ICT-based service in public transportation

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East Japan Railway Company
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World Usability Day 2012

Agenda

- JR East & FS Lab. Overview
- Smart Card Payment System
- Smart Station Lab. & The latest R&D activities
- Yamanote-line Trainnet
- Tokyo Station JR x AR
- Kamishirube

eco-train
East Japan Railway Company & FS Lab.

JR Central
JR Kyushu
JR Shikoku
JR West
JR Hokkaido
JR East

Privatized on April 1st, in 1987

Japan National Railway was divided into 6 passenger railway companies and 1 freight railway company.

Employees: 52,076

Group Revenues: 2011 $30 billion

Stations: 1,689 (Shinkansen: 35)

Railway Lines: 70 (Shinkansen: 3)

Passengers Served Daily: 16 million

Population of Operating Area: 59 million (125 million in Japan)

JR East is...
Transportation

Commuter Train - Shinkansen - HAYABUSA was debut!

In March, 2011
Max speed is 320km/h = 200 mile/h
Harnessing state-of-the-art technology and an aim to achieve 320km/h, the fastest operational speed in Japan.
**Suica (Smart Card) Business**

- Credit Card Size

**WiMAX + Wi-Fi Service**

- LCD Display
- New, Weather, Flight, Ad
- CMS server
- WIMAX Antenna
- WIMAX-WiFi
R&D Center of JR East Group

R&D Center was established on Dec./1st/2001

Frontier Service Development Lab.
Advanced Railway System Development Center
Environmental Engineering Research Lab.
Disaster Prevention Research Lab.

Aiming toward the construction of a new railway system

Technical Center
Information Design Group

Aiming for easy-to-understand information provision to customers by using Information Communication Technology
Basic Process on riding train

Check a fare → Buy Ticket → gate → onboard → gate

Complicated Train Route

Fare depends on distance.

Fare depends on distance.
Suica: Super Urban Intelligent Card

- Contact-less IC Card System
- Commuter Pass, e-money and so on.
- Rewriteable, Rechargeable and Reusable

Credit Card Size
The number of Suica holders is 40 million.
### Suica R&D History

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>'87 ~ '91</td>
<td>Basic Research</td>
<td></td>
</tr>
<tr>
<td>'92</td>
<td>1st R&amp;D Trial</td>
<td></td>
</tr>
<tr>
<td>'93</td>
<td>2nd R&amp;D Trial</td>
<td></td>
</tr>
<tr>
<td>'94</td>
<td>3rd R&amp;D Trial</td>
<td></td>
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<tr>
<td>'95</td>
<td>Development to make practical Suica</td>
<td></td>
</tr>
</tbody>
</table>

#### Design Considerations

**What design is efficient for passengers?**

- **Battery inside**
- **Battery-free**
- **Horizontal Type**

**Reader / Writer**

**Automatic Ticket Gate**
It’s hard for passengers to recognize communication area.

Communication Area

R/W

Controller

IC Card

Coiled Antenna

Magnetic Area by R/W

IC Card works by electromagnetic induction.

Suica and how to work.
<table>
<thead>
<tr>
<th>ISO Standard</th>
<th>14443</th>
<th>18092</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>AB</td>
<td>C</td>
</tr>
<tr>
<td>FeliCa</td>
<td></td>
<td>Vender</td>
</tr>
<tr>
<td>Philips</td>
<td></td>
<td>Motorola</td>
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<tr>
<td>Sony</td>
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</tbody>
</table>

- **Frequency**: 13.56MHz
- **Distance**: 10cm
- **Speed**: 106kbps, 212kbps

**Features**
- Reasonable
- High Speed

**Country**
- Europe, Asia
- U.S.A.
- Japan, Hong Kong

**Implement in**
- Japan
- taspo

**In most of**
- Public Transportation

**ID Management**
- Server for Station
- Management Server
- Host Server
- Mobile Suica Server
- Suica Retail Server

**Big Station**

**D Management Server**

**Host Server**

**Mobile Suica Server**

**Suica Retail Server**
More than 60 passengers per minute on the peak time.

Touch & Go! (0.2 second)
### Suica Electronic Money Service

Suica Electronic Money service was launched in March 2004. Suica is available at many locations such as convenience stores, bookstores, restaurants, and vending machines.

<table>
<thead>
<tr>
<th>Out of Station</th>
<th>Inside Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>shops</td>
<td>Cell phone</td>
</tr>
<tr>
<td>Many Kiosk Terminal</td>
<td>Station ATM</td>
</tr>
</tbody>
</table>

**Where can you charge Suica?**

- Where can you charge Suica?
- Money 22/March/2004

Suica can be used at stores in the station building.
2006~

Processing speed: 0.2s

Reserve seat & purchase ticket with your mobile phone
Data transferred to memory
Handset serves as ticket

Mobile Suica Service
Various Suica Services
Credit card w/ Suica
Green car Ticket
Mobile Suica
Suica Point System
Collaboration with JR Central
Internet Payment
Suica System is spreading in Japan

- **Sapporo Area (JR Hokkaido)**
  - Oct. 2006
- **Kansai, Okayama, Hiroshima Area (JR West)**
  - Nov. 2003
- **Nagoya, Shizuoka Area (JR Central)**
  - Nov. 2006
- **Tokyo Area (PASMO)**
  - Mar. 2007
- **Kyushu Area (JR Kyushu, Nishitetsu, Fukuoka City Subway)**
  - JRKyushu: Mar. 2009

**What is Suica?**

= Super Urban Intelligent Card

Or “Sui-sui” (Go smoothly) with this IC CARD

Suica service debut in Nov. 2001!

10th Anniversary in last November!

- Number of Suica is 40 million
- Integration with credit cards
- Ticket & Commuter pass
- Green Car (First Class) ticket
- Shinkansen Ticket
- Mobile Suica
- Shopping
“Touch-free Gate”
Using by Human-body
Communication Technology

Quotation from “NTT & JR East UbiComp 2006”
The latest R&D activities
Trainnet

JRxAR Kamishirube
R&D activities of information providing to customers
In Tokyo Station 1/3
Trainnet is an Information Providing Service on board to passengers' smartphones. Information automatically changes according to the place the train runs on.

Field trial test from Sept. 2012 to Jan. 2013 for 2 trains / 52

Train info.
News
Marketing

Ad

iOS and Android App. are available. More than 15,000 were downloaded so far.

# Collaborated with MITSUBISHI Electric
Navigation system in station using AR technology.

18,000 apps were downloaded.

But we need to improve AR Navi.

Field trial test from April 16th to June 30th 2012 in Tokyo Station.

# Collaborated with DNP

Kamishirube is a new type of kiosk terminal which reacts to a pamphlet using AR technology. This is for people who are not good at ICT devices like smartphones.

300 passengers used Kamishirube daily. Children loved it!

Field trial test from Oct. 1st to 14th 2012 in Omiya Station.

# Collaborated with DNP
Thank you very much!

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