

## **Jury report**

### **KHMW Kees Schouhamer Immink Dissertation Prize 2024 – Technical computing and telecommunications in a broad sense**

**Dr. S. (Sujoy) Narayana**

*Space Internet of Things (Space-IoT)*

Delft University of Technology, May 2023

In the 21st century we have become accustomed to all kinds of smart devices that are connected to each other. We talk to our audio equipment, the modern car adjusts its speed to that of the car in front of it, we receive a notification when a stranger walks on our property, and we can track our luggage via tags. The collective name for these types of applications and the technologies that make them possible is known as the Internet of Things (IoT). Characteristic features of these things include their small size, their necessarily high requirements regarding low energy consumption, and their often lacking wireless communication options. In other words, small and nice, but quite limited.

In his dissertation, Sujoy Narayana introduces a new paradigm that is closely related to this: the Space Internet of Things, in which a new generation of satellites plays a crucial role. In this Internet of Things it is important to explicitly take into account the limitations of those things. This has led to a range of innovative adjustments regarding communication (which must be very economical and at the same time robust), scalability (where many things are achieved at once) and accessibility (so that remote areas are also covered). And of course the satellites themselves will also be small and nice, and therefore limited.

The techniques developed during his research contribute to applications where devices can communicate not only on earth, but also in space. Consider aircraft, zeppelins and drones, which can communicate with each other, but can also make contact with devices on earth. The laureate describes this new field in an appealing manner, illustrates it with examples and also explains the technical challenges. Other contributions in the thesis concern an energy-efficient way to encode and decode data when exchanged between devices in space on Earth. A GPS-like system for satellites is also described, for which the laureate was awarded a 'best paper award' at the MobiCom Conference.

The jury has chosen this dissertation from a series of very good entries as the winner of the KHMW Kees Schouhamer Immink Dissertation Prize 2024. The subject fits perfectly within the theme of the prize, technical computing and telecommunications in a broad sense. The laureate has been able to publish about this research at highly regarded scientific conferences and has also been able to write about it in an accessible way for a broad audience. The proposed techniques are not only well developed theoretically, but also implemented and evaluated under realistic conditions. The jury also explicitly sees as an added value that the

dissertation introduces a new area of research, which can be an incentive for more high-quality computer science research and many useful applications for society.

On behalf of the KHMW, we would therefore like to congratulate Sujay Narayana on receiving this award.

*Prof. dr. ir. M.R. (Maarten) van Steen, professor of computer science at the University of Twente, scientific director of the ICT Research Institute at the University of Twente*

*Prof. dr. ir. H.A. (Hajo) Reijers, professor of Business Process Management & Analytics at Utrecht University, professor of Business Process Technologies at Eindhoven University of Technology*

The jury met via Zoom on January 18, 2024. The meeting was chaired by M. (Mieke) Zaanen, societal member of KHMW. Also present at the meeting was Prof. A.P. (Ad) IJzerman, KHMW scientific secretary for STEM and medicine.