Summary of SIP-adus Project (FY2016)

Name of the project	Survey and Investigation of Reducing Boarding Times in Public Transport
Responsible Organization	Toyota Tsusho Corporation

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Object of the Project

We surveyed the following three points in order to reduce boarding times on route buses. For the first and second points, we conducted demonstration experiments in addition to theoretical investigations. We set a target of performing specific investigations that would be useful for investigating the realization of the advanced rapid transit (ART) concept in Tokyo by 2019.

1. Investigation of "seemingly free" authentication methods (mechanisms that do not require fare collection when boarding)
2. Simplification of methods of securing wheelchairs
3. Investigation of "seemingly free" business models

Project Summary

1. Investigation of "seemingly free" authentication methods
Based on the results of investigations into bus boarding and exiting times and a questionnaire survey of foreign tourists, we reached the conclusion that there should be new authentication methods that can make up for the weaknesses of transportation IC cards (the occurrence of insufficient funds, low usage rates among foreign visitors) in order to reduce fare collection times. We investigated the authentication methods listed below. Based on the results of these trials, we concluded that it would be effective to introduce payment multi-terminals that support payment methods 1 to 4 below, and to use BLE beacons (with beacon tags).

1) Electronic money other than transportation IC cards
2) Credit card IC functions (contactless)
3) Mobile payment such as Apple Pay (using NFC)
4) Mobile payment using Bluetooth
5) BLE beacons (used with smart phones)
6) BLE beacons (used with beacon tags)

2. Simplification of methods of securing wheelchairs
We created a prototype "roller coaster type safety bar" on which we conducted theoretical investigations last year. We installed it on a route bus and performed driving experiments on public roads. Based on the results of these experiments, we determined that wheelchairs could be safely secured when secured to such a roller coaster type safety bar, meaning that wheelchair users could easily board and use buses. We also determined that the time required to secure a wheelchair could be reduced from the current five minutes or more to about one minute or less.

3. Investigation of "seemingly free" business models
We surveyed free bus models in Japan and overseas and considered the following two business models.

1) Model using electronic money
When an electronic money card is touched to a special-purpose terminal installed on the bus, a boarding history is created. When the passenger exits the bus and shops at a participating store, the bus fare is refunded in the form of points, making the bus fare effectively free.

2) Model using BLE beacons
Passengers who purchase a one-day ticket are given a BLE beacon tag rather than a ticket. When the passenger goes to a store or tourism site with the beacon, the entry fee, etc. is discounted, making the fare effectively free.

Future plan

1. Investigation of "seemingly free" authentication methods
The payment multi-terminal used for these experiments would require software modification so that flat bus fares can be deducted.

2. Simplification of methods of securing wheelchairs
The issues that need to be addressed for practical application of a roller coaster type safety bar are the following.
• Make concurrent use with the three-point securing method possible so that the mechanism can be used by all wheelchair users
• Modify the methods of use of folding seats and reduce the space required when a seat is folded.
• Loosen the standards regarding non-step certification and guidelines adopted in response to the new Barrier-Free Law.
• Introduce improvements to the roller coaster type safety bar installation method to increase strength, etc.

3. Investigation of "seemingly free" business models
There are many issues that will need to be addressed for a charge-free bus model to be successful, such as recruiting sponsors. Under an electronic money model, if bus operators do not participate in the relevant forms of electronic money, the system cannot be established under law. In the case of the BLE beacon model, there are cost-related issues including the high cost of the beacon tags.