İşbirliği konusu:
Uludağ Üniversitesi Tıp Fakültesi akademisyenlerinden Doç. Dr. Burhan Çoşkun ve Orta Doğu Teknik Üniversitesi Uygulamalı Matematik Enstitüsü akademisyenlerinden Doç. Dr. Oğuz Yayla ile "Klinik çalışmalar için üroflowmetride blok zinciri teknolojisinin ve nesnelerin internetinin uygulanması: bir pilot test" isimli makale konusunda işbirliği gerçekleştirilmiştir. Akademisyenler ortaya koydukları "Klinik çalışmalarda veri manipülasyonunun önlenmesi için blok zinciri teknolojisinin kullanımı" tezinin doğrulaması amacıyla nesnelerin interneti tabanlı ürünümüzü kullanmışlardır. Söz konusu çalışma ile EUA22 (Avrupa Üroloji Toplantısı 2022) fuarına poster başvurusu gerçekleştirilmiş ve kabul alınmıştır. Ekte ilgili başvuru dökümanı sunulmaktadır.

Abstract preview: AM22-0491

Title

Application of blockchain technology and internet of things in uroflowmetry for clinical trials: a pilot test

Topic	Non-Disease specific
Sub topic	E-Health & ICT
Clinical step	Diagnosis
Management tool	Urodynamics

Type of presentation

Poster EAU22

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Introduction & Objectives

Data falsification and human input errors can occur in clinical trials. Uroflowmetry data may be susceptible to error or manipulation in the context of a clinical trial. To obtain trustworthy data, the immutability property of blockchain technology is promising.

In this study, we provide an immutable indication of a uroflowmetry output by writing its hash value and timestamp on a blockchain network.

Materials & Methods

Two separate wallets were created using the Algorand TM Wallet application. To run the tests, the algo coins were transferred to the link https://bank.testnet.algorand.network/. We obtained an API key to perform the transactions on the website "Purestake.io". Python 3.9 was installed from the root sources on Oruflow, the self-service uroflowmeter (Oruba Medical Technology, Ankara, Turkey). Pip3 and py-algorand-sdk were installed. The sender's passphrase and the receiver's address and API key were added to perform transcription. To obtain uroflowmetry data, 340 ml of water was poured into the Oruflow in 39 seconds. This is an operator-free diagnostic device with a self-cleaning function that can generate reports of the measurements. These reports can be accessed via web services using Oruflow's Internet of Things (IoT) infrastructure. The results were given in a PDF file. The hash value of the PDF file, determined using the SHA256 algorithm, was inserted into the Notes section of the transaction. Then the script was executed.

Results

The test was conducted on 01/11/2021, 16:30 (GMT+03:00). The test results can be found in the pdf output (Figure 1). A copy of the pdf output of Uroflowmetry has been uploaded to https://users.metu.edu.tr/oguz/oruflow_report.pdf. A transaction is executed on 01/11/2021, 16:33:25 (GMT+03:00). The details of the transaction, including the hash value of the pdf file of the test result in the Hex/ ASCII section, can be found at https://testnet.algoexplorer.io/tx/Z5FU5OQWJ4PKJR7Z5XOO3CJ37LNCCQQYPMFBH5L4GBKQKJ4YEJ7Q.

The hash value of the PDF document and the hash value provided in the Notes section of the transaction are identical. Therefore, someone with access to the PDF file can verify the integrity, immutability, and timestamp of the recorded test result.

Conclusions

The hash value of an IoT-based uroflowmeter output can be inserted into a public blockchain network to strengthen data integrity without compromising identity confidentiality.