Why do I work with electronics?

- Carsten Wulff
- Senior R & D engineer wireless department at Nordic Semiconductor
- Postdoctoral research fellow at NTNU
- Married with three kids
- Master of Science (2002) from NTNU, Ph.D. (2008) from NTNU

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Controlled study proves activity monitor and motivational website increase children's physical activity and improve health by making exercise fun

Zamzee uses Nordic Semiconductor technology to encourage children to exercise

The 'Zamzee' activity monitor, which includes a new Bluetooth Smart wireless version that employs Nordic Semiconductor wireless technology, encourages sedentary children to start enjoying the health and wellness benefits of physical activity by measuring performance and rewarding effort with virtual badges, "pointz", and virtual currency called "Zamz" which can be redeemed for prizes like toys and gift cards
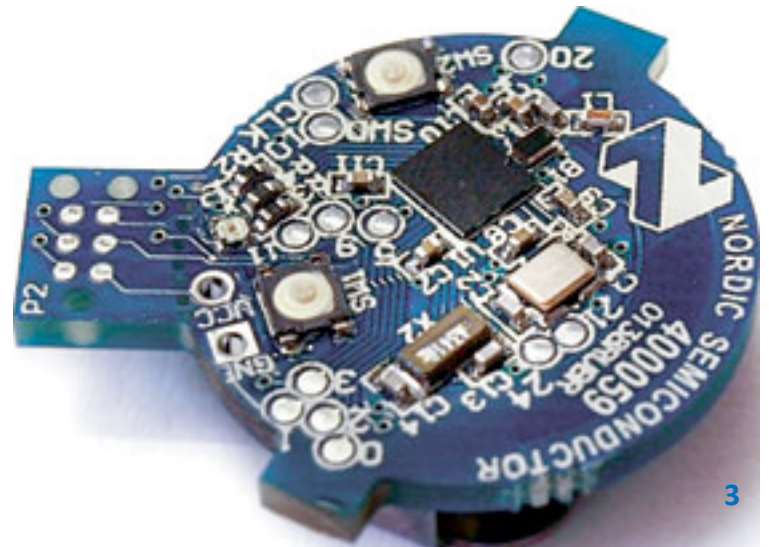
Oslo, Norway | 2014/08/26

Ultra low power (ULP) RF specialist Nordic Semiconductor ASA (OSE: NOD) today announces that U.S.-based non-profit research organization, HopeLab, has specified Nordic nRF8001 Connectivity ICs to provide the Bluetooth Smart® (previously known as Bluetooth low energy) wireless link in the latest wireless version of its 'Zamzee' activity monitor for children.

In a six-month randomized controlled trial of 448 subjects aged 11 to 14, Zamzee was proven to increase the weekly moderate-to-vigorous physical activity (MPVA) in children by 59 percent (equating to 45 additional minutes of MPVA per week) compared to a control group. (See "A summary of the behavioral and biological

Press release

Who is Nordic Semiconductor?

- Norwegian company
- Offices
  - Trondheim (main office), Oslo, Hong Kong, Seoul, Taiwan, Tokyo, Los Angeles, Philippines and Krakow
- Main product
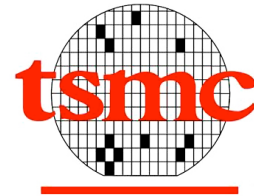 - 32 –bit ARM MCU with multi-protocol 2.4GHz transceiver

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How can a small Norwegian company rule the low-energy wireless world?

Some of our customers:
Google "nrf8001 teardown"

Some of our suppliers

A common subcontractor

Wait for it

A common subcontractor

Who makes electronic things?

World's largest public and private employers, 2012[1]		
Employer ⬍	**Employees** ⬍	**Headquarters** ⬍
United States Department of Defense	3.2 million	🇺🇸 United States
People's Liberation Army	2.3 million	🇨🇳 People's Republic of China
Walmart	2.1 million	🇺🇸 United States
McDonald's	1.9 million	🇺🇸 United States
National Health Service (NHS)	1.7 million	🇬🇧 United Kingdom
China National Petroleum Corporation	1.0 million	🇨🇳 People's Republic of China
State Grid Corporation of China	1.5 million	🇨🇳 People's Republic of China
Indian Railways	1.4 million	🇮🇳 India
Indian Armed Forces	1.3 million	🇮🇳 India
Hon Hai Precision Industry (Foxconn)	1.2 million	Taiwan

Enabling devices

- High sales of smartphones enable rapid development of products
  - 500 million iPhones (2014)
  - 100 million Samsung Galaxy (2013)
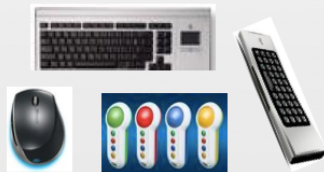- Fun projects
  - StickNFind
  - Nordic Puck

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Nordic market segments - Q2 2011

PC / Media controllers

Wireless PC mouse / keyboard, Media center remote control, Game controller

Q2 Revenue: MUSD 28.6 (MUSD 31.2)

- *PC Peripherals*: Strong growth potential, particularly in low cost category (emerging markets and replacement of wired devices)

- *Media remotes*: New market for remote controls for connected TV's based on mouse/keyboard designs

- *Game controller*: Designs for new interactive controllers currently under development

Sports / Health monitors
Heart monitors, foot pods, watches

Q2 Revenue: MUSD 1.8 (MUSD 1.8)

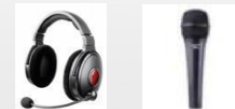- Production issue impacts Q2 sales. Very strong order backlog for Q3.

Audio devices
Wireless audio streaming, microphones, gaming headsets

Q2 Revenue: MUSD 0.1 (MUSD 0.3)

- Slow market ahead of launch of new Nordic audio product

Other applications
RFID, Toys, etc.

Q2 Revenue: MUSD 4.0 (MUSD 3.0)

- New toy design, RFID product and other new devices drive growth

ASIC components / consulting
Wide sector span

Q2 Revenue: MUSD 4.0 (MUSD 5.7)

- Recent release of an end product with a Nordic ASIC design driving revenues

NORDIC SEMICONDUCTOR

Nordic market segments - Q2 2014

PC / Tablet Accessories
Wireless PC mouse and keyboard, tablet accessories

Q2 Revenue: MUSD 21.8 (MUSD 18.6)

- Sales of PC accessories stabilize, first major sales of BT Smart for tablets

Mobile / Wearable devices
Sports and medical monitors, mobile accessories, proximity tags, watches

Q2 Revenue: MUSD 10.4 (MUSD 4.3)

- Rapid revenue growth driven by demand for *Bluetooth* Smart in wearable electronics

ASICs (application specific IC's)
Wide sector span

Q2 Revenue: MUSD 2.9 (MUSD 1.7)

- Supporting existing customers only, not a focus area for growth. Sales fluctuates based on few designs.

Home electronics devices
TV / appliance remotes, game controls, wireless charging, toys

Q2 Revenue: MUSD 2.7 (MUSD 1.3)

- New *Bluetooth* Smart toy and home media designs drive growth

Installed Sensor networks
RFID systems, building sensors, industrial automation, automotive

Q2 Revenue: MUSD 3.7 (MUSD 2.8)

- Record high revenue driven by recent RFID design wins
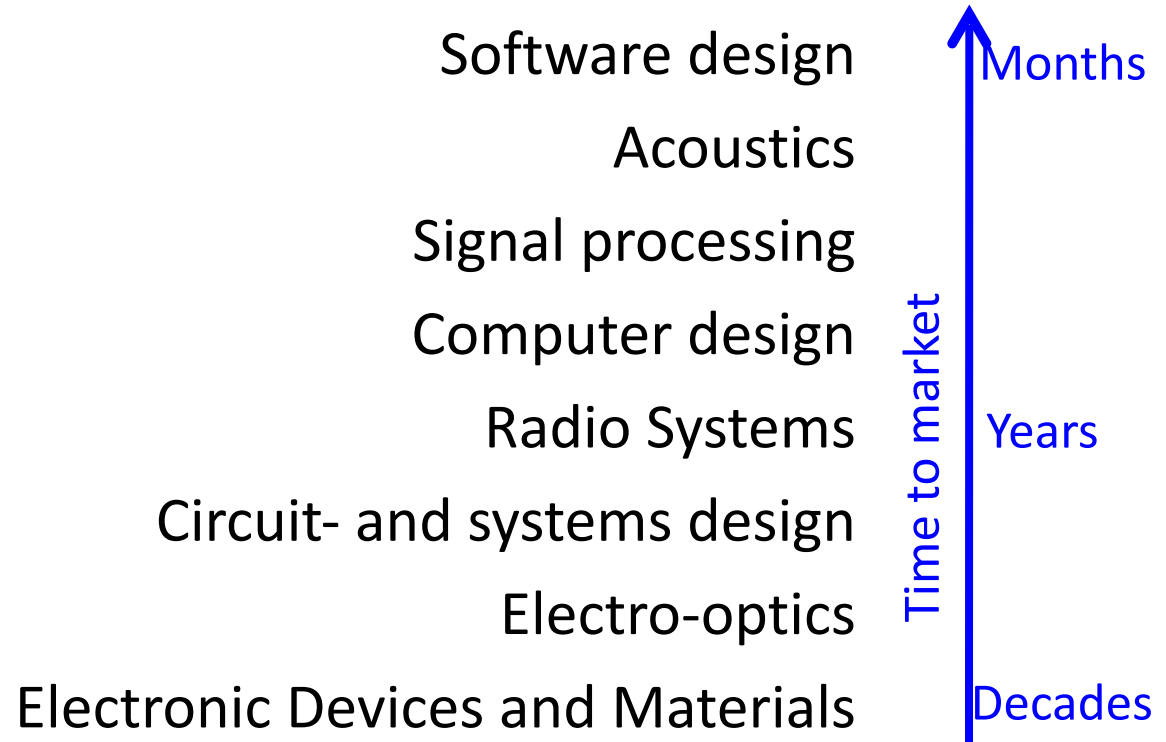
Consulting services
Custom electronics design

Q2 Revenue: MUSD 0.0 (MUSD 0.1)

- Project services for existing ASIC customers

Research & development takes time

Software design

Acoustics

Signal processing

Computer design

Radio Systems

Circuit- and systems design

Electro-optics

Electronic Devices and Materials

Time to market

Months

Years

Decades

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Divide and conquer

- Break complex stuff down into smaller pieces

- Ignore the difficult stuff, and try to get an approximate understanding, then add in the difficult stuff

- Don't be afraid if something is difficult

- Don't think your stupid and won't be able to understand

- Don't think that everybody else is smarter than you

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When you don't understand

- Ask someone

- Don't be afraid to show that you don't know something, not knowing is OK (except on the exam, and in a job interview)

- Use wikipedia

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What you need to teach yourself

- Ability to work hard (constant speed)

- Programming

- Report writing

- Explaining things to other people

- Convincing people that your right through persuasive arguments

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Questions?

Things you should know about

Software:

Scripting (Bash, Perl, Python, Ruby, TCL, LISP)

Editors (Emacs)

Math software (Matlab, Maple, Octave)

Information sources:

http://ieeexplore.ieee.org

Where to by electronic supplies:

www.digikey.no

www.mouser.com