GPS HRN
GLOBAL POSITIONING SYSTEM in Health Research Network

NEWS UPDATE

February 2017 | Issue #11

An international collaboration to connect academics and health professionals interested in GPS technology

GPS-HRN IS BACK!

Dear GPS-HRN members,

It is with pleasure that I announce the return of the GPS-HRN.

As you may know, Dr Scott Duncan has stepped down as Chair due to other commitments. He has asked me to take on the role so that the network can continue. I'm very happy to have the opportunity to carry on the development of the network. Again, I would like to thank and congratulate Scott for launching such a valuable initiative and for having managed the network without any funding for several years.

This new issue of the GPS-HRN newsletter is fairly short but I believe it important to bring members together. In this new issue I am very happy to introduce to you the new editorial team of the GPS-HRN. Jenna, Kelly, Scott, and Jasper will help me to manage both the website updates and the editing of the newsletter. Many thanks team!

Also in this issue, Gabriel Okello, who is a Ph.D student at the University of Aberdeen (Scotland), describes his research that deals with the use of GPS combined with time-activity diaries to help us better understand exposure to biomass fuel smoke among different age and gender groups in sub-Saharan Africa.

What might be the future of our network? Currently, the GPS-HRN newsletter is the cornerstone of our network, enabling and accelerating exchanges between us. Given both the number and skill of the members that constitute this GPS-HRN network, and the important research works and human field applications using GPS, my feeling is that the network could propose other valuable initiatives to facilitate knowledge exchange and diffusion. I will make some suggestions soon…

To conclude, please remember to check that your member page is up-to-date on the website. Importantly, feel free to post any GPS-related news or information you would like on our website: www.gps-hrn.org

Note that the GPS-HRN website has migrated to my institution, the *Ecole normale supérieure de Rennes*, last September.

GPS-HRN is back!

All the best,

Alexis Le Faucheur

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SAVE THE DATE!

ACSM Annual Meeting
May 30-June 3, 2017 • Denver, Colorado USA

May 30- June 3, 2017 ; ACSM annual meeting at Denver, Colorado
Follow the program to track GPS-related communications!
www.acsmannualmeeting.org

June 21 – 23, 2017 ; ICAMPAM at Bethesda, Maryland
www.ismpb.org
The International Society for the Measurement of Physical Behaviour (ISMPB) and the National Institutes of Health (NIH) will be hosting the 5th International Conference on Ambulatory Monitoring of Physical Activity and Movement (ICAMPAM) conference, in Bethesda, Maryland.

Several communications will focus on the use of GPS measurement related to the study of physical activity in Human.

ISMPB
International Society for the Measurement of Physical Behaviour

GPS-HRN EDITORIAL TEAM

Dr. Alexis Le Faucheur, Associate Professor
Department of Sport sciences and physical education, Ecole normale supérieure de Rennes & "Movement, Sport and health Sciences" laboratory (M2S), Rennes 2 University. Bruz, France.

His current research focuses on the use of GPS in a clinical context, specifically to assess outdoor walking capacity in patients with peripheral artery disease. He is also interested by, and currently working on, the coupling of different activity monitors not only for the measurement of walking capacity, but also for the study of physical activity, and the related energy expenditure, both in health and disease.
m2slab.com/index.php/members/alexis-le-faucheur

Dr. Jenna Panter, Senior Research Associate
MRC Epidemiology Unit & Centre for Diet and Activity Research (CEDAR), University of Cambridge.

Her current research focuses on examining patterns and determinants of change in physical activity, and evaluating environmental and policy interventions. Jenna has experience in using GIS and GPS data in large studies. She has used both to determine the environmental influences on physical activity and has analysed GPS data in combination with heart rate and movement sensors to quantify and validate physical activity, sedentary behaviour and energy expenditure on the commute.
www.cedar.iph.cam.ac.uk/people/cdfs/jenna-panter

Dr. Kelly Evenson, Research Professor
University of North Carolina at Chapel Hill – Gillings School of Global Public Health, Department of Epidemiology

Dr. Kelly Evenson is a Research Professor who specializes in physical activity epidemiology. She has collaborated or led many studies on physical activity and sedentary behavior. She is a fellow with the American College of Sports Medicine and served for three years as an Associate Editor for their journal. She currently serves on the Editorial Board for several journals including *Medicine and Science in Sport and Exercise, Journal of Physical Activity and Health,* and *the International Journal of Behavioral Nutrition and Physical Activity*.
sph.unc.edu/adv_profile/kelly-r-evenson

Dr. Jasper Schipperijn, Associate Professor
University of Southern Denmark, Department of Sport Sciences and Clinical Biomechanics, research unit for Active Living

Jasper Schipperijn conducts research on the relation between human behavior and the physical environment, with a particular focus on developing methods to objectively describe behavior and the environment that behavior takes place in. In recent years, he has worked on the development of objective measures describing exposure to environmental characteristics using specifically-designed database systems, GIS (Geographic Information Systems), GPS, accelerometer, Bluetooth tracking, and various other sensors. Much of the methods development work he has been involved has centered on larger intervention studies or natural experiments. Dr Schipperijn's teaching takes place in a number of Graduate courses, primarily on using quantitative research methods.
www.sdu.dk/en/Om_SDU/Institutter_centre/Iob_Idraet_og_biomekanik

Dr. Scott Duncan, Associate Professor
Human Potential Centre, the Auckland University of Technology

Associate Professor Duncan is the Head of Research of the School of Sport and Recreation and the Associate Director of the Human Potential Centre at the Auckland University of Technology. Areas of expertise include the measurement and classification of physical activity, programme design and evaluation, curriculum-based health and wellbeing interventions for children, and determining the effects of the built environment and daily mobility on health outcomes. He is particularly interested in engaging children in healthy lifestyles through traditional unstructured play and independent mobility. Current research includes several large-scale lifestyle interventions in school, community, workplace, and primary care settings.
www.aut.ac.nz/profiles/sport-recreation/head-of-research/scott-duncan

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Assessing Personal Exposure to Biomass fuel smoke in sub-Saharan Africa using GPS and Time-Activity

Gabriel Okello
PhD student
University of Aberdeen
r01go15@abdn.ac.uk

Background
The use of biomass fuels in sub-Saharan Africa (SSA) is extremely high with more than 90% of the population depending on biomass fuel for cooking and heating purposes. Biomass fuels utilized mostly include wood, crop residue and cow dung and are regularly used in open fire or traditional stoves with incomplete combustion leading to high concentrations of household air pollutants (HAP). Exposure to HAP, predominantly carbon monoxide (CO) and fine particulate matter ($PM_{2.5}$), accounts for about 3,5–4 million global deaths every year. HAP is associated with a range of illnesses including acute and chronic respiratory diseases, cardiovascular diseases, low-birth weight and cataracts.

Measurement of personal exposure in exposure assessment is a vital part of determining the amount of HAP that a given individual inhales as they move around the various locations and 'micro-environments' throughout the course of their day. Therefore it is critical to accurately record the time a given individual spends in a specific location as this influences the accuracy of the exposure concentration calculation.

My PhD is looking at the various factors that influence air pollution people experience every day and the levels of air pollution people breathe in both inside and outside spaces/micro environments throughout the course of the day. Several traditional methods for acquiring time–location information exist and these include time–activity diaries, observation, questionnaires. This study is looking at the use of GPS combined with time-activity diaries to help us better understand exposure to biomass fuel smoke among different age and gender groups in sub-Saharan Africa. The combination of these two methods will help us to quantify how much time people spend in different settings thus enabling us estimate the amount of smoke people inhale from burning biomass fuels such as wood and charcoal. This will also enable us compare the differences in estimates of exposure to CO and $PM_{2.5}$ from the two methods.

Figure 1. Adult female holding a GPS.

Personal exposure and area monitoring
In our study, six age-gender specific groups including infants , young males, young females, adult males, adult females and the elderly are having their personal exposure to biomass fuel smoke measured over a 24 hour period using either (or both) a particulate matter ($PM_{2.5}$) monitoring device or a carbon monoxide measuring device. A GPS tracking device was worn by the different age group participants (except infants) to provide location data. Sixty participants wore the **GT-730 tracker** whereas 5 participants wore the **Garmin etrex 20x**. A time-activity diary was also given to all participants for the 24 hours to help establish a record of the main activities they performed and where they spent their time. The GPS and diary data will be used to quantify time-activity patterns over the course of a typical day.

Field work
Data has been gathered in Uganda and Ethiopia and is currently in the process of being analyzed. A total of 65 study participants wore the GPS devices for an average of 18 hours each. The GPS devices have been found to be widely accepted by study participants with most liking the portability and silence of the instruments in comparison to some of the personal air samplers. The other reason was that the GPS device could be anywhere on the participants' bodies including the pockets as opposed to other air monitoring devices which had more restricted positioning.
The only challenge experienced with the GPS logger **GT-730 Tracker** from feedback was the anxiety caused by the blue light at night. Some participants held religious beliefs about having blue or red lights on at night time. This was resolved by wrapping black tape around the light area.

Conclusion
Much as the method has had limited application especially in sub-Saharan Africa, the use of global positioning system (GPS) method to determine time–location patterns certainly has benefits such as reducing participant burden of carrying diaries and writing thus possibly providing more accurate and unbiased assessments of location. However, the interpretation of the GPS data/coordinates remains a major challenge. Another likely challenge is the clarity of the points in rural areas located in sub-Saharan Africa.

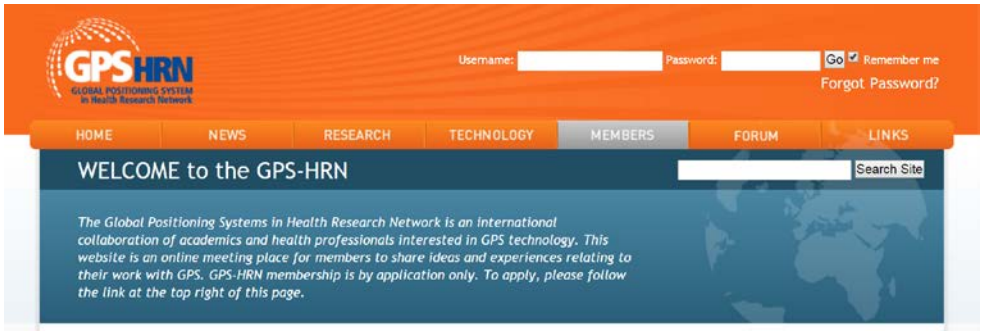
An interesting aspect of our work will be the comparison of the mean times spent indoors and outdoors between the GPS-based and the time-activity diary method; and also the differences in estimates of exposure concentrations to CO and $PM_{2.5}$ clarity of the points in rural areas located in sub-Saharan Africa.

Figure 2. Cello tape wrapped around blue light.

GPS-HRN: HOW TO BECOME A MEMBER?

Become a member of the GPS-HRN!

It's free! No subscription is required, and you have access to the whole content of the information of the website.
To apply, please follow this link: https://www.gps-hrn.org/pages/membersDetails/signUp.php



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Ecole normale supérieure de Rennes,
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Chair: Dr Alexis Le Faucheur
Editorial team: Dr Jenna Panter, Dr Kelly R. Evenson, Dr Alexis Le Faucheur, Dr Scott Duncan, Dr Jasper Schipperijn.
Publisher: ENS Rennes. Campus de Ker Lann - Avenue Robert Schuman - 35170 Bruz - FRANCE
Phone: +33 (0)2 9905 9419
Email: alexis.lefaucheur@ens-rennes.fr

www.gps-hrn.org