31st UN/CEFACT Forum

TRAINS ON THE ROADS

PLATOONING supported by Radar Positioning System Technology

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PLATOONING

- Lower Fuel Consumption
- Less CO2 Emissions
- Improves traffic safety
- Efficiently boosts traffic flows

EUROPEAN TRUCK PLATOONING

PLATOONING CHALLENGES

- Optical/Radar Systems for Achieving Relative Position from Vehicle Ahead
- Cumulative Error Following the Leader
- GNSS limited accuracy & availability and hacking issues
- Wireless Communications do not Warrant QoS
- Large Safety Distance Required Between Vehicles
- Autonomous Platooning is Currently Limited to 2 or 3 vehicles

INTRODUCTION TO RPS TECHNOLOGY

VIDEO

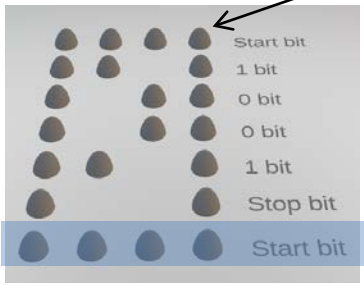
https://www.youtube.com/watch?v=qAfoiSl0D10

PAINT THE ROADS

VIDEO

https://www.youtube.com/watch?v=AUKbgLrxU0Q

ENCODING SYSTEM



The 64-bit code is associated to the position of the last paint drop

1 bit row

By reading 64 rows, 1 cm accuracy position is obtained

Then, **the position is updated row by row**

Start bit

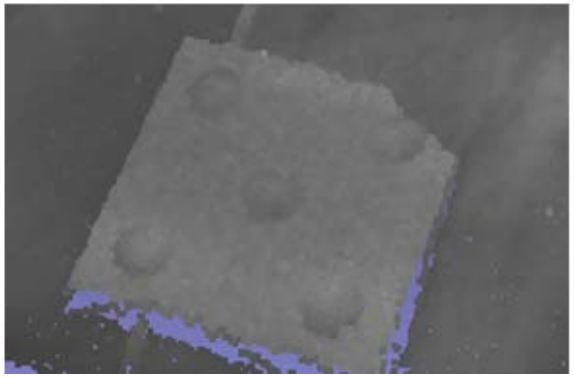
Drop-reference for positioning

Stop bit

RADAR TECHNOLOGY FOR READING 3D PAINT DROPS

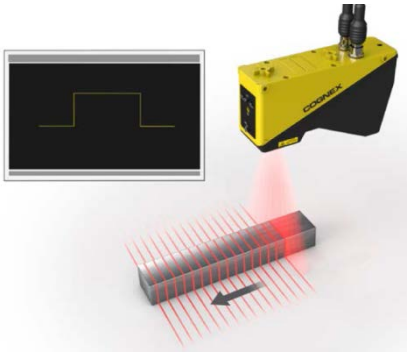
Multiple low-cost choices:

- 3D Infrared Cameras
- Laser profilers
- mm-wave Radars
- Solid State Lidars

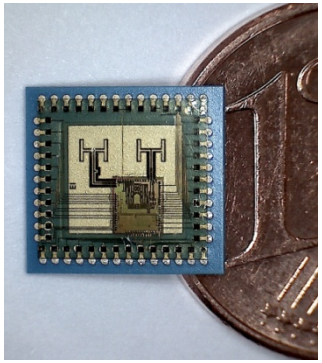


3D Infrared Radar Image

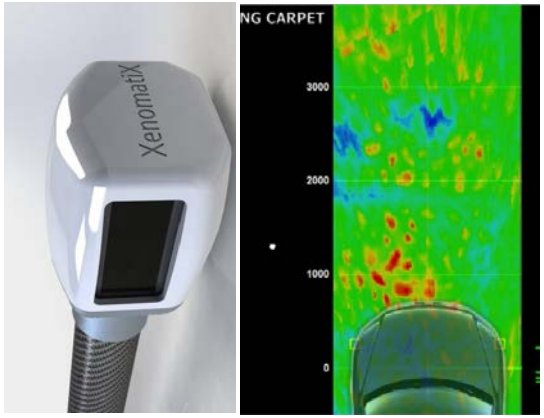
6mm Paint Drops
Optical image



10 µm Accuracy Laser Profiler



0.1 mm Accuracy mm-Wave Radar



Solid State Lidar Surface Image

200€ infrared 3D camera

RPS DEPLOYMENT FEASIBILITY

Printing Speed:

12 Km/h

Paint Cost:

220 €/km

3D Paint Drops Support

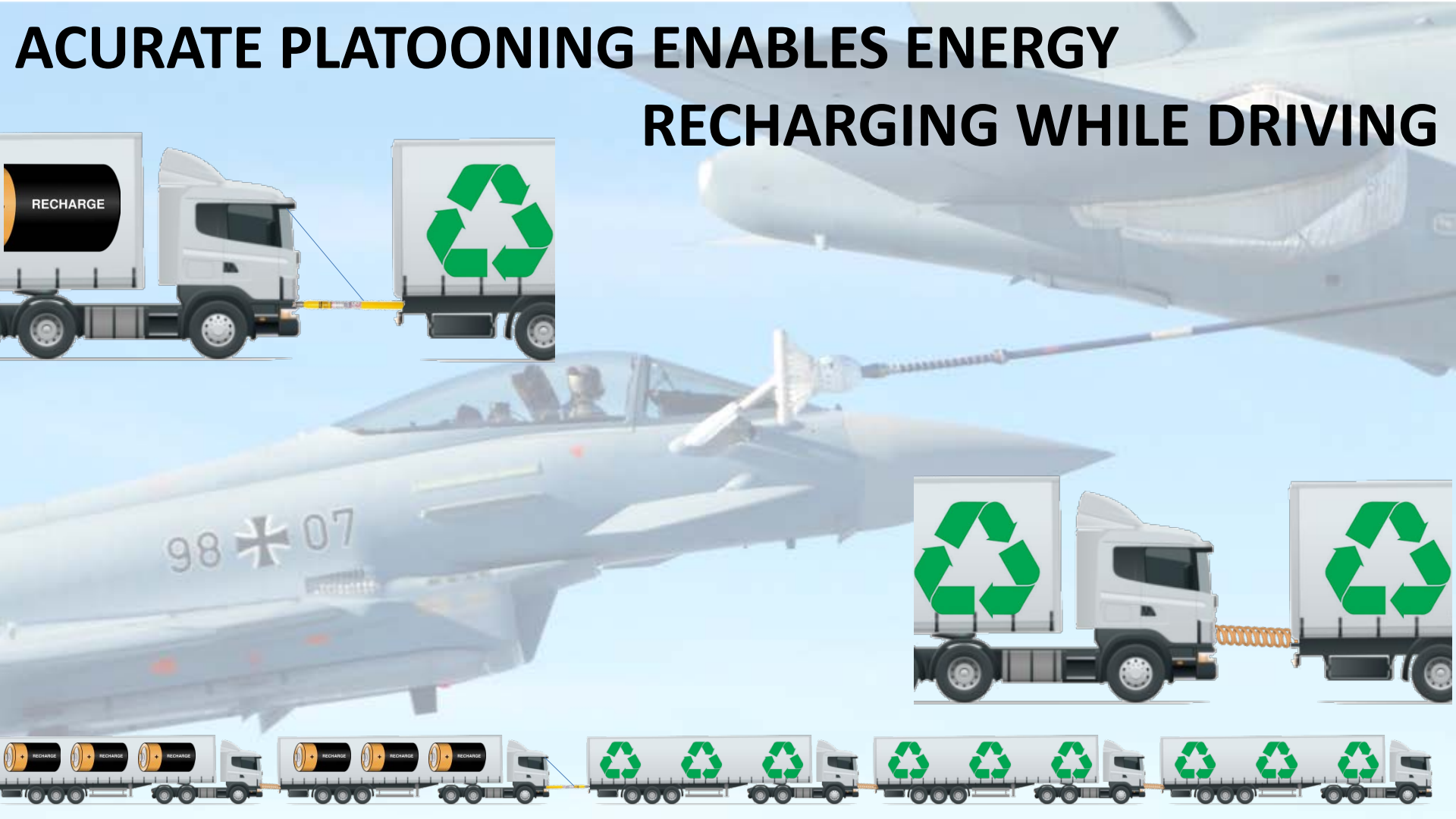
4 Million Tire Over-Crossings

BENEFITS OF RPS TECHNOLOGY

- Detailed Roadmap is Stored in Every Vehicle: Hack Free Technology.
- Leader accelerates and brakes taking into acount the other vehicle's locations & capabilities
- The Leader Shares its Trajectory **with 1 cm Accuracy**
- The Rest of Vehicles Follow **EXACTLY** the Same Trajectory
- **Trains on the Roads**: 1 Leader Can Drive >100 semi-Autonomous Platooning Trucks
- Breaking Reaction Time <30 µs (<0.7mm of Vehicle Advance @80km/h)
- 1m Gap Between Trucks Enables **Physical Connections:**
    - Ultra Low Delay & Secure Connections
    - **Energy transfer** between vehicles

RPS

ACURATE PLATOONING ENABLES ENERGY RECHARGING WHILE DRIVING



Welcome to RPS Mobility!

Thanks for your attention

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