Expanded Outline

Transportation and Information: Trends in Technology and Policy

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Chapter 1 Introduction

1.1 Trends in ICT-Based Surface Transportation
- Sensors
- Location and positioning systems
- Information extraction technologies
- Sensor fusion technologies
- Communication methods
- Information and data management
- Methods for information analysis
- Methods to understand user dynamics and impacts associated with the use of mobility information and services

1.2 Overview of the State of Information-Based Mobility Environment
- Primary, secondary and tertiary tiers

1.3 Key Trends Motivating ICT Use in Transportation
- Market pull and push factors

1.4 Mobility Technology Areas
- Location-Based Services
- Intelligent Transportation Systems
- Smart Cities and Ubiquitous Information Societies

- Intelligent Infrastructure Technologies for Transportation Asset Management and Condition Monitoring
- Informatics for Citizen Engagement and Participatory Sensing
- Mobile Health and Technologies for Special Mobility Needs

1.5 Mobility Policy Areas
- Sustainable Mobility Policy Area 1: Economic and Financial Aspects
- Sustainable Mobility Policy Area 2: Environmental Aspects
- Sustainable Mobility Policy Area 3: Social and Human Aspects

1.6 Organization of the Book

Chapter 2 Data Sources and Management

2.1 Introduction

2.2 Traffic Detection and Surveillance Systems

2.2.1 Sensors for Traffic Monitoring
- In-Road Sensors
  - Inductive Loop Detectors
  - Magnetometer
- Over-Road Sensors
  - Passive Infrared
  - Active Infrared
  - Acoustic
  - Ultrasonic
  - Video Systems
  - Radar
  - Laser-pulsed

2.2.2 In-Vehicle Sensors

2.2.3 Some New Sensing Modalities
- Toll Tags
- Bluetooth
- Mobile Phones and Mobile Devices
- Biometric Sensors
- People as Sensors

2.3 Transportation-Oriented Communications Systems

2.3.1 Communications Access for Land Mobiles

2.3.2 Machine-to-Machine (M2M)

2.3.3 Application Programming Interface (API)

2.3.4 Positioning Systems
- Satellite-based Positioning
- Mobile phone based Positioning
- Indoor Positioning
- Other issues

2.4 Methods to Add Intelligence to Sensor Data
- Information Extraction Methods
- Analysis
- Information Fusion
- Event Stream Processing and Complex Event Processing

2.5 Initiatives and Programs through Technology Integration

2.5.1 What happens to all that data?

2.6 Privacy, Trust and Security
- Privacy-Enhancing Technologies including pseudonyms and mix-zones
- Locational privacy in communications
- Locational privacy in position sensing systems
- Locational Privacy in Vehicular Ad-Hoc Networks (VANET)

Chapter 3 Technology Systems for Transportation System Management and Personal Use

3.1 Introduction

3.2 Transportation System Management, Operations and Safety

3.2.1 Transportation System Management
- Adaptive Signal Control
- Ramp Metering
- Incident Management
- Parking Management
- Maintenance and Monitoring: Asset Monitoring and Workzone Management

3.2.2 Safety

- Infrastructure-based Safety Approaches
- Vehicle-based Safety Approaches
- Passive and Active Safety Systems
- V2V and V2I
- Safety Systems Involving Non-Motorized Modes

3.2.3 Dynamic Resource Management

- Fleet and Dynamic Resource Management
- Weather-responsive mobility services
- Emergency Management and Crisis Informatics
- Energy, Smart Grid, V2G and Electric Vehicle Information Systems
- Smart city, u-city, e-city, digital city and Transportation

3.3 User-Generated Content: Involving People in Mobility Management

3.3.1 Proactive User-Generated Content

- Type of Content
  - Idea Generation, Feedback and Problem Solving
  - Human Computation
  - Sensing
    - Participatory Sensing
    - Opportunistic Sensing
    - Ad-hoc Sensing
- Compensation
- Type of motivation

3.3.2 Retroactive User-Generated Content

3.3.3 Issues to Consider in Designing Sensing Programs

3.4 Technologies for Personal Mobility and Accessibility

3.4.1 Travel Information and Location Services

- Types of Personal Mobility and Accessibility Services
- Resource Discovery Systems
- Navigation and Routing Systems
- Personalized Itinerary Scheduling Systems
- Location-Based Social Networks
- Location-Based Personal Productivity Systems

3.4.2 Mobile Health and Wellness Technologies
- Mobile Health and Wellness Informatics
- Modes of Physical Activity Support
- User-centered design and social design principles
- Persuasive technology principles
- Ubiquitous Health and Wellness Monitoring

3.4.3 Technologies to Meet Special Mobility Needs
- Paratransit Service Management
- Mobility management
- Wayfinding, navigation and outdoor mobility
- Indoor Mobility

Chapter 4 Institutional and Policy Factors in ICT-Based Mobility Services

4.1 Introduction

4.2 Institutional Challenges

4.2.1 Funding and Revenues
- Governmental Funding and Trends
  - Governmental Support for ITS
  - Funding for Broadband and other Infrastructure
  - Public-Private Partnerships
- Private Investments
  - Investments in Hardware and Communications Infrastructure
  - Revenue Streams for Software

4.2.2 Policy and Regulatory Environment
- ITS Architectures
- Locational Privacy
- Regulating and Managing Spectrum
- Distracted Driving

4.2.3 Policies towards Data
- Open Data Policies
- Big Data Initiatives

4.2.4 Management and Governance

- Capacity Building and Body of Knowledge for Mobility Intelligence
- Governance and Public Management
- ICT-based Mobility Project Leadership
- ICT-based Mobility Project Development and Management
- Addressing Equity in Service Provision

4.2.5 Legal and Ethical Issues
- Liability
- Intellectual Property infringement
- Consumer Awareness and Protection
- Trust Services

4.3 Societal Preparedness

4.3.1 Digital Citizenship
- Digital Mobile Etiquette
- Digital Literacy
- Digital Participation

4.3.2 Digital Divide

4.4 Coordination of ICT with Transportation Services and Plans

4.4.1 Coordination with Transportation Services

4.4.2 Coordination with Transportation Planning Efforts

4.4.3 ICT-Based Mobility Strategy Design for User-Centeredness and Sustainable Outcomes

Chapter 5 Conclusions

5.1 Ubiquitous Information-Centered Mobility Environment

5.2 Major Trends
- Computational Research
- Mobility intelligence and information analysis
- Planning, public administration and management research
- Social science research
- Interdisciplinary research on Human-Computer Interactions

5.3 Conclusions

Additional Material

References

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