Standardizing Digital Maps for Future Mobility

Digital Twin: A key Enabler for Future Mobility

PARK, ILSUK (kakaomobility NEMO Labs)
History of Digital Maps

• The journey of building a digital map

History of Digital Maps

• The journey of building a digital map

Sources: https://geology.com/google-earth/
History of Digital Maps

• Revolutionizing the use of digital maps

Sources: https://developers.google.com/maps/documentation/navigation, https://www.youtube.com/watch?v=M0vTQm8Lkoo
History of Digital Maps

• Journey to the future of digital maps

Sources: https://www.google.com/streetview/how-it-works/
History of Digital Maps

• Journey to the future of digital maps

History of Digital Maps

• Journey to the future of digital maps

History of Digital Maps

• Journey to the future of digital maps

Digital Maps in Mobility

- Mobility Service: Connecting suppliers and demanders for a variety of movements

Digital Maps in Mobility

• Traditional location-based services rely on superior human performance

Digital Maps in Mobility

• Geospatial information for machines must provide accurate 3D-locations and paths.

Digital Maps in Mobility

• Digital maps should be the next generation of infrastructure

Sources: kakao mobility report(https://report.kakaomobility.com/)

Couldn't the camera and the machine's own sensors do the job?

Couldn't cloud computing using telecommunications solve this?

High cost, Low demand, and Long time to build communications infrastructure
Digital Maps in Mobility

- Digital geospatial information in mobility
- Become a part of the control, not just something people look at for reference

**Diagrams: Navi vs HD Map**

<table>
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<tr>
<th>구분</th>
<th>Navigation Map</th>
<th>ADAS Map</th>
<th>HD Map</th>
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<tbody>
<tr>
<td>지도</td>
<td></td>
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<tr>
<td>응용</td>
<td>내비게이션 기능 구현 목적</td>
<td>ADAS 기능 구현 목적</td>
<td>자율주행기능 구현 목적</td>
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<td>도로단위</td>
<td>도로단위</td>
<td>차선단위</td>
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<tr>
<td>장비</td>
<td>GPS + Camera</td>
<td>MMS(Mobile Mapping System)</td>
<td>(GPS+IMU+LIDAR+DMI+Camera)</td>
</tr>
<tr>
<td>정확도</td>
<td>± 1m ~ 3m</td>
<td>± 1m</td>
<td>± 0.02m</td>
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<tr>
<td>자율주행 Lv</td>
<td>(자동화 보조 주행) L1 ~ L3</td>
<td>(자율 주행) L3 ~ L5</td>
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</tbody>
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*© Kakao Mobility Corp.*

Sources: [kakao mobility report](https://report.kakaomobility.com/digital-twin-for-future-mobility-ai-robot)
Why is it difficult to standardize for mobility?

• The difference between what you want and what technologies and standards are actually applicable

Digital Maps for Autonomous driving

• To create a ecosystem platform to ensure accuracy, scale, and updating capabilities.

Sources: https://waymo.com/research/block-nerf/, https://www.youtube.com/watch?v=vgot-CK1xRk
Digital Maps for Autonomous driving

• To create a ecosystem platform to ensure accuracy, scale, and updating capabilities

Digital Maps for Autonomous driving

- Our NEMO(NExt MObility) Labs research is focused on two main topics.
  - Research on a universal format for conversion between digital maps.
  - Building a point cloud platform to provide accurate 3D Route information.
Digital Maps for Autonomous driving

• Research on a universal format for conversion between digital maps.
  • Accuracy problem
  • Model based vs Data based
  • Geometry relation for mobility control
Digital Maps for Autonomous driving

• Building a point cloud platform to provide accurate 3D Route information.
  • Sensor Fusion
  • 3D GCP (Ground Control Point)
  • Cloud native application (web-based 3d solution)
Kakao Mobility Digital Twin Factory

- DT Factory collaborates with various companies on DT (Digital Transformation) business as well as new technologies

HD-ADAS Map
Parking Map
Robot Map

Digital Twin: A key Enabler for Future Mobility

- Enable AI to make sense of our world