GPS HRN
The GLOBAL POSITIONING SYSTEMS in Health Research Network

NEWS UPDATE

August 2009

Online Survey

Thanks to all who completed the online survey for new members. It provided us with some very useful information regarding your expectations of the GPS-HRN.

It was interesting to see that the most of you joined for all four of the reasons we listed: networking possibilities (94%), regular GPS research updates (91%), sharing of experience (91%), and regular GPS technology updates (77%).

Almost all members are interested in free-living physical activity (94%). There are also high levels of interest in the built environment (77%), the social environment (59%), epidemiology (56%), obesity (56%), and transport (53%).

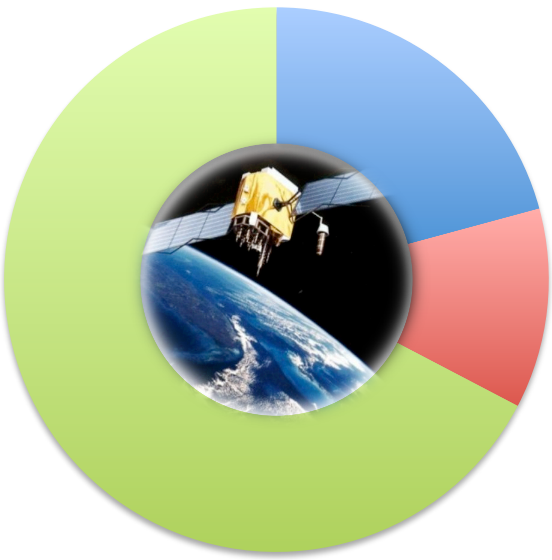
Garmin GPS units (Foretrex, Forerunner, Etrex, Edge) are the most widely used, although many of you also have experience with Telespial Trackstick, StarsNav BTS-110, GlobalSat DG-100, FRWD B100, various Qstarz units, and other mobile phone or custom built GPS technology. Our GPS roundup (next page) compares the specifications of several of these devices.

The preferred form for the GPS-HRN is a website with a discussion forum (see diagram below). We are currently working on this and hope to have an online presence in the next few months. We will also continue to e-mail our triannual newsletter for those who prefer a simple mailing list.

For those of you who have yet to complete the survey, the link is still active at:

http://www.surveymonkey.com/s.aspx?sm=zuoBaPzL7IUn7E8jp_2f3mGQ_3d_3d

Thanks again for your support of GPS-HRN.



What form would you like the GPS-HRN to take?

- Mailing list
- Website
- Website with forum

Welcome to the GPS-HRN

Hello everyone

It gives me great pleasure to welcome you to the GPS in Health Research Network (GPS-HRN). I have been delighted with the positive response from the academic community. We now have 62 members from 39 universities/institutions across eight countries.

The purpose of this triannual newsletter is to update you about recent developments in the GPS world, including the latest research publications and technical innovations.

The first issue presents the outcomes of our online survey in addition to a roundup of the most common portable GPS receivers. One of our regular features will be to profile members' current research. In this issue Dr Kay Hongu summarises her excellent work at the University of Arizona.

We are also looking forward to a GPS-HRN website in the next few months. This will allow us to interact and share ideas easily and regularly. Some of you may have noticed the GPS-HRN has been given a page on the International Physical Activity and the Environment Network (IPEN) website (www.ipenproject.org). We intend to maintain a close relationship with this very successful network.

For now, please send me any GPS-related news, updates, or recent publications you come across for inclusion in the next GPS-HRN newsletter (Dec 09).

Cheers!

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Portable GPS Roundup

For the first issue of the GPS-HRN newsletter we thought it would be useful to compare the specifications of portable GPS devices commonly used in health-related research. In future issues we will review the latest developments in GPS, including GPS-enabled mobile phone technology. Please note that the product information used in this article was sourced from user manuals and online technical specifications (i.e., not from independent testing).

Garmin Foretrex 201

Price: US$182
Size: 84 x 43 x 18 mm
Weight: 78 g
Connection: Serial
Location accuracy: < 15 m (95%)
Recording intervals: 1 s, continuous
Data storage: 10,000 points, 10 tracks
Battery life: 15 h
Acquisition time: Warm = 15 s, cold = 45 s
Key features: DGPS (WAAS) capable (<3 m accuracy), waterproof

Telespial Trackstick II

Price: US$149
Size: 114 x 32 x 19 mm
Weight: 43 g
Connection: USB
Location accuracy: 2.5 m
Recording intervals: 5 s, 1-15 min
Data storage: 1 MB
Battery life: Power save mode = 1 week, full mode = 36 h
Acquisition time: Hot = 9 s, warm = 37 s, cold = 52 s
Key features: Weatherproof case, detachable belt clip, direct integration with Google Earth

Garmin Etrex

Price: US$100
Size: 51 x 112 x 30 mm
Weight: 150 g
Connection: Serial
Location accuracy: < 15 m (95%)
Recording intervals: 1 s, continuous
Data storage: 10,000 points, 10 tracks
Battery life: 22 h
Acquisition time: Warm = 15 s, cold = 45 s
Key features: DGPS (WAAS/EGNOS) capable (<3 m accuracy), waterproof

StarsNav BTS-110

Price: US$65
Size: 76 x 46 x 20 mm
Weight: 50 g
Connection: USB
Location accuracy: 7 m (90%)
Recording intervals: 1 s to 30 min
Data storage: 4-16 MB (optional)
Battery life: 22 h
Acquisition time: Hot = 3-6 s, warm = 38 s, cold = 42 s
Key features: Voice feedback, auto on/off function

Garmin Forerunner 405

Price: US$300
Size: 48 x 71 x 16 mm
Weight: 62 g
Connection: USB
Location accuracy: 5 m
Recording interval: 4 s
Data storage: 18,000 points
Battery life: Power save mode = 2 weeks, training mode = 8 hours
Acquisition time: Warm = 15 s, cold = 45 s
Key features: Water resistant, enters power save mode after a period of inactivity

FRWD B100

Price: US$200
Size: 95 x 55 x 15 mm
Weight: 85 g
Connection: Bluetooth (to computer or mobile phone)
Location accuracy: 3 m (90% typical)
Recording intervals: 1-6 s
Data storage: 16 MB
Battery life: 12 h
Acquisition time: Information not available
Key features: Shockproof and splash waterproof, armband and back satchel available

Qstarz BT-Q1000X

Price: US$100
Size: 72 x 47 x 20 mm
Weight: 60 g
Connection: Bluetooth, GPS
Location accuracy: 3 m
Recording interval: 0.2-1 s
Data storage: 200,000 points
Battery life: 42 h
Acquisition time: Hot = 1 s, warm = 33 s, cold = 35 s
Key features: DGPS (WAAS/EGNOS/MSAS) capable (2.5 m accuracy), auto on/off function, direct integration with Google Earth

GlobalSat DG-100

Price: US$70
Size: 80 x 70 x 18 mm
Weight: 68 g
Connection: USB
Location accuracy: 10 m
Recording intervals: 5 s, 10 s, 30 s (default)
Data storage: 60,000 points
Battery life: 24 h
Acquisition time: Hot = 1 s, warm = 38 s, cold = 42 s
Key features: DGPS (WAAS) capable (1-5 m accuracy)

GPS: Only one piece of the puzzle

Dr Hannah Badland
AUT University
New Zealand

There is an increasing body of evidence focused on understanding how and where people move in their local neighbourhood. Largely, behavioural data have been generated through self-report measures while built environment variables have been created using Geographical Information Systems (GIS).

Although useful, these approaches have limitations when attempting to understand the associations between travel behaviours and local built environment exposure. These constraints include: 1) self-reporting travel data and destinations accessed over several days is a complex (and daunting) task, and is particularly challenging for children; and 2) using GIS at the neighbourhood-level may be too blunt to reflect the actual environment an individual moves through.

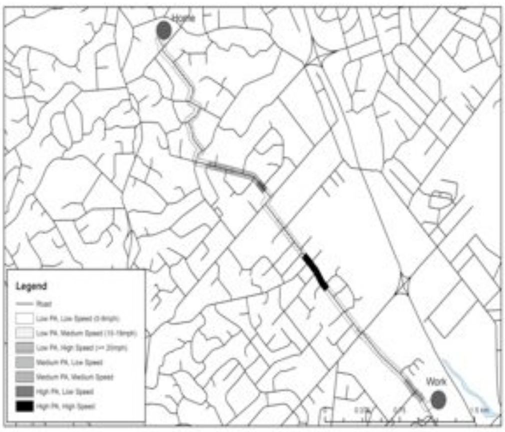
GPS data can overcome these limitations by providing a richer and more relevant context in which to frame these associations as the units track where a person travels. Furthermore, GPS units are reducing in cost, becoming less obtrusive, improving in accuracy and initialisation times, and are therefore becoming increasingly appropriate for population-level monitoring.

However, the real, and largely untapped, advantage of GPS monitoring lies in the ability to integrate the data with other objective sources (e.g., accelerometry, heart rate monitoring, GIS), online mapping tools (e.g., Google Maps), and more recently, digital cameras. Merging these data sources provides a more detailed and contemporaneous picture of the associations between the built environment and the behaviour being investigated.

To date, a few studies have integrated data from separate instruments, and it is likely that more sophisticated technology will become available that combines several measurement features into a singular unit.

The Physical Activity Location Measurement System (PALMS) initiative currently being developed by IPEN researchers will house GPS algorithms and calculations that can be shared and used with multiple devices. Development and use of integrated tools along with provision of supporting structures will be an important and substantial advancement for this field of research. Not only will researchers be able to interpret and share findings more easily, but the breadth and depth of information provided by a singular unit will be improved while reducing participant burden.

Accordingly, it is critical that researchers play an active role in the future development of these tools to ensure they are appropriate for the contexts the units in which they will be administered. How best to contribute to these developments will likely be a mixture of having a clear understanding of the research question being investigated, an appreciation of available and potential technologies, and partnerships within a multi-disciplinary group.



Breaking Research

ORIGINAL ARTICLES

AP Jones, EG Coombes, SJ Griffin & EM van Sluijs

Environmental supportiveness for physical activity in English schoolchildren: A study using Global Positioning Systems.

International Journal of Behavioral Nutrition and Physical Activity, 2009, 6(1):42.

PA Zandbergen

Accuracy of iPhone locations: A comparison of Assisted GPS, WiFi, and Cellular Positioning.

Transactions in GIS, 2009, 13(S1):5-26.

W Bohte & K Maat

Deriving and validating trip purposes and travel modes for multi-day GPS-based travel surveys: A large-scale application in the Netherlands.

Transportation Research Part C, 2009, 17:285–97.

P Schantz & E Stigell

A criterion method for measuring route distance in physically active commuting.

Medicine & Science in Sports & Exercise, 2009, 41(2):472-8.

JS Duncan, HM Badland & G Schofield

Combining GPS with heart rate monitoring to measure physical activity in children: A feasibility study.

Journal of Science & Medicine in Sport, 2009, 12(5):583-5.

REVIEW

MJ Duncan, HM Badland & WK Mummery

Applying GPS to enhance understanding of transport-related physical activity.

Journal of Science & Medicine in Sport, 2009, 12(5):549-56.

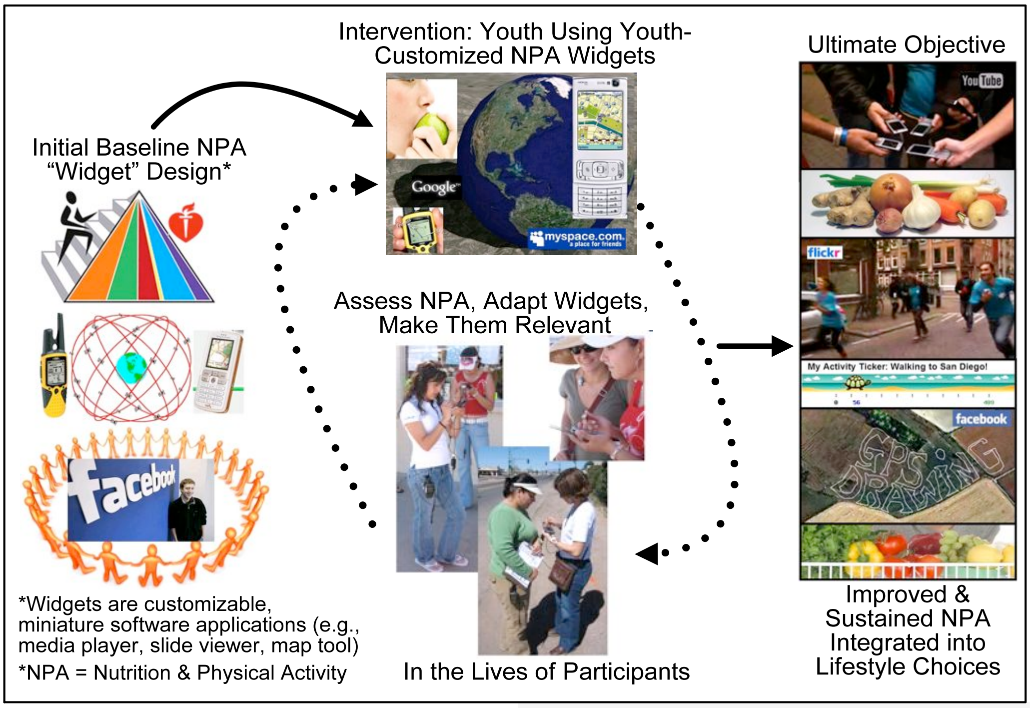
Research Profile

'Stealth Health' promotes physical activity: Engaging sedentary youth through computer technology

The University of Arizona (UA), USA, research team is devising a plan to target childhood obesity through the very technology that is partly to blame for the increasingly large number of growing young waistlines.

The UA research team is working to increase physical activity and improve nutrition knowledge and behaviour using a youth friendly informal approach that capitalises on activities and technologies (e.g., GPS, mobile phones, instant messaging) that youth enjoy and social networking environments (e.g., Facebook, MySpace) they inhabit. The UA research team aim to capture youth who do not participate in traditional interventions (an overwhelming majority) by infusing PA and informal learning into settings they do not associate with health promotion.

Currently, the programming team is working to develop baseline integrative software "widgets" to track, map and share nutrition and physical activity information on mobile phones and in social networking web sites. The UA research team will work closely with 30 adolescents, ages 12-18 years old, who will be mentored by software developers as they customize the technology to adolescents' particular interests. Following



development and pre-testing, the UA research team will assess the "stealth health" impact of the teen-produced widgets on nutrition and physical activity programmes, and implement them in diverse, after-school education programmes with over 200 adolescents.

The final step will be encouraging future youth-led, stealth nutrition and physical activity innovation through a national competition seeded by 4-H, YMCA and America On the Move.

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International Physical Activity & the Environment Network

IPEN was launched by Professor Jim Sallis (USA), Dr Ilse DeBourdeaudhuij (Belgium) and Professor Neville Owen (Australia) at the International Congress of Behavioral Medicine in Mainz Germany in August 2004.

Physical activity habits are determined by multiple levels of influence – personal, family, social, environmental, economic and other factors. Ecological models of health behaviour have been used to synthesize research at these different levels, and to focus attention on relationships of particular physical activities with specific attributes of physical environments, including the built environment.

While physical activity environments will vary within countries, the greatest and most informative sources of variation in the relationships of environmental attributes with physical activity are likely to be between countries. The IPEN initiative seeks to stimulate, inform, and support systematic and rigorous studies of physical activity and the environment, in as many countries as possible.

Please contact Jacqueline Kerr (jkerr@ucsd.edu) or Nicole Bracy (nbracy@projects.sdsu.edu) if you would like more information.

www.ipenproject.org

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