Ultrasound-aided Pedestrian Dead Reckoning for Indoor Navigation

Carl Fischer¹, Kavitha Muthukrishnan², Hans Gellersen¹, Mike Hazas¹

¹ Computing Department, Lancaster University, UK.
² Faculty of Computer Science, University of Twente, The Netherlands.
Target applications
Pedestrian dead reckoning

Inertial sensing
+ smooth
+ precise
- drift
“Breadcrumb” trail

Ultrasound beacons

+ absolute position
+ accurate
- noisy measurements
Guidance

Direct the user towards a point slightly ahead of them on the recorded path

Head Mounted Display
Where are we now?

Requirements
- Higher beacon measurement rates
- Higher beacon density

Work in progress
- Evaluation of our online implementation

Future improvements
- Investigating SLAM techniques
- Multiple inertial sensors
Thank you.
Simulations

US range and bearing
- Measurement rate 5Hz
- Gaussian distribution, centred, standard deviation 5cm/30°

Inertial
- Measurement rate 100Hz
- Heading drift at certain points