

Accepted Manuscript

Challenges in wireless communication for connected sensors and wearable devices used in sport biofeedback applications

Anton Kos, Veljko Milutinović, Anton Umek

PII: S0167-739X(17)31669-2
DOI: <https://doi.org/10.1016/j.future.2018.03.032>
Reference: FUTURE 4044

To appear in: *Future Generation Computer Systems*

Received date: 30 July 2017
Revised date: 25 February 2018
Accepted date: 17 March 2018

Please cite this article as: A. Kos, V. Milutinović, A. Umek, Challenges in wireless communication for connected sensors and wearable devices used in sport biofeedback applications, *Future Generation Computer Systems* (2018), <https://doi.org/10.1016/j.future.2018.03.032>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Challenges in Wireless Communication for Connected Sensors and Wearable Devices Used in Sport Biofeedback Applications

Anton Kos¹, Veljko Milutinović^{2,3}, and Anton Umek¹

¹ Faculty of Electrical Engineering, University of Ljubljana, Tržaška cesta 25, 1000 Ljubljana, Slovenia

² School of Electrical Engineering, University of Belgrade, Bulevar kralja Aleksandra 73, 11000 Belgrade, Serbia

³ IPSI Belgrade, Dalmatinska 55, 11120 Belgrade, Serbia

E-mail: anton.kos@fe.uni-lj.si (corresponding), vm@etf.rs, anton.umek@fe.uni-lj.si.

Abstract: *Sensors, wearables, wireless networks, and other Internet of Things technologies are ever more present in our daily life. We study their applicability and use in biofeedback systems and applications in sport. Biofeedback systems are important in motor learning where a person in the loop uses the feedback information to influence the execution performance. Sensors, actuators, and wireless technologies come in great varieties regarding their properties. We describe the most common groups of sensors and actuators that are used in sport and list the most widespread and easily available wireless technologies. We present the most important constraints of a biofeedback system operation and define a number of fundamental architectures of biofeedback systems. Taking into account all of the above, we present a number of different biofeedback application scenarios in sports. We match the scenarios to the most appropriate existing wireless technology that is expected to sustain scalability in the number of nodes or increased data rates for the expected application lifetime. We find out that currently none of the existing wireless technologies can satisfy the variety of demands of different biofeedback application scenarios.*

Index Terms: *biofeedback systems; wireless technologies; wearable sensors; embedded devices; Internet of Things; distributed applications*

1 INTRODUCTION

A great number of researchers are putting their efforts into research connected to the Internet of Things (IoT) – a field of research with great prospects and plans for the future. IoT is present in systems of all scales; from large systems such as smart energy and smart city, medium sized systems such as industry automation and smart home, to small sized systems such as connected car and smart wearables. IoT can offer benefits also to more traditional areas, such as agriculture, and healthcare [1]. IoT can also help with promoting and enabling the concept of smart and connected communities [2].

We are particularly interested in the role of IoT in human wellbeing, which includes, but is not limited to healthcare, rehabilitation, recreation, and sports. Sport and recreation are identified as some of the most rapidly growing areas of personal and consumer Internet of Things applications [3]. *Smart devices* or *smart wearables* such as wrist band activity trackers, heart rate monitors, motion tracking devices, and others are penetrating our daily life; they are readily available, affordable, and fast growing in numbers, and spatial density. The practical use of such embedded devices heavily depends on the development of wireless and sensor technology, corresponding applications, and a close cooperation with sports experts.

This paper studies the possible use of embedded devices and (distributed) mobile applications in recreational and professional sports. We try to make a leap from toys and gadgets that mostly offer approximate, statistically based, activity and biometric measurements, to devices, tools, and applications that would offer precise and timely information for motor skill or training improvement.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات