

Next generation GNSS Technology

GNSS Receiver with an open Interface

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Next generation GNSS Technology

Overview

- Project description, idea and motivation
- Project partner
- Working packages navXperience
- User interviews and online survey
- Board architecture
- Our two GNSS board developments



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Name of the project: GOOSE

GOOSE – **GNSS Receiver with an open Software standardized interface**

The Project is government-funded from the ministry of economics and supported from DLR



GNSS boards small cutting

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	ComNav K508	Datagrid DGRx-GNSS	Javad TR-G3T	Novatel OEM 638	Trimble BD920
Channels	198	336	216	240	220
GNSS Systems	GPS L1, L2 L5 Glonass L1, L2 Beidou all	GPS L1, L2, L2C Glonass L1, L2 Galileo E1	GPS all Glonass all Galileo all Beidou all	GPS all Glonass all Galileo all Beidou B1, B2	GPS L1, L2 Glonass L1, L2 Galileo Yes? Beidou B1, B2
Max Satellites	60	30 or more	all	120	44
Size (mm)	100x60x12	90x60x12	57x88x12	125x85x14	51x41x7
Weight (g)	42g	50 g	47 g	37 g	25 g
Accuracy	5 mm + 1ppm	< 1 cm	3 mm + 0,5 ppm	4 mm + 1 ppm	1. mm + 0.1 ppm
Ports	4	3	12	12	7
Baud rate (bps)	921.600	115.200	460.800 10/100 Mbps	921.600 12 Mbps	460.200 10/100 Mbps
Temperature	-40 to 85°C	-40 to +85°C	-35 to +75°C	-40 to 85°C	-40 to +85°C
Power	1,8 Watt	1,5 Watt	3,4 Watt	2,8 Watt	1,3 Watt

Idea and Motivation

- Today the software (firmware) of all GNSS boards manufactures is not open
- Nobody can't use his own RTK engine directly on the board
- Only the manufactures know how they calculate the tracking loops etc.
- No developer can use the complete raw data from the satellites
- If you develop special solution you always need a extra computer
- Our Idea: Open Firmware, Open Software interface, what do you want more



Project partner and rules



Leader and carriers of technology



Founder, market research and software design



First user and RTK software developing



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Fraunhofer

IIS

Joseph Fraunhofer eponym of the Fraunhofer Gesellschaft

Born 6th of march 1787 and died 7th of june 1826

German optician and scientist,
founder of the Fraunhofer lines

Manufacture of telescopes
and optical instruments








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The Fraunhofer-Gesellschaft in Figures

- Founded in Munich in 1949
- 60 institutes across Germany with a total staff of 20,000
- Five Fraunhofer Centers in the USA
- Representative offices and senior advisors in Asia, the Middle East and Moscow
- Total budget € 1.8 billion with € 1.5 billion of income generated from contract research




Headquarters in Munich







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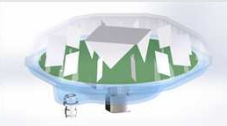

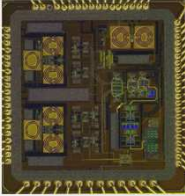
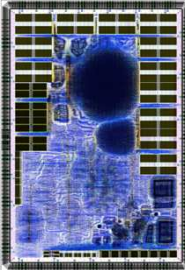





Fraunhofer


IIS

GNSS Developments short overview


- Galileo Testbed GATE: L1/E5/E6 Frontends & Baseband Processing
- Flexible GNSS Frontend (80 MHz bandwidth)
- Multi-frequency GPS/GLONASS/GALILEO receivers and development platforms (ASIC development)
- Beamforming monitoring receivers
- ASIC design of GNSS receivers and components
- Galileo PRS applications
- 3G+C Antenna design transfer in a patent




XXV FIG Congress
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Engaging the Challenges, Enhancing the Relevance
16 - 21 JUNE 2014, MALAYSIA






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der Bundeswehr

Universität München




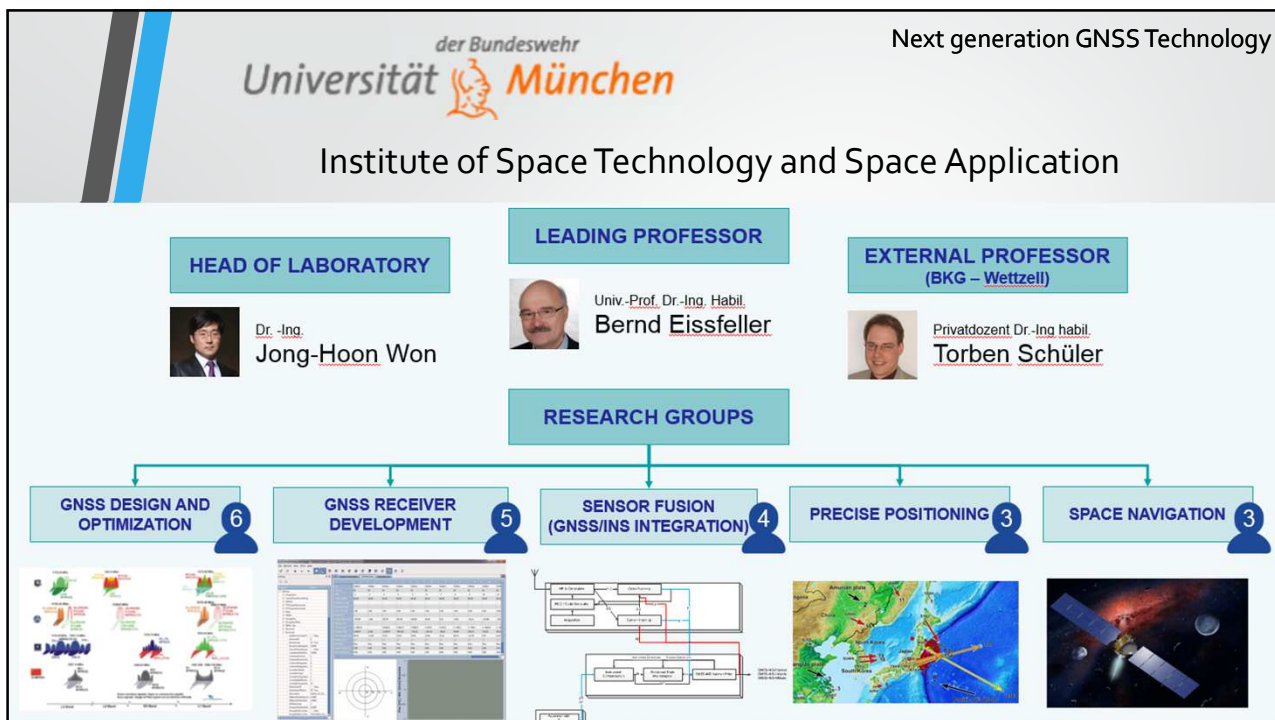
- Founded in 1970 from the defense secretary Helmut Schmidt
- First students in the year 1973
- Today around 3.000 students in Munich
- 95 % of the officer cadet study in 20 different fields
- From the beginning of GPS the UniBW research in GNSS technology




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- Founded in 2009 from Hubert Schmitz and Dirk Kowalewski
- GNSS Antennas for all constallations and all L-Band GNSS signals
- GNSS antennas for all solutions (reference stations, mobile solutions, maritime, machine control, agriculture and defense) with high accuracy




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Several navXperience Projects

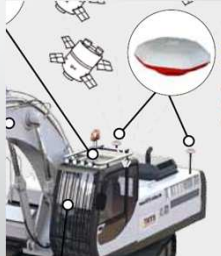



Contract over 1.500 3G+C mobile antennas for the engineer corps of the US Army from 2014 to 2019



Developing for the SAC a GNSS antenna including the S-Band signals for the IRNSS

Delivering the GNSS antennas for a digger machine control system of the MTS company from Germany





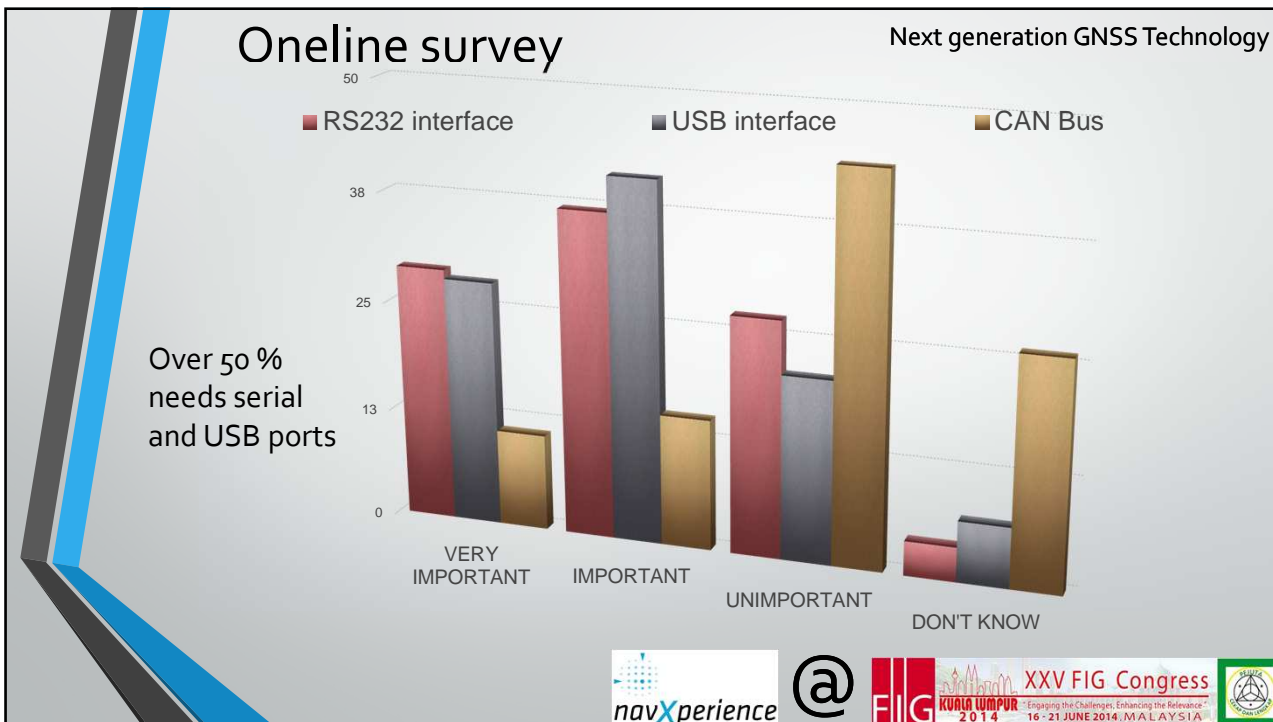
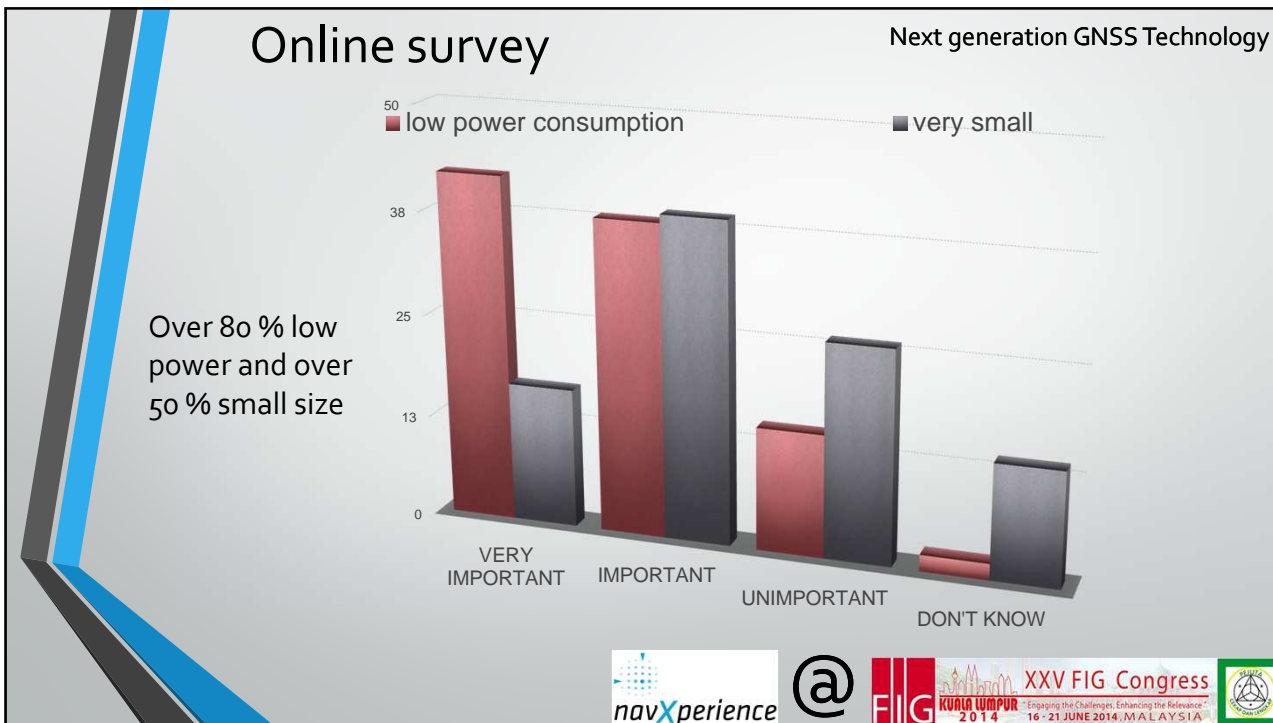
Working packages navXperience

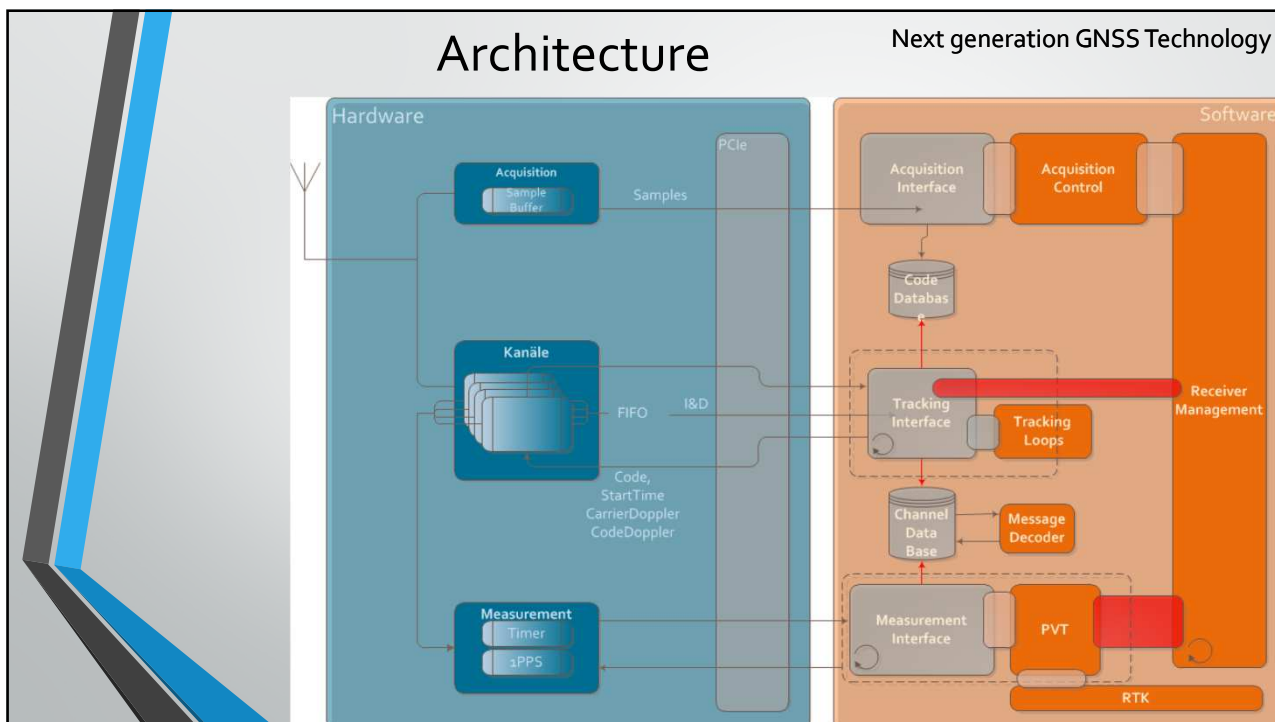
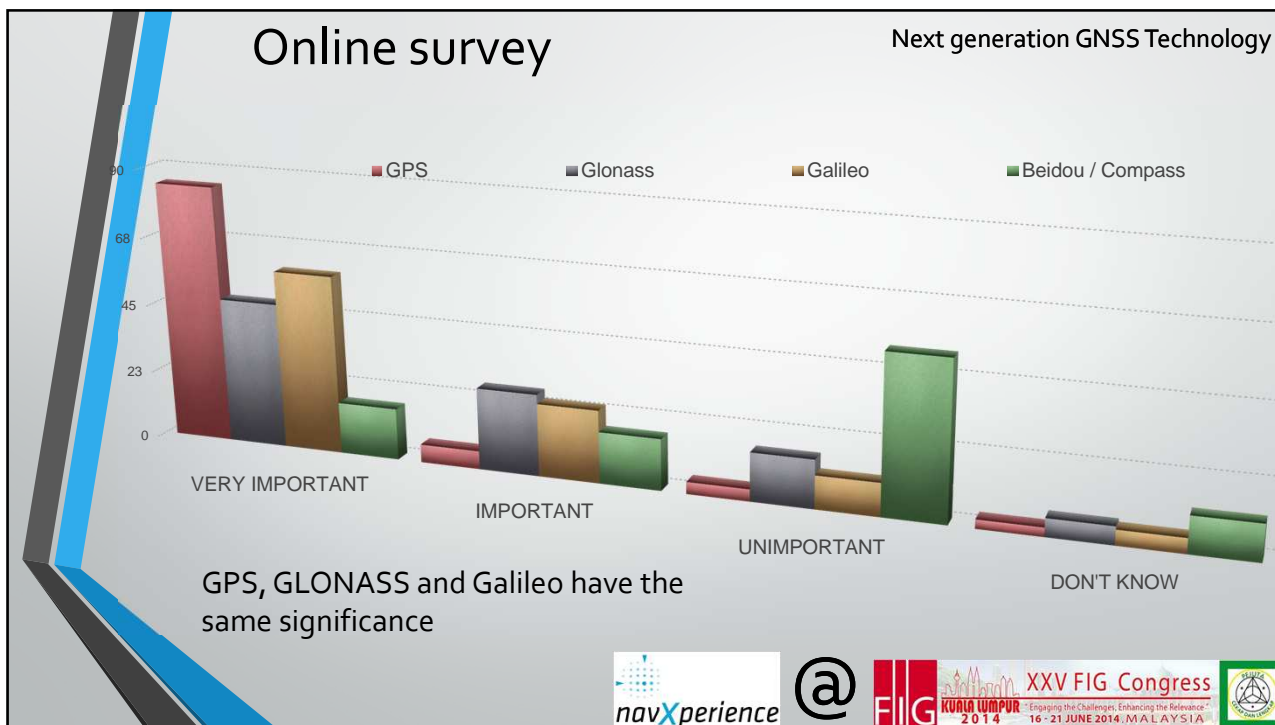
- Customer survey
- Define the specification of the Goose board
- Competition analysis
- Prepare the product specifications
- Working together with FhG IIS at the operating system
- Controlling the results

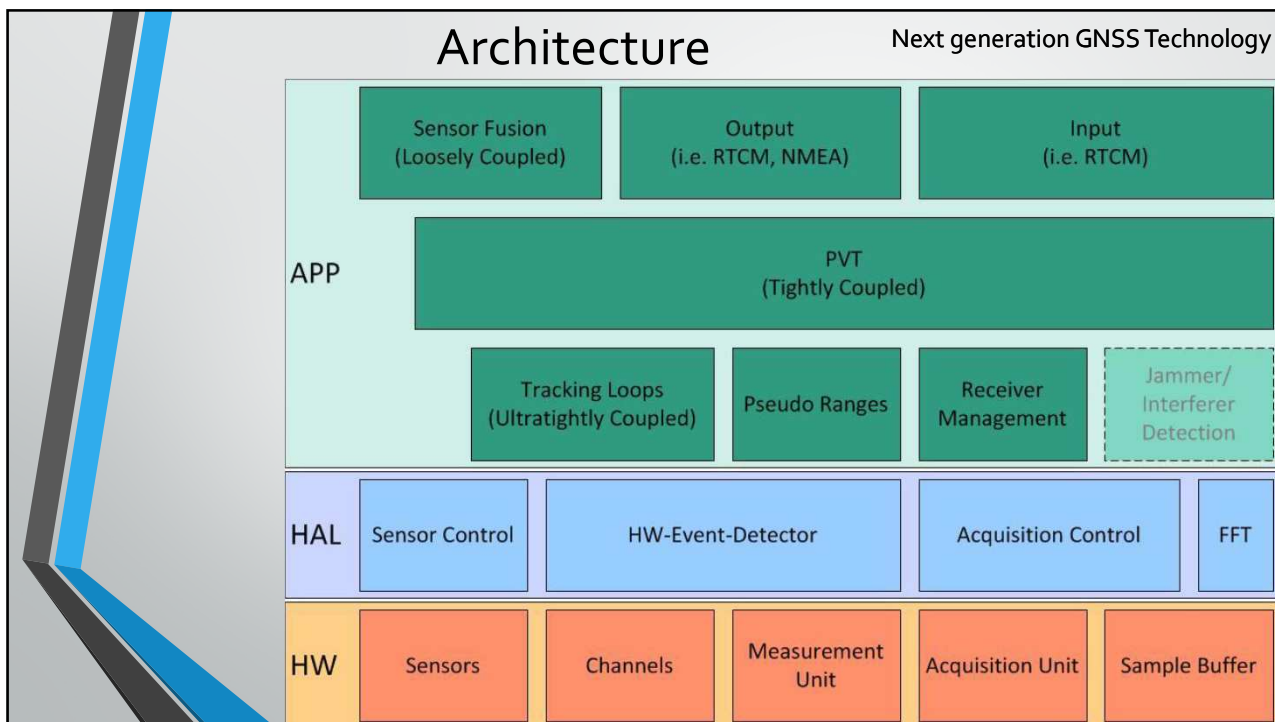


Interviews













Developer and reference station board Next generation GNSS Technology


- PCIe interface
- Integration in a PC
- Also working alone
- GPS, GLONASS, Galileo, Beidou and all other L-Band signals

The illustration shows a green printed circuit board (PCB) with a PCIe interface being inserted into a PC. A lightning bolt symbol indicates the board is receiving signals. The board is shown both as a standalone component and as integrated into a PC case.



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User GNSS board

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- Same architecture as the developer board and the same characteristic
- Smaller
- A GNSS developer can be absolutely sure, that his programming software works with same properties on both boards



Only a sample, not the real board



Thank you very much for your attention

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