

Fotmonterad tröghetsnavigering



ROYAL INSTITUTE
OF TECHNOLOGY



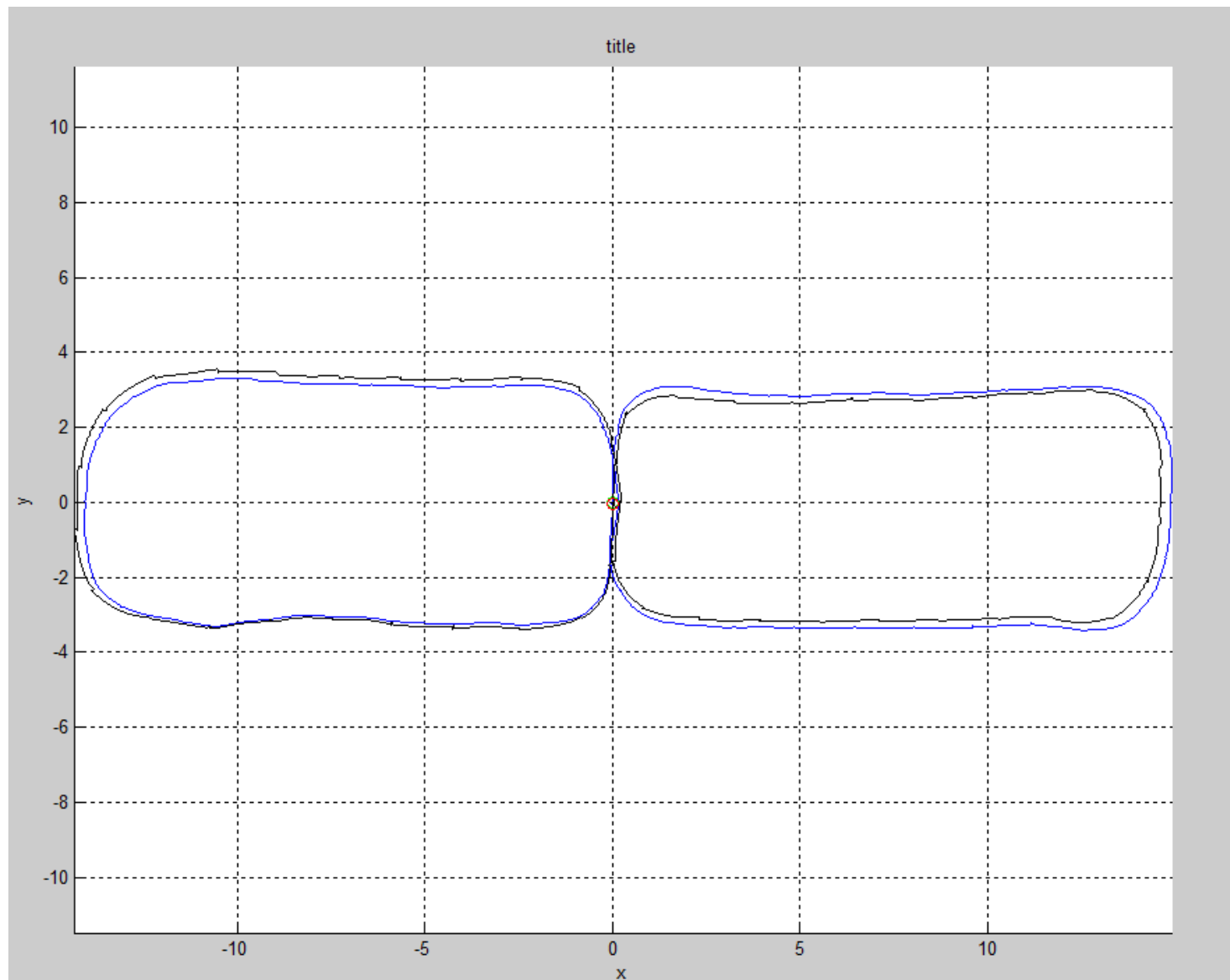
Reglermöte 2012, 13:e juni
John-Olof Nilsson
Signalbehandling KTH

Fotmonterad tröghetsnavigering



www.openshoe.org

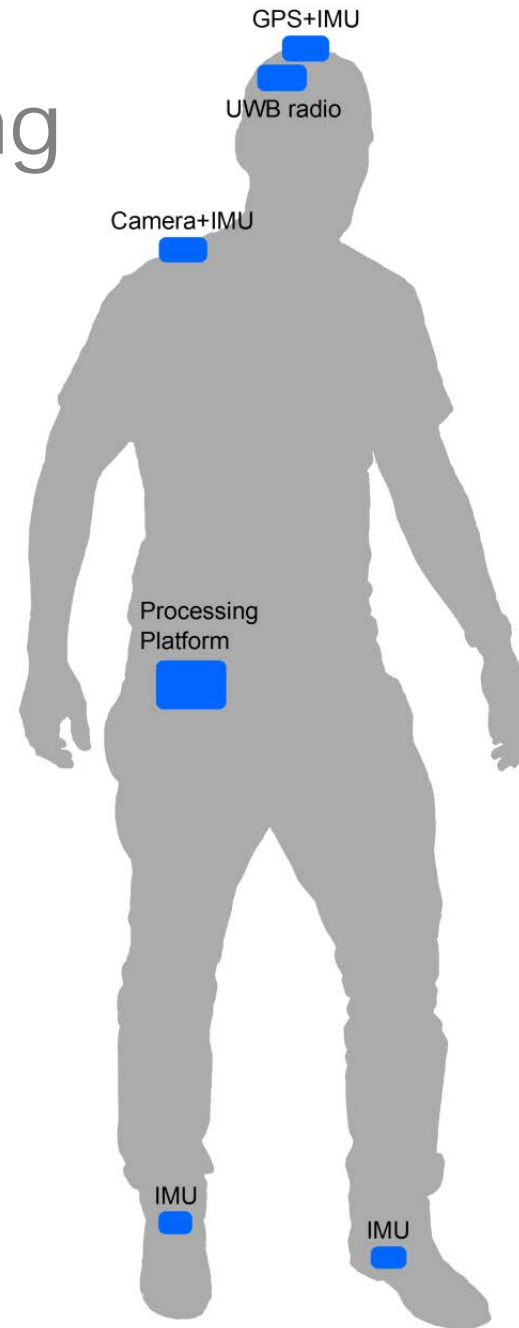
Personnavigering



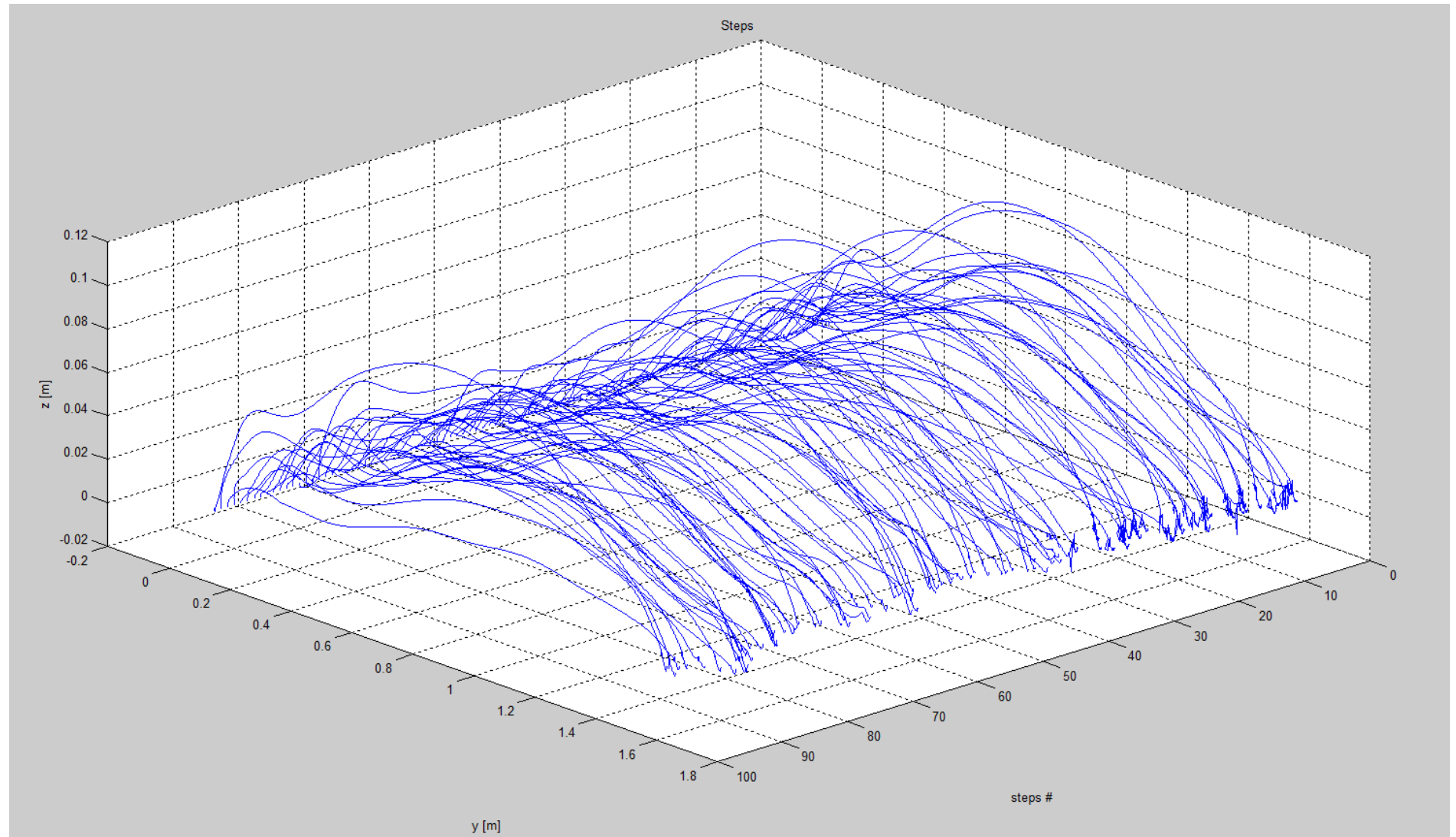
Personnavigering



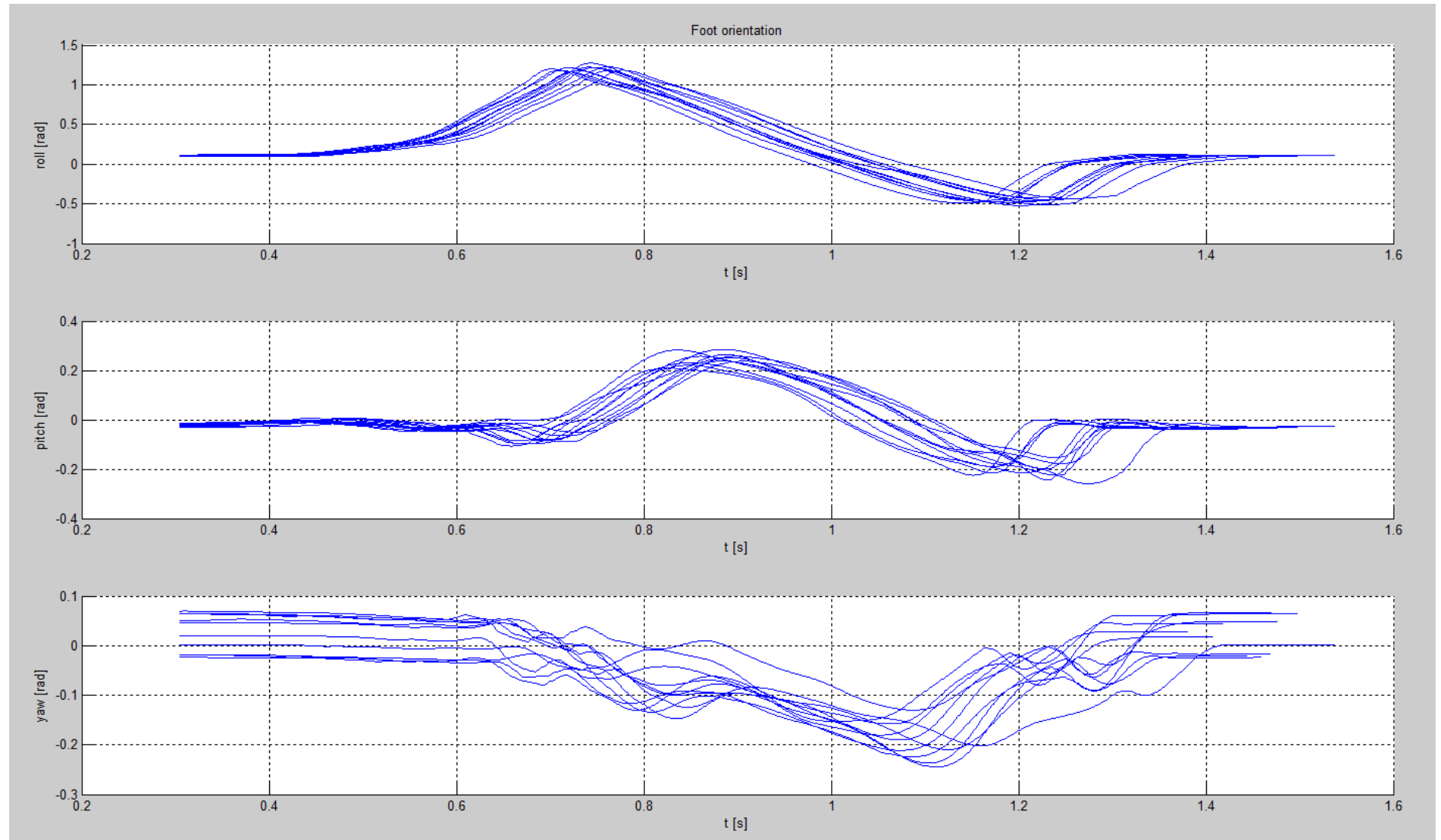
Personnavigering



Rörelseanalys



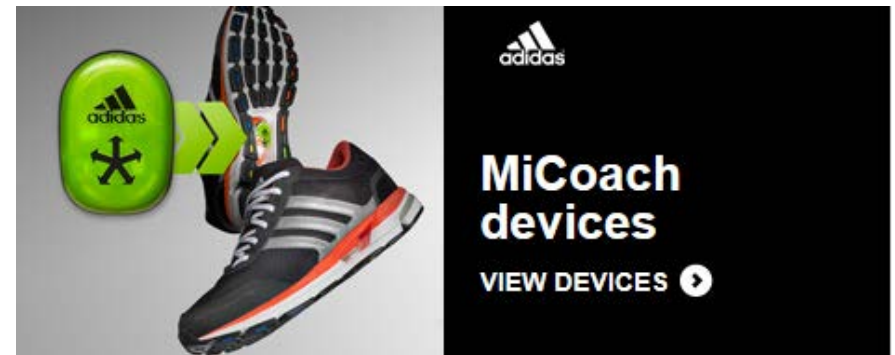
Rörelseanalys



Rörelseanalys



Rörelseanalys



Tröghetsnavigering

- Newtons rörelselagar / klassisk mekanik

$$x = \int \int_0^t \ddot{x} dt + x_0$$
$$\theta = \int_0^t \dot{\theta} dt + \theta_0$$



- Mät acceleration och rotation med accelemetrar och gyroskop

Feltillväxt och divergens

- Fel accumuleras i integrationerna

$$x = \int \int_0^t \ddot{x} dt + x_0$$

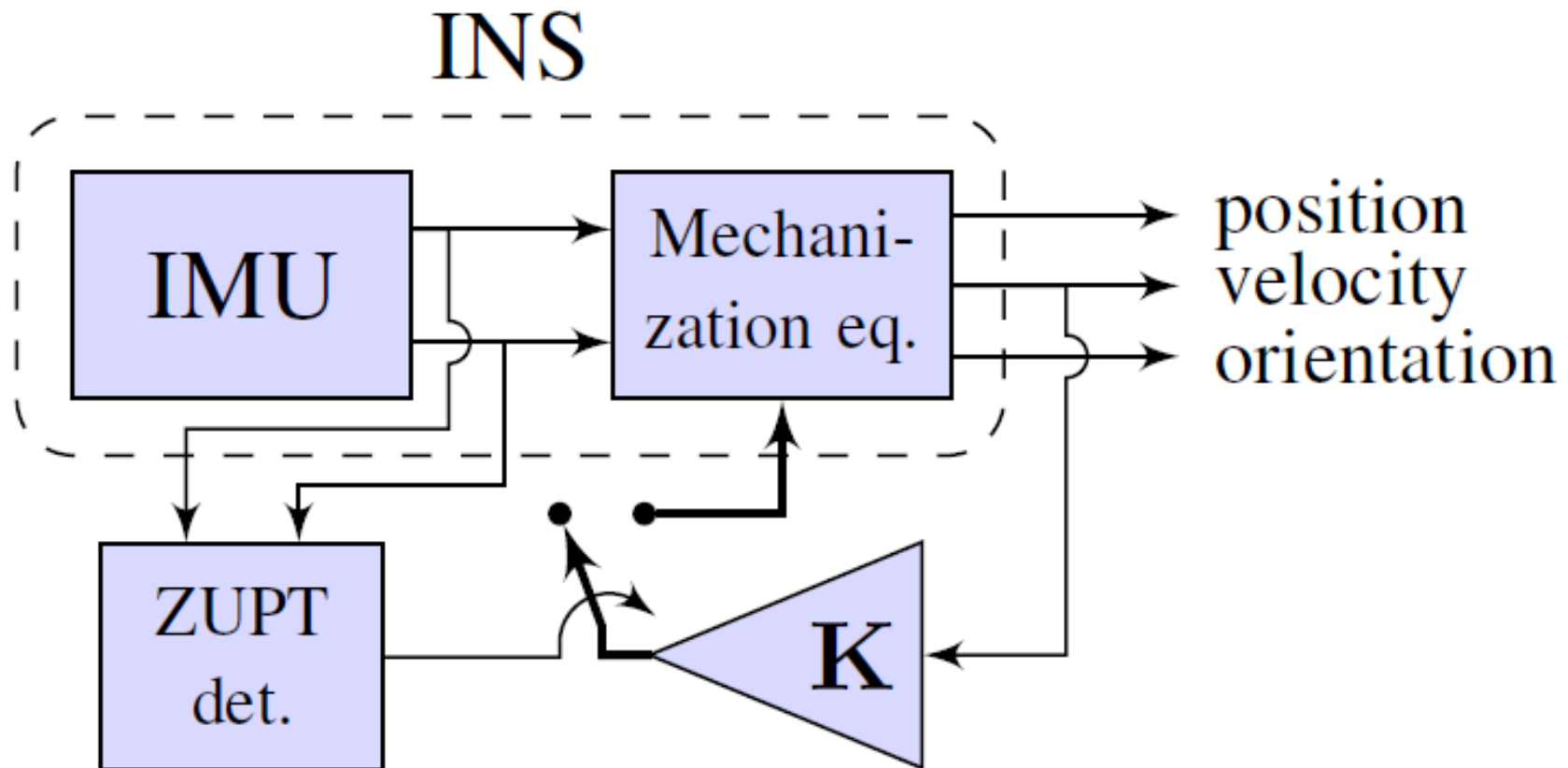
$$\theta = \int_0^t \dot{\theta} dt + \theta_0$$

- Lösningsoalternativ
 - Bra (dyra) sensorer
 - Ytterligare information
 - Fler givare
 - Antagnade om rörelsen

Nollhastighetsuppdateringar

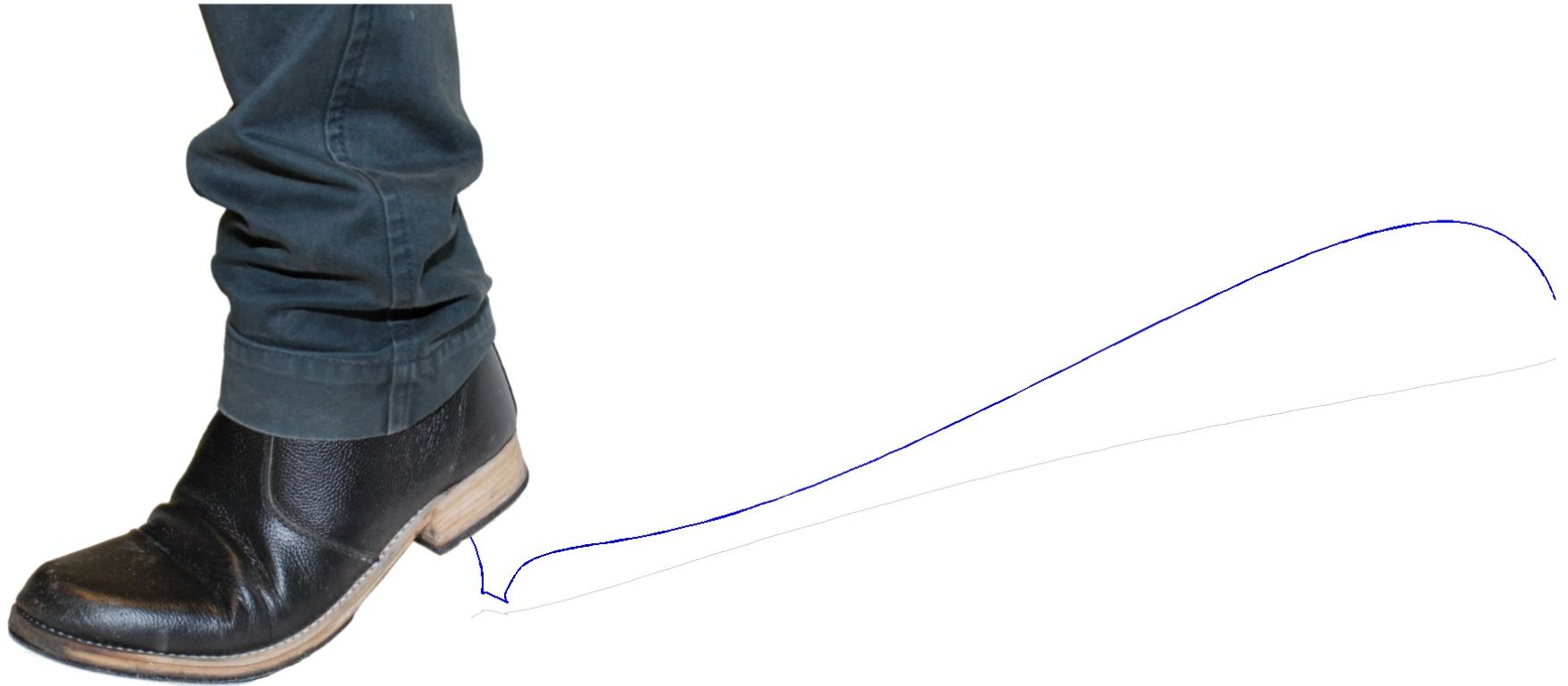


ZUPT-aided INS



Implementering

- Känd teknik men går inte att köpa!



OpenShoe

- Implementering av fotmonterad tröghetsnavigering
 - Öppen källkod och hårdvarudesign
 - Lätt tillgängliga komponenter
 - ~6000kr

Dokumentation och kod:

www.openshoe.org



Implementation

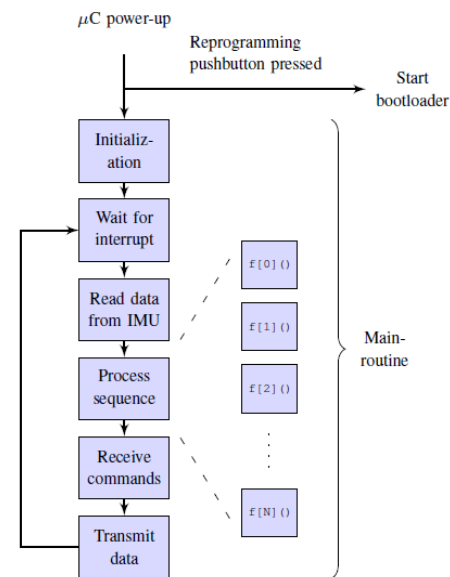


Implementering

- Hårdvara



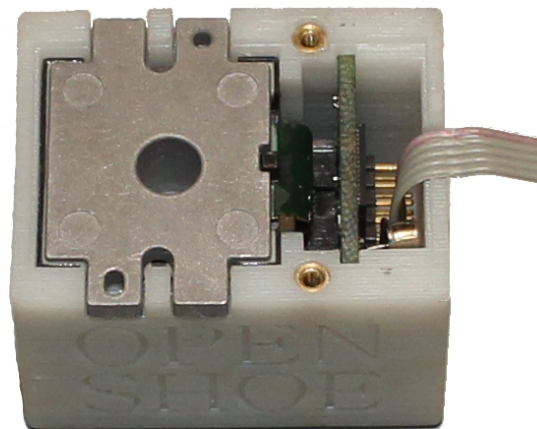
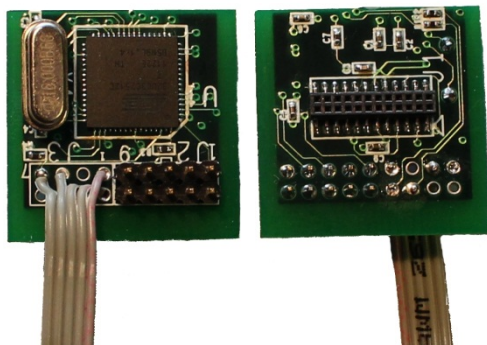
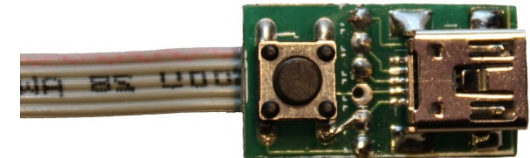
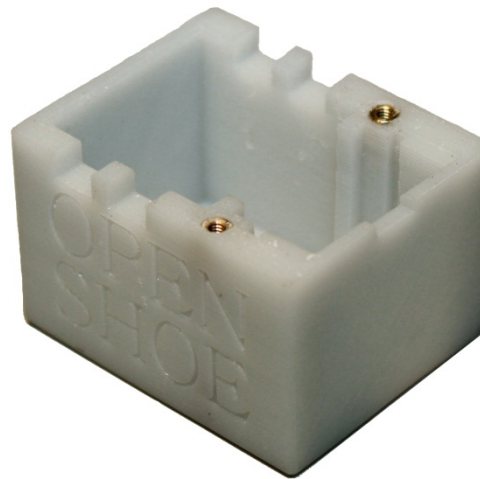
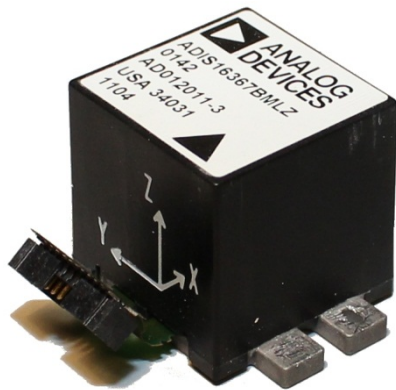
- Mjukvara



- Skor



Hårdvara



Open-source

OpenShoe

Foot-mounted INS for Every Foot

Open source embedded foot-mounted INS



OpenShoe is an open source embedded foot-mounted INS implementation including both hardware and software design. A cross section of a shoe with a unit of the implementation integrated into the sole can be seen above. *To our knowledge, this is the only implementation of its kind.*

The implementation has been done with the hope that it will save time, sweat, and tears for navigation researchers as well as facilitate the use of the technology by researchers not specialized in aided INS, e.g. in fields such as biomedical engineering, behavioral science, and ubiquitous computing. The value of the embedded implementation also lies in its modu-



OpenShoe is an open source project for creating an embedded foot-mounted INS implementation.

Pages

- » [Home](#)
- » [About](#)
- » [News](#)
- » [System description](#)
- » [System reproduction](#)
- » [System modification](#)
- » [Matlab Implementation](#)
- » [Download](#)
- » [Publications](#)
- » [Licenses](#)
- » [People](#)
- » [Feedback and contact](#)

External links

- » [Analog Devices \(IMUs\)](#)
- » [Atmel \(microcontrollers\)](#)
- » [Intelligent shoes in India \(in Swedish\)](#)



**ROYAL INSTITUTE
OF TECHNOLOGY**

Slut