Next-Generation “Regional” Transport using Automated Driving Technology and Special Ward for Field Practice

Takahiro SUZUKI
NICHe, Tohoku University
Aobayama Campus Field Experiment
- Visualization of campus bus & EV locations
- On-demand traffic information system
- Auto allocation of shared mobility
- Evacuation guidance in emergency
- Utilizing EV energies at evacuation place

Social Implementation to Tohoku Disaster Area
- Transport System supplementing existing community bus
- Multi-mode mobility with evacuation guidance function

For Social Contribution

Next-Generation Advanced Mobility System Research Group

Prototype Evaluation Base for Next-Generation Vehicles

Miyagi Reconstruction Park NICHe TAGAJYO BASE
- Early operation restarting of the suffered companies
- Creation of new industry and employments by advanced technologies

Cross-cutting Integration for Advanced Technology Development
- EV Bus
- In-Wheel Motor
- Head-Up Display
- Omnidirectional Camera

- Micro EV
- Autonomous Vehicle
- Lithium-ion Capacitor EV
- Dual-Mode EV (for emergency)

- Driving Simulator
- Traffic Simulation
- Virtual Space
- Driver Sensing

Region-based Collaboration of Industry-Academia-Government
- Toyota Motor East Japan, Inc.
  - Outdoor Un-manered Vehicle
  - Next-Generation Distribution
- Kudo Electronics Corporation
  - Motor, Power Electronics
- Hikichiseiko Co.,Ltd.
- Murakami Co.,Ltd.
  - Wireless Charging Station
  - EV Design & Manufacturing

under collaboration with Ministries, Prefectures, Cities & Towns

Outdoor Unmanned Vehicle
Next-Generation Distribution
Motor, Power Electronics
Wireless Charging Station
EV Design & Manufacturing

Social Implementation to Tohoku Disaster Area

In the Sony Corporation Sendai Technology Center

1 : Community Bus
2 : EV Sharing
3 : e-assist bicycle

1 : Community Bus
2 : EV Sharing
3 : e-assist bicycle
Aobayama Campus Smart Mobility Vision (Planning)

Smooth Transfer to Multi-Mode
- Subway Tozai Line
- Campus Bus
- E-Cycle Sharing
- Micro EV Sharing

Development of Smart Station/Port
- Terminal
- EV Station
- E-Cycle Port

Clean Traffic Mode for Sustainable Society

Monitoring & Automated Operation
- On-line
- Demand response

Smart & Integrated Management

Showcase of Advanced Technologies
- Next-Generation Smart Campus Model
MEXT Tohoku reconstruction Next-Generation Energy R&D Project (2012-2016)
“Creation of Energy-Mobility Integrated Management Systems (EMIMS)”

(1) Creation of EMIMS ①～⑤
Construction of Energy-Mobility Network

(2) Mobility System R&D ⑥～⑨
Revitalization of regional transport using EV
(Advanced Regional Society Model from Disaster Area)

(3) EMS & Local Renewable Energy R&D ⑩～⑭
Inspections inside and outside of the country to Miyagi Reconstruction Park (Tagajo city)

Shinzo Abe, Prime Minister (Dec. 2013)
Sadayuki Sakakibara, Chairman of Keidanren (Jul. 2014)

T. Nemoto, Minister of Reconstruction Agency (Sep. 2013)
Shoichiro Toyota, President Emeritus of Toyota Motors (Nov. 2014)

Shinziro Koizumi, Reconstruction Parliamentary Secretary (Aug. 2014)
Mali Republic (Africa) (May, 2014)
**Social Innovation Creation Special Ward**

- **Reformation Base for Promotion of Woman Activities & Social Business**

**Promotion of Social Business**
- Shorten NPO startup procedures to a half etc.

**Promotion of Woman Social Participation**
- Locally limited nursery examination
- Nursery in urban park etc.

**Field Practice of Advanced Technologies**
- New Innovation Creation by Field Tests of Automated Driving with Tohoku University

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**Sendai, Miyagi**

**Surroundings of Sendai city**

Increasing women entrepreneurs

<table>
<thead>
<tr>
<th>Year</th>
<th>Young Entrepreneur</th>
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<tbody>
<tr>
<td>H23</td>
<td>56</td>
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<tr>
<td>H24</td>
<td>71</td>
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<tr>
<td>H25</td>
<td>87</td>
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<td>H26</td>
<td>444</td>
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Entrepreneur mind changes greatly after disaster

<table>
<thead>
<tr>
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<th>To utilize skill</th>
<th>To contribute to society</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>20.6%</td>
<td>16.5%</td>
</tr>
<tr>
<td>After</td>
<td>15.2%</td>
<td>23.7%</td>
</tr>
</tbody>
</table>

Tohoku region is “Advanced Problem Area”

- Young Entrepreneur mind changes greatly after disaster

- **Disaster-Suffered Area**
- Advanced Aging
- Low Birth-Rate

**To utilize skill**
- To contribute to society

**Entrepreneur mind changes**
- Before
- After
Advanced Technology Field Practice Special Ward:
“Creation of Aobayama Campus Next-Generation Advanced Mobility System Practice Field”
=> Authorized as “Sendai Social Innovation Creation Special Ward” (2015)

- **Outline:**
  Field practice of advanced technologies as automated driving or UAV are executed in Aobayama campus. Utilizing new & existing campus as special ward widely open to active researchers, their realization and deregulation can be quickly proceeded.

- **Contributions:**
  - Quicker realization of technologies
  - Active deregulation
  - Promotion of field test research
  - Attraction of interests
  - Dissemination to public
  - More attractive campus etc.

Stage 0 (Lab): R&D in Academia or Industry (Ex. Miyagi Reconstruction Park)

Stage 1: Field Practice in New Campus Area

Stage 2: Practical Operation in Existing Campus as Special Ward

Stage 3 (Regional Implementation): Model Development to Surrounding Area (Island, Remote Area, etc.)

- Automated Driving
- UAV (Drone)
- Platooning, Remote Drive
- Wireless Charge
- Unmanned Vehicle

- Infra Inspection
- Disaster Resilience
- Law Reform Deregulation
- Modeling Dispatch

Open to other R&D sectors
Advanced Mobility System Practice Field Plan

Advanced Mobility System Practice Field
(Open Practice Field / Demonstration Field)

For Researcher:
- Hatchery / Nursery / Practice Field
- Utilize Closed Park / Open Road
- Verification of Social Receptivity
- Dissemination to Public
- Advanced Marketing
- R&D considering Practical Needs

For Users & General People:
- Attraction of Advanced Technology, Experience of “Near-Future”
- Improvement of Understanding
- Creation of Near-Future Image
- Participation to Near-Future R&D
- Human Resource Creation

Conventional closed R&D Field

Step.0 Virtual Lab (Simulator)
(Tagajo DS + Traffic simulation)

Step.1 Closed Park
(New Campus)
(Non-public road, not mixed)

Deregulation 
Law reform

Step.2 Special Ward
(Old Campus)
(Public road, Mixed(partly))

Step.3 Surrounding Areas
(Tohoku Area)
(Remote Islands, Mountainous Areas)

Globally develop from Tohoku Area

R&D Support
- Practice Field Operation
  Real & Virtual Proving Ground
- Open Lab (PJ Space)
  widely open to other sectors
- MICE function (seminars)
  Public Relations
- Global Cooperation Hub
  Tele-Conference, Travel Support, Accommodation

Supporting Dissemination
- Showcase & Demonstration
  cooperate w/ top researchers
- Correspondence to Inspection
- Human Resource Development
- Experience Lab

Incubation
- Support Industry-Academic Collaboration
- Industrialization Support
- VC
Ex. Jeju Global Smart Grid Platform
Field Practice in Disaster Damaged Area for Reconstruction

Automated Driving Practice Field Plan

- Reform the coastal disaster-damaged area to a practice field for automated driving to solve problems of regional public transport
- Propose a model of “Last-One-Mile” new mobility system and demonstrate field practice
- Area: Arahama district (disaster-damaged area)

Future Plan
- Ordinary: Transport in area and connecting to transport hub (Last one mile, Robot taxi, etc.)
  => making workable area in the district
- In Emergency: Smooth evacuation to higher place

- Unmanned inspection, surveillance for evacuee (Utilize autonomous vehicle, drone, etc.)
“Car-sharing” to create “community” (in Ishinomaki)

Japan Car-Sharing Association: http://www.japan-csa.org/
目的: EVと観光ITSの実配備・運用、地域発で全国に通用するルール化・標準化を行うプロジェクトの遂行、環境、観光を軸とした地域振興・産業振興の実現、エネルギーシステムとEVに係るモデル実証等

長崎EV&ITSコンソーシアム（エビッツ）

WG 1 EV・充電設備関連
WG 2 ITSインフラ関連
WG 3 コンテンツ関連

Secretary

関係機関
市町・県
地元企業・団体
情報関連企業
観光関連企業等
d e facto Standards Board

① 検討項目
太陽光発電を活かしたマイクログリッド、スマートグリッドなど、エネルギーの地産地消の検討等

② 検討項目
ニーズ把握
サービス定義、フォーマット化
コンテンツ整備
地域情報の収集・提供等の運用方法等

① 関係機関
電気メーカー
通信機メーカー等

② 検討項目
ITS車載器スペック
多言語対応
DSRC、テレマティクス活用場面整理
決済サービス（ETC等）等

① 関係機関
電力事業者
自動車メーカー
充電器メーカー等

② 検討項目
EV導入・利用計画
充電設備スペック、配備計画
EVとITSの連携（CANI/F）等

長崎県・五島市・新上五島町・長崎河川国道事務所

Crossing cooperation of WGs

“Tohoku Near-Future Technology Field Practice Consortium”

Target: Promote field practice research of near-future technologies as automated driving and UAV, and accelerate social implementation

Tohoku Near-Future Technology Field Practice Consortium

Board
Secretary

Large group of industries and associations

Technological and Functional Specification
de facto Standards

City & Town Local Communities

University Network Hub

Now Preparing

- Workgroups for Automated Driving, UAV, or other technical fields
- Workgroup for legal and social issues
  (supporting law reformation and deregulation by national government) etc.

↓

Now Preparing