SAT

Synergies Autonomous Transport

Med stöd från

VINNOVA Sveriges innovationsmyndighet

Energimyndigheten

FORMAS

Strategiska innovations-program

DRIVE SWEDEN

Goals

- Make future urban freight and passenger transport more sustainable, efficient, accessible and safe.
- Cooperation between robot and bus
- Testing with potential users at Chalmers

Execution

Business Models & Incentives
Handels

Urban Development
Prepair the real estate industry on a future with autonomous

Transport Efficiency and CO2 reduction
Chalmers

Digital backbone
Ericsson Innovation Cloud

User Centered Design
Chalmers

Create a concept and working prototypes
Hugo

Testing
Keolis

Business Models & Incentives: Handels

Conclusions

- All parties see value in autonomous solutions
- A completely autonomous transport system is perceived as costly and far into the future
- Driving lanes designated for autonomous vehicles if flexible usage is made possible
- A local mobility center that offers a variety of local services is expected to create economic and social value
- A need for regulation that is long term but flexible

Urban Development

Samverkande Autonoma Transporter

- Leveransrobot och självkörande buss testas tillsammans på Chalmers med syftet att se hur gods- och persontransporter kan samverka i stadsmiljö.
- Partners:
  Akademiska Hus, Chalmers, Chalmersfastigheter, Ericsson, Framtiden Byggutveckling, Göteborgs Stad (trafikkontoret), Göteborgs Universitet, Hugo Delivery (projektledare), Johanneberg Science Park, Keolis, Landvetter Södra Utveckling AB, Mölndala Fastighets AB, PostNord, Riksbyggen, Skanska, Tele2, Västtrafik, Wallenstam
- Finansiering: Vinnova inom innovationsprogrammet Drive Sweden.

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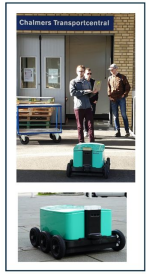
FORMAS
Strategiska innovationsprogram
DRIVE SWEDEN
Johanneberg Science Park

Transport Efficiency

CHALMERS
UNIVERSITY OF TECHNOLOGY

1- Assessing the efficiency of goods deliveries by robots



- How to pack robots?
- What route should the robots take?
- How many robots are required?
- Are robots' energy efficient compared to e-vans?

Letters

Packages

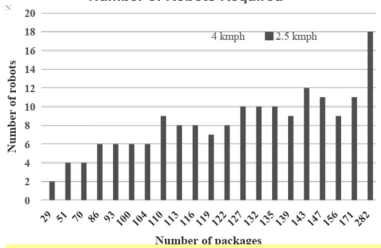
Pallets

2023-05-22

CHALMERS
UNIVERSITY OF TECHNOLOGY

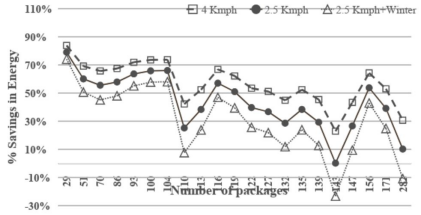
1- Robot delivery efficiency

Number of Robots Required



- **7-8 robots sufficient for 50% of cases**
- **2-18 robots required depending on demand**
- **6 tours/ robot**
- Depends on demand, robot speed and time window

Energy Savings Compared with Pickup



- **Savings of -23% to 84% in energy compared to pickup**
- **Average savings of 27% is possible**
- Beneficial unless during winters, and at lower speeds
- Depends on freight demand, typology, and dimensions

2023-05-22

Potential energy saving of 27%

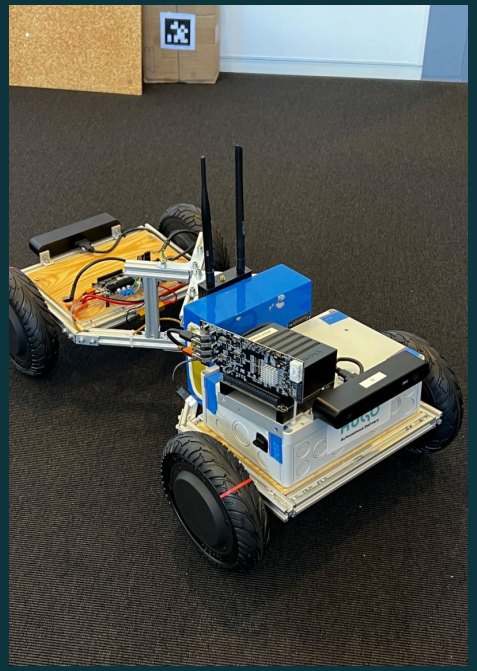
Ericsson Innovation Cloud

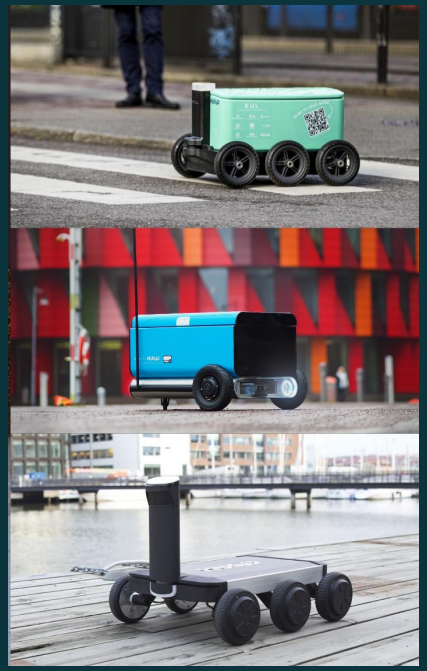
User Centered Design

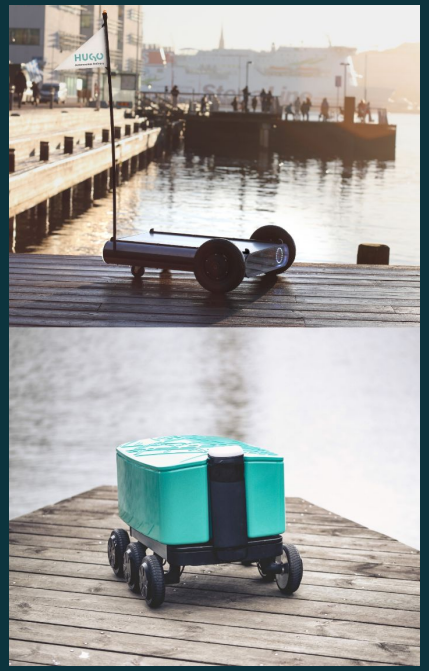
- There is great potential for a positive user experience and acceptance

- Standardization will be required for aspects such as driving behavior, but also for the surrounding robot delivery system

Hugo, concepts and prototypes







Collaboration between robot and bus

Results

- Workshops with real estate
- Robot + Bus Concept tested
- Unattended deliveries concept initially tested
- Potential energy saving of 27%
- More development needed for rollout. Communication protocol, localization, user interaction, standardisation

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