SCIENCES & BIOENGINEERING SCIENCES

The Research Group
Web & Information Systems Engineering Lab

has the honor to invite you to the public defence of the PhD thesis of

Kushal Soni

to obtain the degree of Doctor of Sciences

Title of the PhD thesis:

A Software Framework for Easily Generating Blockchain-Based Applications for the Exchange of Resources between Different Parties

Promoters:
Prof. em. dr. Olga De Troyer
Prof. dr. Bart de Boer

The defence will take place on

Friday, October 18, 2024, at 3 p.m. in auditorium D0.05

Members of the jury

Prof. dr. Malaika Brengman (VUB, chair)
Dr. Audrey Sanctorum (VUB, secretary)
Prof. dr. Bas Ketsman (VUB)
Dr. Hans Weigand (Tilburg University, NL)
Prof. dr. Suzanne Kieffer (UCL)

Curriculum vitae

Kushal Soni obtained the degree of Master of Science in Computer Science at the Vrije Universiteit Brussel in 2018. Afterwards, he started a PhD at the WISE Lab. During his PhD work, he participated in five international conferences where he gave presentations and presented posters. His research resulted in the publication of five peer-reviewed papers. In addition, he held a full-time position as an assistant and was responsible for the practical sessions of seven different courses. Finally, he supervised master students during their internship and master thesis project.

Abstract of the PhD research

Currently, digital resources of customers are typically stored on the infrastructure of the businesses or organizations that offer the resources and they are often fully managed and controlled by these businesses/organizations. This puts customers in a vulnerable position, as they do not have true ownership over these resources.

The major objective of this dissertation was to enhance the end users' control and ownership over digital resources in the context of resource exchange platforms, and moving away from these centrally controlled (web) infrastructures. Tokenizing resources, which involves leveraging blockchain technology and smart contracts to store and manage the resources, could enable this. However, implementing such solutions requires extensive IT and blockchain expertise -- a barrier that is often too significant to overcome for small organizations. Therefore, we also aimed for simplifying such a tokenization process, particularly for people with little to no IT knowledge. We achieved this through the provision of an easy-to-use tool to set up blockchain-based infrastructures and applications for the exchange of digital resources. Such applications may involve multiple entities, such as organizations, businesses and their customers, and enable the provision and exchange of resources between them. Additionally, the tool enables the creation of regulated exchanges, such as financial settlements, and enforces compliance without the need for a centralized governance. In general, a blockchain-based resource-exchange system can be set up within 30 minutes with the tool through an intuitive user interface.

Although at first glance, providing so-called true ownership over the resources customers receive seems to be only to the customer's advantage, it could also offer new business opportunities, and reduce infrastructure setup, maintenance, and developer costs for organizations.

Four use cases are provided to demonstrate the potential of the tool. The tool was evaluated by business-type people with little to no IT or blockchain knowledge by means of user studies. Based on the results, we can conclude that the tool has good usability for this type of people. Furthermore, the participants perceived the tool as having the expressiveness to support a diverse range of use cases. This indicates that the tool can be utilized by a multitude of organizations and businesses for different use cases in the context of the manual and automatic exchange of digital resources.