution, along how to deal with likely apprehensions and methodologies to overcome the same.

1 Evolution of transport ticketing modes

The earliest known method of financial transactions was the barter system, but in that era, there were very limited modes of public transport. The most common modes of transport pre-1830 were boats or animals like camels, equine species or elephants until the advent of trains, which revolutionized transport.

Another major development was the arrival of metallic coins, followed by paper currency which have both lasted for thousands of years and are still prevalent. The last 200 hundred years has witnessed vast development in the public transport sector in terms of introduction of buses, trains and aeroplanes.

Another significant and much more recent change started only a few decades ago, wherein the ticketing methodology saw a lot of transformations, mainly through two developments, usually running simultaneously with paper-based currency. First is the introduction of plastic cards with top-up money, which is quite prevalent in Urban Metros and buses in many developed countries. Second is the internet based online tickets and can be seen in airlines and inter-city trains in most of the developed and developing countries. For example, the Oyster card was first issued to the public on 30 June 2003, with a limited range of features and there continues to be a phased introduction of further functions (BBC, 2013). As of now, more than 85 % of all journeys on public transport in London are made using the card. Also, online check-in services in airlines industry was introduced for the first time in September 1999 by Alaska Airlines in US (Stellin, 2008).

This paper discusses the challenges with plastic cards used for urban metro travel ticketing methodology. This ticket methodology is most prevalent these days in most urban environments across the world.

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2 Challenges associated with current modes of ticketing

The plastic-card based ticketing methodology is useful in some ways but is a source of discomfort for many. The problem may be seen in a bigger context of use of plastic cards for multiple organisations, one deals with. Firstly, sometimes it might be difficult to prove one's own identity as it is associated with a series of plastic cards, such as the Driving License, Credit Card, Student or Employee Card, Metro or Oyster card and so on. Every organisation one deals with provides one plastic card for accessing the services and without these cards, it is very difficult to prove one's own identity. Furthermore, it is very inconvenient and irritating to carry all the cards without fail or loss. Very often people lose their cards and are denied access till they complete the formalities of lodging the complaint, depositing the fee, completing the documentation and getting a duplicate card. Till then, the access to services are denied and it results in wastage of time, money and energy in getting a new card. To address this issue, many efforts are already in experimental stage in the market, one of which is developing a single card which takes care of multiple cards (Indiegogo, 2017).
Secondly, the digital-card based identity is transferrable and saleable. Transferability means the benefits meant for the card-holder can be used by anyone who presents the card. Also, one may rent out one's card to others for passing on the benefits associated with the card. For example, subsidised travel card benefits in Metro trains can be availed by anyone possessing the card. Also, there are cases of frauds with stolen digital cards. For instance, as per statistics of Financial Fraud Action in United Kingdom, the country has witnessed 1.8 million cases of all types of financial fraud in 2016 (Leyden, 2017). Out of these, most of the cases have been related to the Digital Payment card category such as Debit and Credit cards only, which resulted in a loss of £618 m to UK. Furthermore, card fraud as a proportion of spending equates to 8.3p for every £100 spent.
Thirdly, there is an adverse environmental impact due to paper-based processing in terms of documentation, manufacturing and despatch of these cards coupled with the necessity of preservation of such records for a long period.

3 Proposed solution

To make people's life simpler again, to get rid of these webs of cards, time has come for 'Creative Destruction' (a term coined by German economist Schumpeter to describe the desired break in existing patterns of industry in response to a highly creative solution.), where we move towards Biometrics. Already, we have successful examples of international 'Visas', where the policy makers and the technology have demonstrated reasonable faith and confidence in having a safe, secured and prompt database, not only for nationals but also for foreigners. For example, UK government has already introduced compulsory biometrics for all applicants (Mayhew, 2015). Similarly, Schengen countries in Europe have also introduced biometrics for visa. Hence, there is no feasibility related constraints in switching over to a Biometrics based identity regime. So, to begin with at a monitor-able, low scale and lesser financial interface, it is proposed to introduce Biometrics in urban public transport such as the Metro trains and buses. To begin with, the scheme should run as an alternative instead of replacing the existent system. In fact, UK government is already considering introducing multiple options including biometrics in coming times in urban transport. (Rodinova, 2017).

4 Implementation plan

Biometrics records of the citizens can be linked to an internet based digital payment wallet like Paypal and the access for availing the services can be pre-authorised by the citizen to the respective organisations of their choice, which may auto-verify the identity of the citizen and also auto-deduct the transaction charges while availing the services. This methodology addresses the concerns related to inconvenience of carrying the cards, possibilities of frauds and adverse environmental impact. A study has estimated that biometrics vendors are expecting a growth from $10.74 billion in 2015 to $32.73 billion by 2022. This will be mainly through primarily three sectors, healthcare, financial services and travel. Few steps are already started in aviation sector, which could be extended to urban transport also (Pando,2017).

5 Likely apprehensions and solution

There may be some apprehension with citizens while introducing a new policy. The first apprehension would be related to privacy. For this, citizens need to be made aware that no private or additional data is captured from the citizen, except finger-print or eye iris image. This is some sort of verification identity only, such as CVV number (Card Verification Value on a credit/debit card is a 3-4-digit number) of digital cards or signature on some documents. It cannot be misused by anyone, with greater likelihood of that in case of CVV number or signature.

The second apprehension is related to likelihood of more financial frauds by some unknown method. For this, people need to be educated that biometrics is just a substitute for digital cards, with the only difference that biometrics result in ID and password verification simultaneously, unlike in many digital cards. Furthermore, to give them more assurance, instead of linking the details to the main bank account, the biometrics records can be linked to a payment wallet which could have much lesser funds.

Thirdly, people might have other hesitations regarding the technical feasibility of the biometrics. For this, the success stories of biometrics in international visa and attendance in many offices can be showcased. Further, there could be problems regarding IT related competencies, which happens in any new system. For it, the existing system of digital cards may continue simultaneously for some time, till the initial troubles related to biometrics get sorted out. The government may also consider giving a small subsidy to incentivise people for opting the biometrics based ticketing.

6 Conclusion

The above paper illustrates the advantages, possible implementation plans and the debunking of certain myths related to Biometrics based Urban Transport Ticketing solutions. While implementing biometrics in the Urban public transport, the final goal should not be forgotten, which is basically to consider biometrics as a substitute for all digital cards, such as debit cards, credit cards and employee identity cards. This change is going to come, it's a choice, who wants to lead this change?

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