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Sessions and participants

SESSION

SUBSESSION

ABSTRACT

David Plets - Information Technology, iMinds- Ghent University, Belgium

On-Body Path Loss Modelling at 2.4 GHz for Dairy Cows

Presenting Author

David Plets - iMinds- Ghent University, Information Technology , Belgium

Description

Wireless body area networks (WBANs) provide a wide variety of opportunities in the domain of human health monitoring. These networks can also be effectively used in health tracking of dairy cows to enhance productivity and cow welfare (e.g. temperature or mobility monitoring). However, the deployment of WBANs requires a proper characterization of the on-body wireless channel between nodes placed on the cow's body. The goal of this work is to develop on-body path loss models for dairy cows at 2.4 GHz, obtained from both simulations and experiments.

Path loss measurements were performed using two ZigBee motes. The receiving mote was attached to the cow's collar, while the transmitting mote was positioned at 33 different locations on the cow's body. On-body wireless communication links were investigated between the neck (collar) and four other body parts where sensors could be attached: hind and front leg, udder, and ear. The same measurement scenarios were simulated using the electromagnetic solver SEMCAD-X. In order to develop a path loss model of the whole body, all 33 positions were considered. A one-slope log-normal path loss model was used to fit the obtained path loss values.

In all investigated scenarios, the simulated path loss values showed an excellent agreement with the values obtained from the measurements. The lowest path loss values were obtained for the ear-neck scenario with an average of 65 dB, due to the short distance between the ear and the neck. The udder-neck scenario presented the highest path loss values with an average of 80 dB. The path loss models had a path loss exponent of 3.1 and a path loss at reference distance (10 cm) of 44 dB. Based on these results, WBANs for dairy cows can be realized in practice. Also, they can be used to investigate the performances of WBANs in terms of packet error rate and energy efficiency.

Contributors

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VENUE

Conference venue and location

Our 4th international conference on Agricultural and Biosystems Engineering with the subtitle: Automation, Environment and Food Safety will take place in Aarhus, Denmark on 26 to 30 June 2016. The conference will be hosted by and take place at Aarhus University, Lakeside Lecture Theatres, Bartholins Allé 3, DK-8000 Aarhus C, Denmark: [Map of Aarhus](#)

About Aarhus

Denmark is one of the world's leading destinations for international meetings. In the heart of Jutland, situated on the Eastern coast, you will find Aarhus, the capital of Jutland and Denmark's second largest city with a population of approximately 285,000 inhabitants. The culture is lively and young mainly due to the city's large student population.

Aarhus is an old city but still young at heart! The city was founded in the Viking age as an open trading station at the mouth of the river. Today the café environment along the river is one of the most popular gathering places, and acts as a magnet on the city's residents and guests.

In short, Aarhus is an educational and cultural centre, and its very soul is a charming blend, combining the atmospheres of a provincial town and an active city, which will make you feel welcome and at home. Scattered around the city you will find many restaurants, bars and cafes, many of these are located at the river and suited for all kinds of budgets.

Aarhus is really a remarkable place and among greatest experiences it offers are such intangible qualities as atmosphere and spirit. These can be felt in the city's streets and lanes, at music venues, in the old part of the city, the "Latin Quarter", in the restaurants and cafés which connect the city to the sea, in which the most daring Vikings bathe all year round, while others are content to take a sailing trip around the bay. Discover its delights for yourself. Most things are within walking distance and the city of Aarhus is the place where every wish can be fulfilled in fascinating and inspiring surroundings.

Ideally situated in its bay, fringed by beach forests and lush scenery, yet bustling with life, Aarhus offers an inspiring setting for the MatchPoints Seminar.

For more information see the official tourist portal for Aarhus:

www.visitaarhus.com/ln-int/denmark/tourist-in-aarhus

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