ESS-NW/CAR

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MF2063

December 10, 2018

Overview

Introduction and background

Autonomous vehicles

JACK STEWART TRANSPORTATION 08.04.18 07:00 AM

TESLA SAYS ITS NEW SEL DRIVING CHIP IS FINALL BAKED

Move over Tesla, this self-drivi you sleep or watch a movie du highway commute

Tom Huddleston Jr. | 5:00 PM ET Tue, 26 June 2018

46 Corporations Working On Autonomous V

September 4, 2018

Autotech

Scania self-driving trucks to be tested on Finnish roads

How Intel Plans to Win Self-Driving Cars

Inside Intel's compelling self-driving car strategy.

Ashraf Eassa (TMFChipFool)
Jul 9, 2018 at 6:06PM

Waymo's driverless cars hit a new milestone: 10 million miles on public roads

BBC Sign in News Sport Weather Shop

NEWS

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Business Market Data Global Trade Companies Entrepreneur

The UK firm hoping to take on G driverless cars

By Will Smale
Business reporter, BBC News

8 October 2018

Apple self-driving car fleet grows to 66 vehicles in California

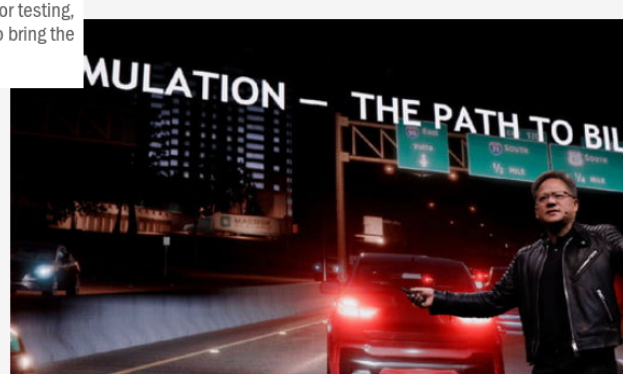
By Malcolm Owen
Wednesday, July 18, 2018, 12:14 pm PT (03:14 pm ET)

Apple is continuing to increase the number of autonomous vehicles it has on the roads for testing, reportedly registering more vehicles with the Californian Department of Motor Vehicles to bring the fleet up to 66 self-driving cars operating in the state.

+ A –

onaoina challenaes

Nvidia is helping autonomo ulate their way to safety

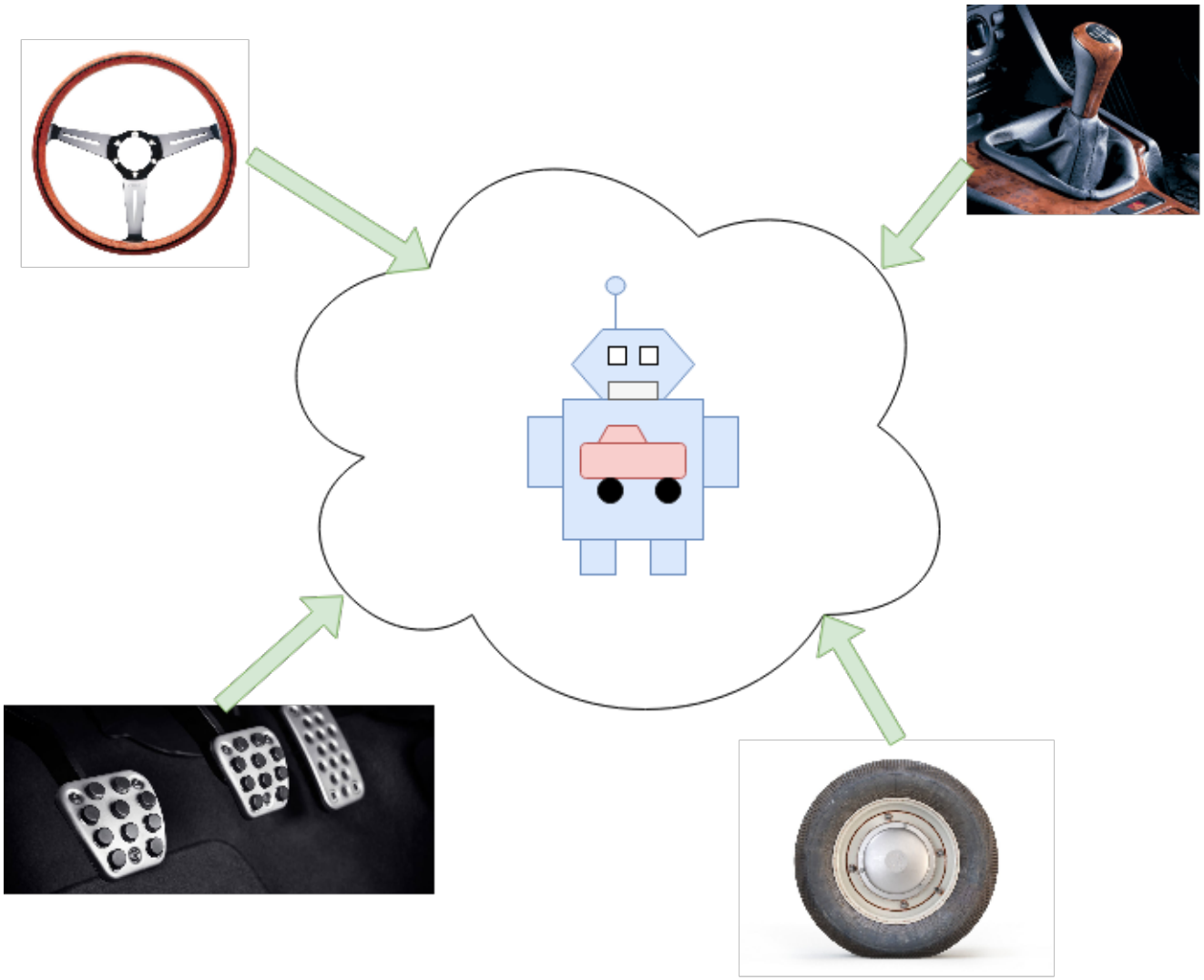


Article

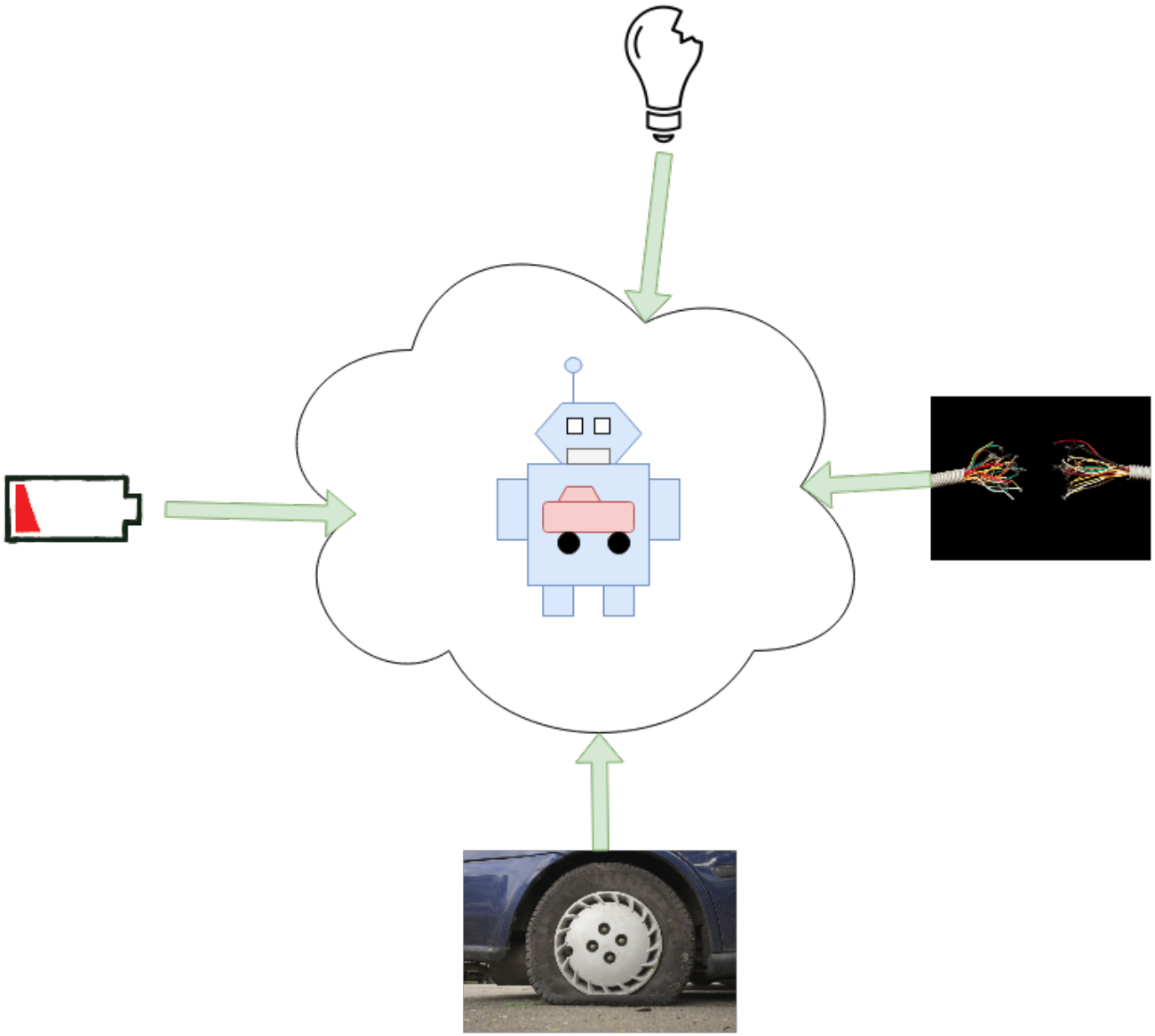
Development of self-dr vehicles in the United I

Where science fiction meets sc

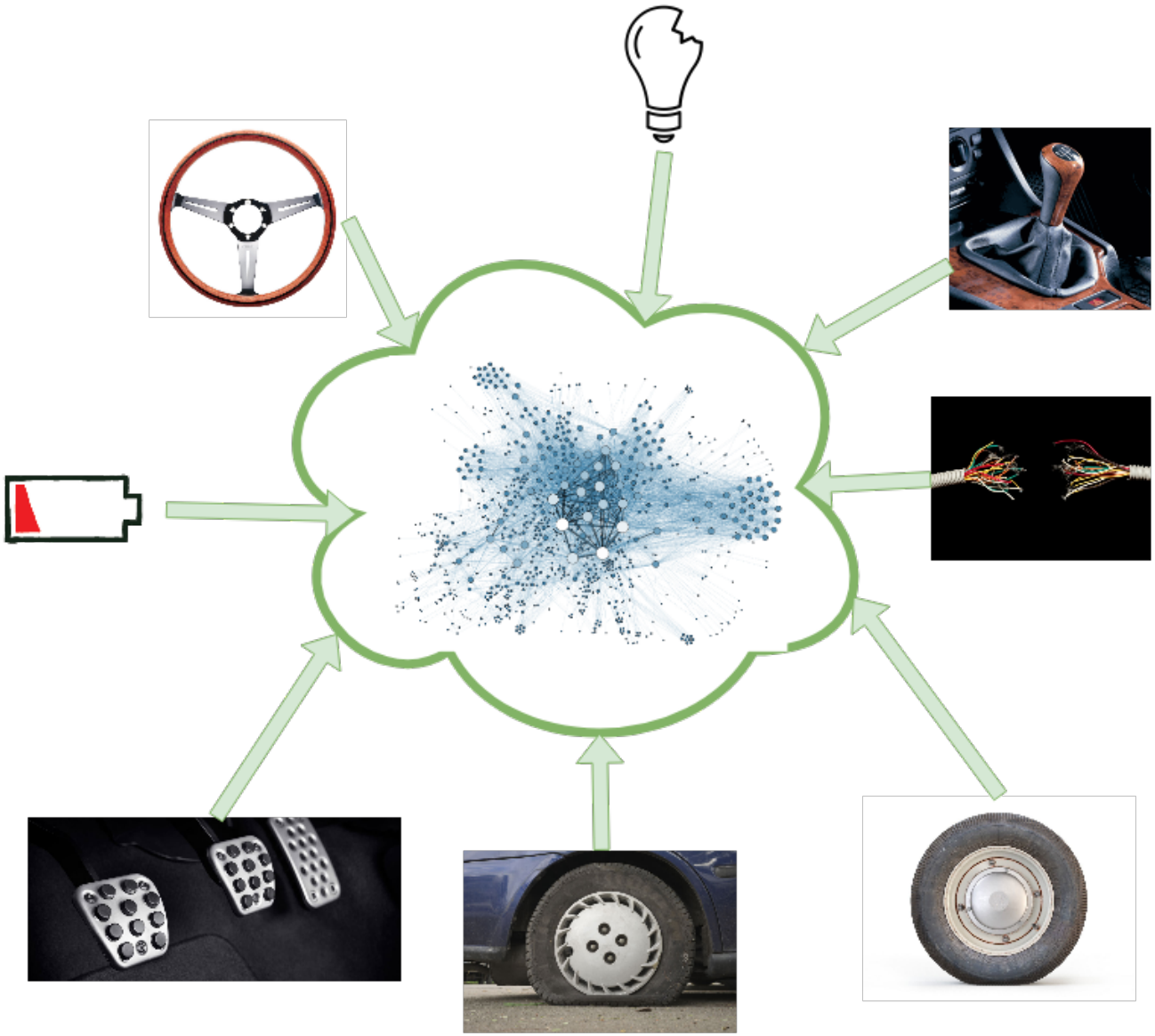
Autonomous vehicles



Autonomous vehicles

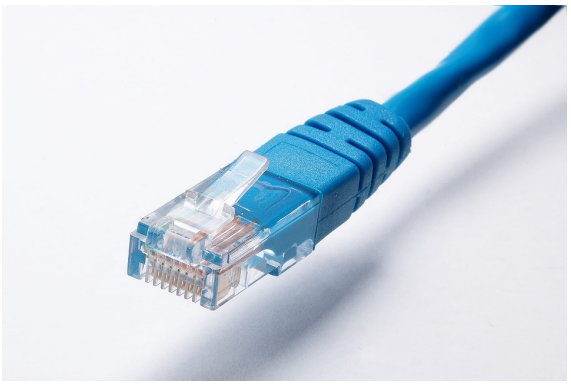


Autonomous vehicles



The problem with existing communication technologies

- Existing communication technologies between internal computers in cars:
  - CAN (1 Megabit/s)
  - LIN (19.2 Kilobit/s)
  - FlexRay (10 Megabit/s)
- Too slow for autonomous cars!
- Regular internet based technologies can be a solution for communication in cars.
- Wired ethernet speeds reach into the Gigabit/s range.



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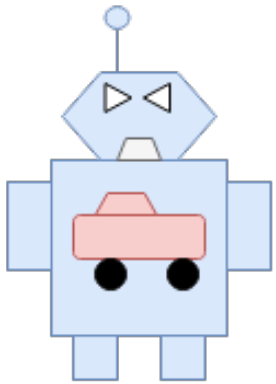
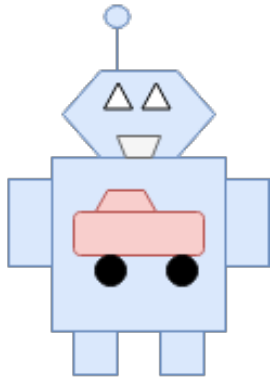
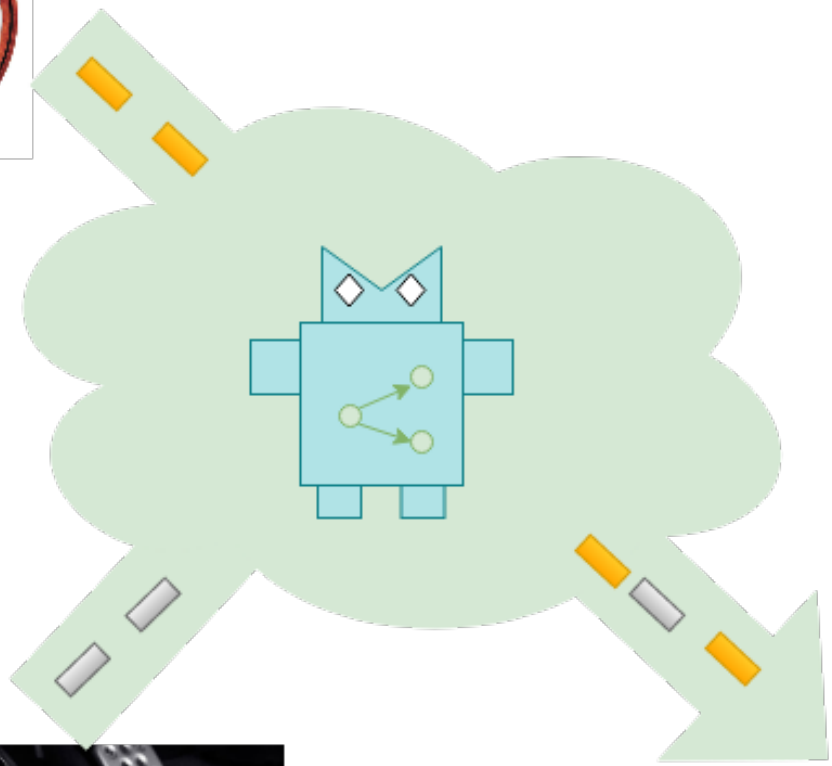


Software-Defined Networking (SDN)





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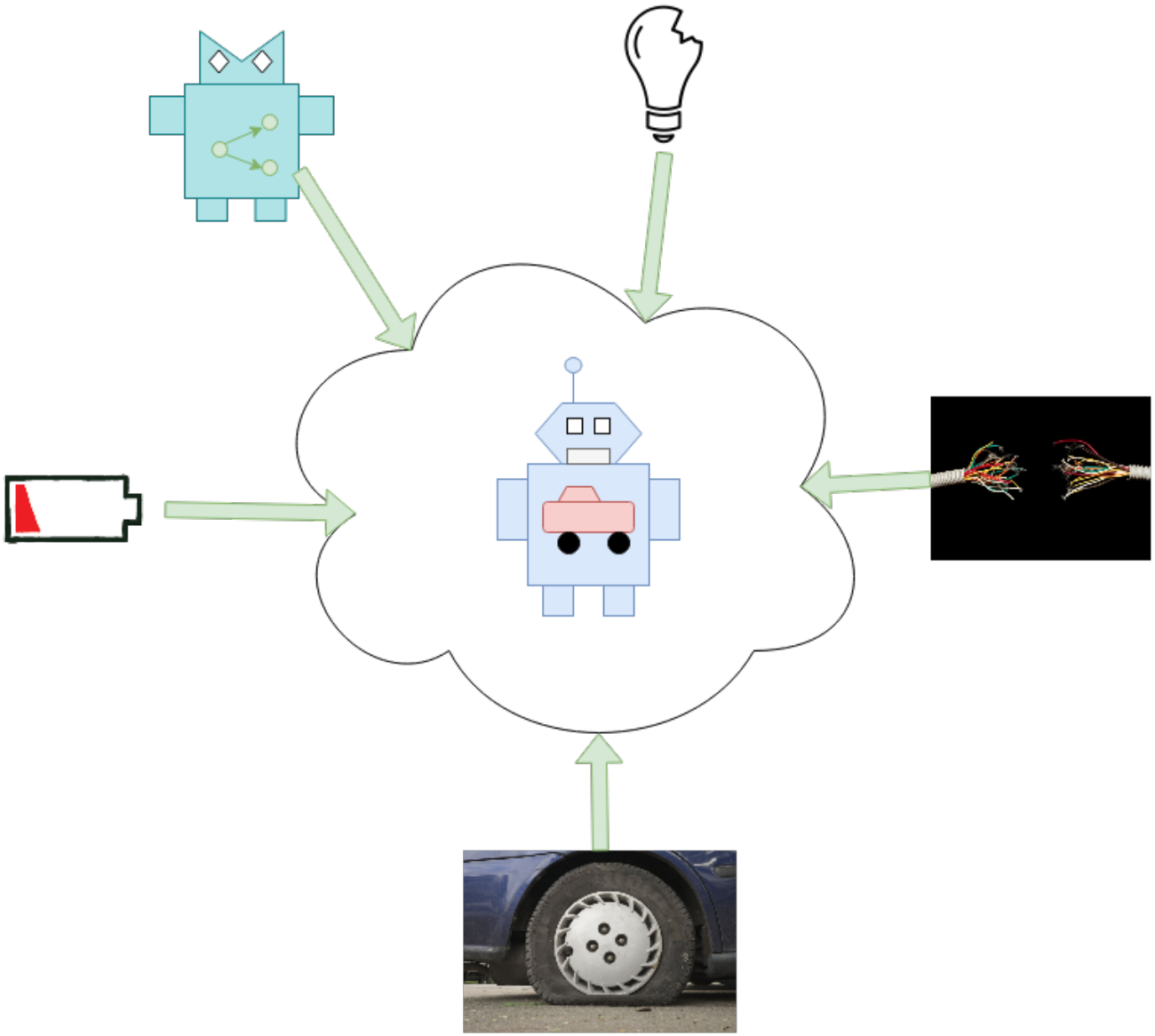


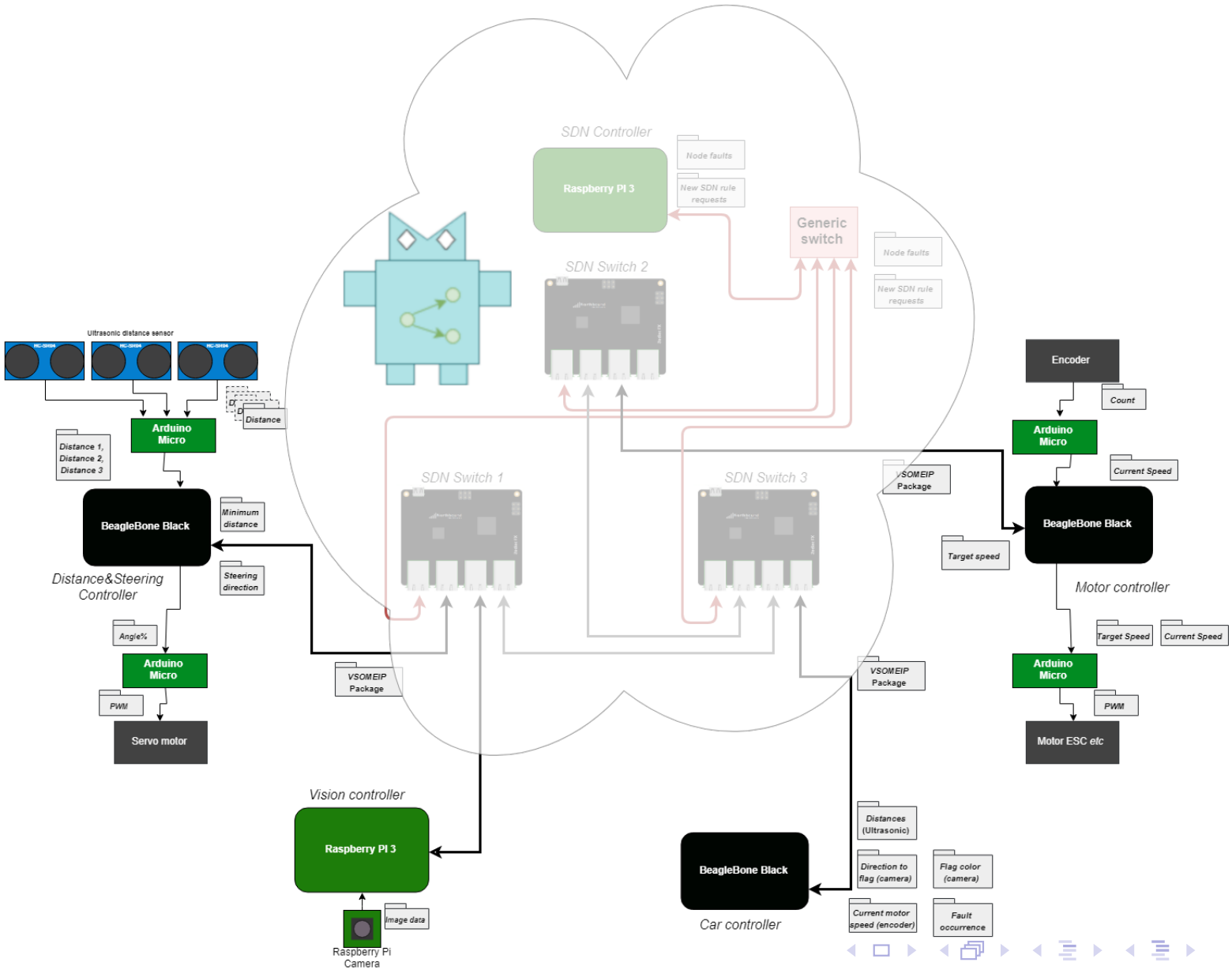
Our project

Goals of the project

- Produce a prototype of an SDN-based communication infrastructure for automotive vehicles.
- Produce a prototype of intelligent system monitoring and adaptation service for automotive vehicles.

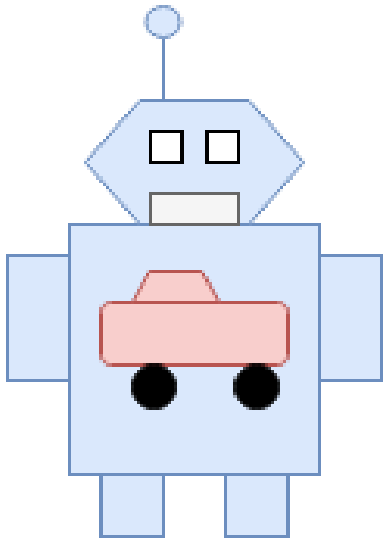
Figure: RC-car model kit used for the prototype

System architecture



Implemented services

- Speedometer
- Cruise control
- Steering
- Object recognition
- Distance measurement

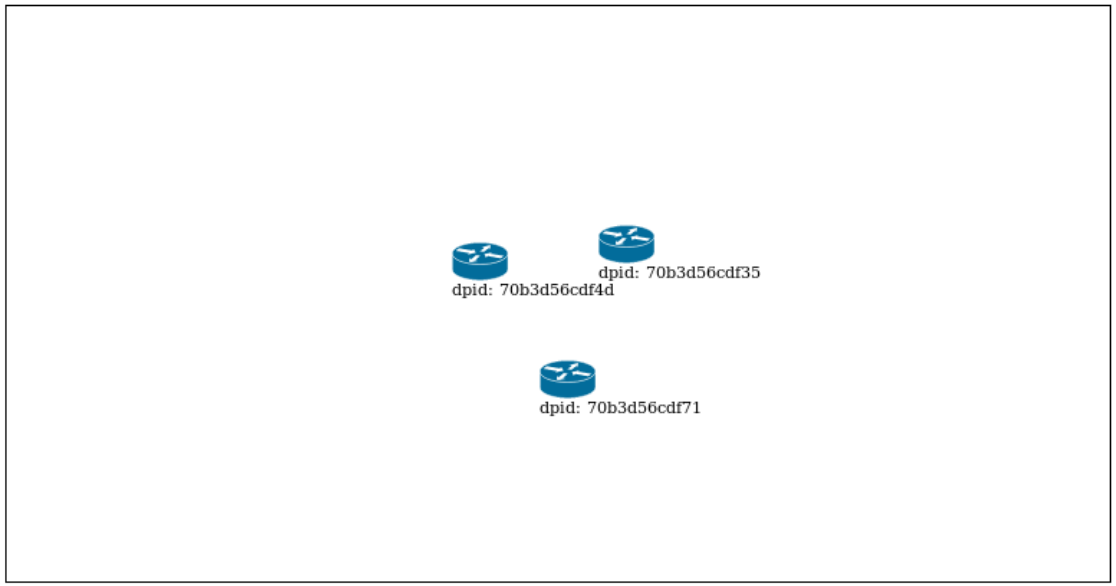


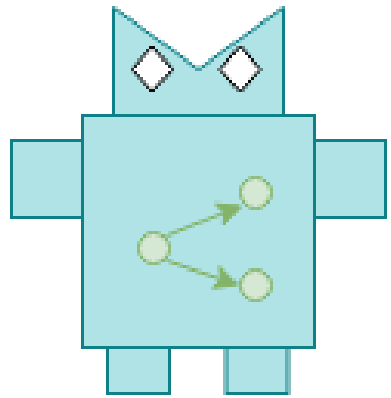
Network surveillance

Trafic monitor

Datapath	Name	Hw_addr	Port	Rx-pkts	Rx-bytes	Rx-error	Tx-pkts	Tx-bytes	Tx-error
000070b3d56cdf71	eth0	cb:4e:3e:a4:00:30	1	5859	614780	0	9464	856655	0
000070b3d56cdf71	eth1	9d:ab:65:6d:8d:bf	2	9647	797919	0	14388	1581775	0
000070b3d56cdf71	eth2	e4:b9:3f:35:4b:c9	3	11247	1205594	0	12004	1047240	0
000070b3d56cdf4d	eth0	cb:4e:3e:a4:00:30	1	7850	653099	0	16759	1881590	0
000070b3d56cdf4d	eth1	82:24:8c:ae:81:64	2	5698	610879	0	10662	963493	0
000070b3d56cdf4d	eth2	e4:b9:3f:35:4b:c9	3	14375	1577603	0	9647	861381	0
000070b3d56cdf35	eth0	82:2b:18:66:18:f4	1	7777	859438	0	11728	1002136	0
000070b3d56cdf35	eth1	9d:ab:65:6d:8d:bf	2	6149	631056	0	12063	1060752	0
000070b3d56cdf35	eth2	e4:b9:3f:35:4b:c9	3	12004	1047240	0	11247	1205594	0

Network Topology





Summary

Summary

- Ethernet is a promising candidate for increasing demand on bandwidth for communication in autonomous cars
- Ethernet is not without problems, many of which a SDN can help to solve.
- SDN networks allow for safe communications on autonomous vehicles by being fast, adaptive and customisable
- Fault detection and failsafe behaviour is a **must** in autonomous vehicles.

Come check out our DEMO in the prototyping lab on floor 3!