GDAŃSK UNIVERSITY OF TECHNOLOGY

Practical use of cryptocurrencies

inż. Patryk Kalkowski,
Wydział Elektroniki, Telekomunikacji i Informatyki,
Politechnika Gdańska

InSecTT
Intelligent Secure Trustable Things

InSecTT (https://www.insectt.eu/) project has received funding from the ECSEL Joint Undertaking (JU) under grant agreement No 876038. The JU receives support from the European Union's Horizon 2020 research and innovation programme and Austria, Sweden, Spain, Italy, France, Portugal, Ireland, Finland, Slovenia, Poland, Netherlands, Turkey. The document reflects only the author's view and the European Commission is not responsible for any use that may be made of the information it contains.

GDAŃSK UNIVERSITY OF TECHNOLOGY

RESEARCH UNIVERSITY EXCELLENCE INITIATIVE

Research project

IoT devices utilising blockchain technology

Supervisor: prof. PG dr hab. inż. Łukasz Kulas

Team: inż. Patryk Kalkowski, inż. Adam Glaza,

The goal of the project: carrying out the task of designing and creating a Proof-of-concept solution illustrating **the fusion of blockchain technology with IoT systems or autonomous systems**.

Our idea

Our system is capable of carrying out **fast, cheap and secure** cryptocurrency transactions between a client and a device (e.g. a vending machine)

Our system is simple to install and use for non-IT people.

Źródło: blockchain-technology-can-make-micropayments-finally-functional

Our idea

A system which can lower transaction fees significantly when compared to traditional transactions and enable an easy exchange of the store of value especially in regions, where traditional banking is hardly accessible.

Entrepreneurs

Transaction fees can be lowered to less than a fraction of a penny.

Increase your profits by almost completely eliminating transaction fees

Clients

Crossing the border is no longer a problem.

Pay in the same way across the whole world

Co stoi na przeszkodzie?

Main features for a competitive and secure payment system:

- high transaction speed
- ease of use
- low transaction fees
- transparent communication
- high mistake tolerance
- attack resistance (Sibil, DDOS, Double-spending …)
- secure storage of sensitive data
- high durability
- low production and maintenance cost
- volatility of cryptocurrency's value
- and much more

How to create a good system… ?

Stage I

Currently there are more than 4000 different cryptocurrencies out of which most likely more than 95% will end up failing prematurely

Create a new project or maybe build on top of an already tried and tested cryptocurrency?

Popularity usually guarantees that a project won't be gone by tomorrow (with some exceptions like LUNA/UST). In addition a large transaction volume may save it from high volatility.

Source: Rick&Morty

IN LOVING MEMORY OF TERRA [*]

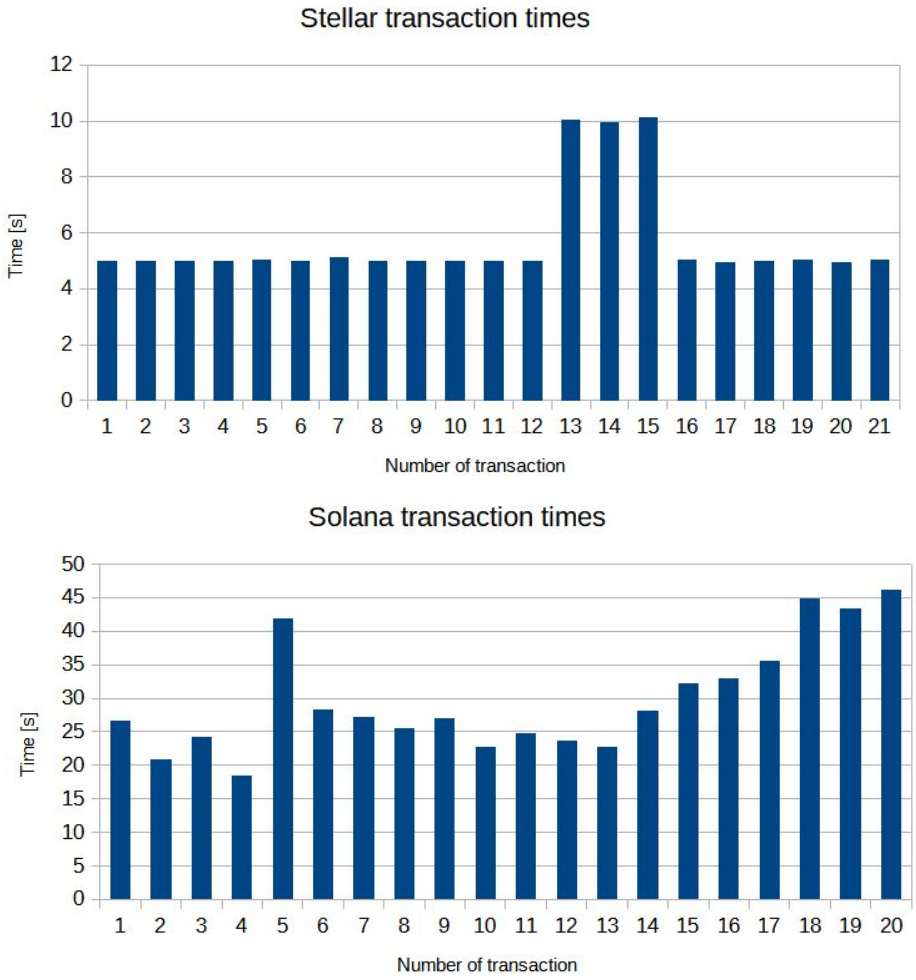
Research project

Stage II

The list of cryptocurrencies that passed the first stage of elimination was further analysed.

Our main criteria:

- project whitepaper
- project history
- possible vulnerabilities
- development of the project and projects based on it (based on activity on their respective repositories)
- future of the project (underestimated or overestimated value)
- environmental impact - low energy usage/CO2 footprint
- short transaction times
- network reliability



Transaction times for Stellar and Solana blockchains

Prototype

We will be presenting the capability of this system using an arcade machine.

We want to test whether an average client will be able to utilise this system (UX/UI prototyping).

Final product should already be adapted for the use by potential clients. Our system should gain the trust of the client through its transparency and ease of use.

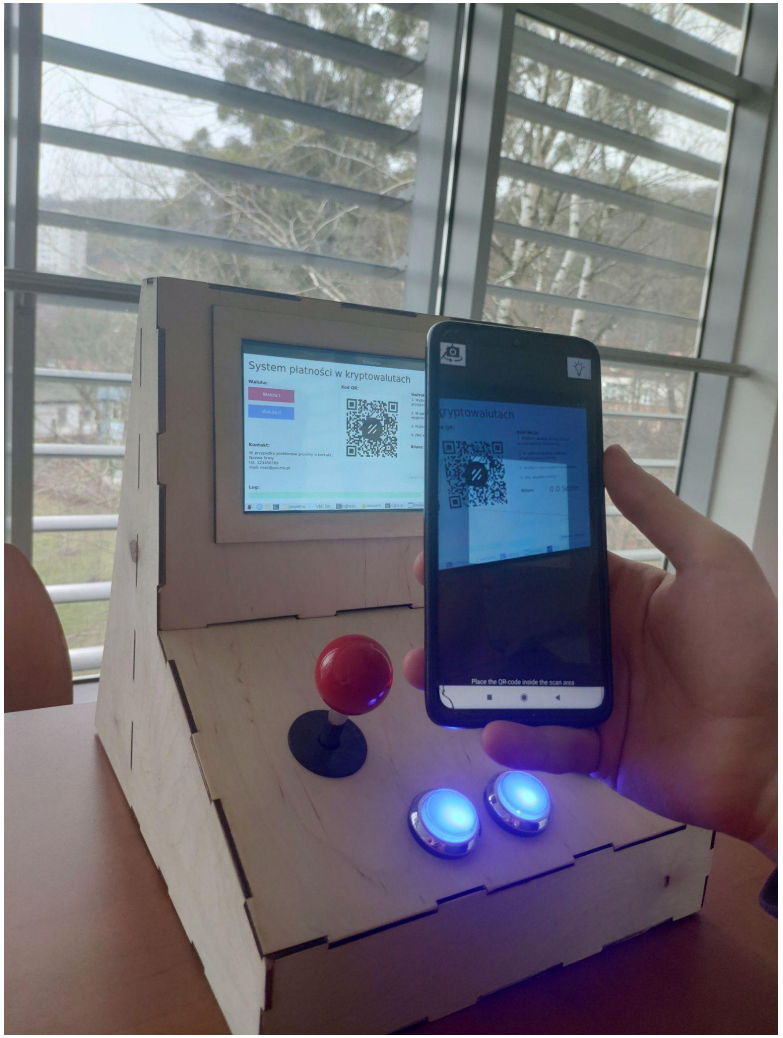
Prototype

The device is ready - it shows the QR code necessary for transactions.

The user can change the cryptocurrency type using the touchscreen.

Prototype

The user carries out the transaction via a mobile wallet.



GDAŃSK UNIVERSITY OF TECHNOLOGY

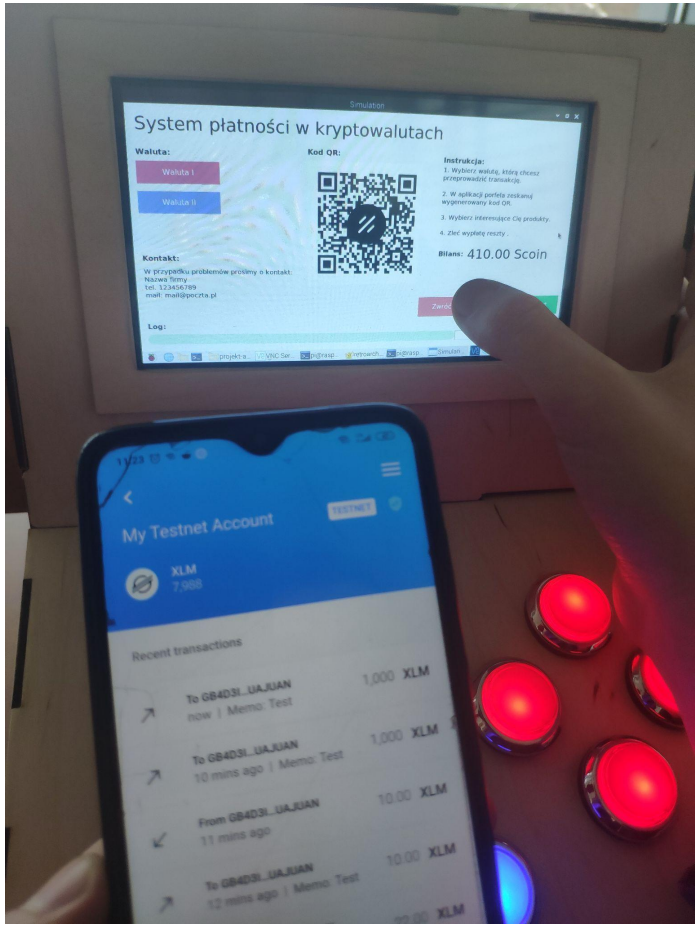
RESEARCH UNIVERSITY EXCELLENCE INITIATIVE

Research project

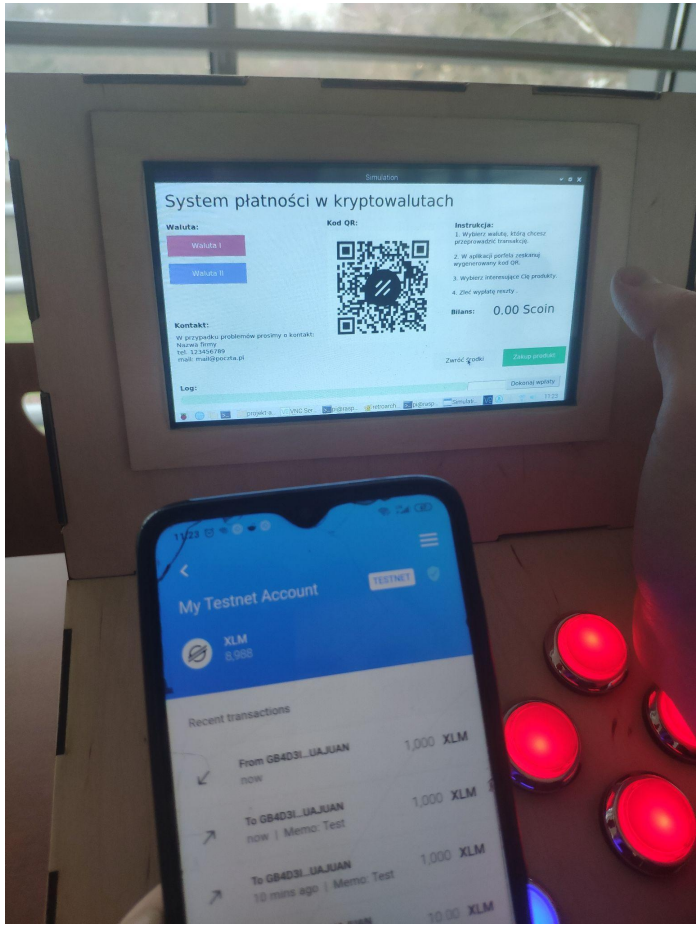
The user selects the amount to send on their mobile phone.

The machine has received the transaction.

The console also offers a return option



The user selects the ‘Return funds’ option



The machine has returned the funds (a new transaction is visible on the mobile phone)

Prototype

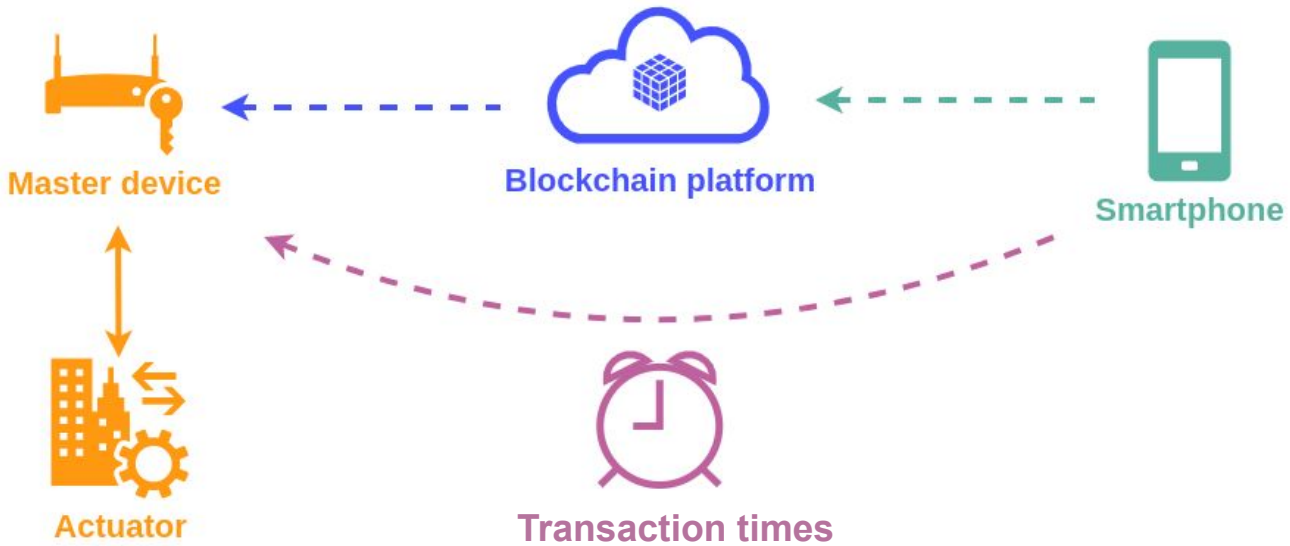
After completing the transaction the user can play a game.

GUI


System płatności w kryptowalutach
WALUTA:
CRYPTO I
CRYPTO II
CRYPTO III
KOD QR:
INSTRUKCJA:
1. Wybierz walutę, którą chcesz przeprowadzić transakcję.
2. W aplikacji porfela zeskanuj wygenerowany kod QR.
3. Wybierz interesujące Cię produkty.
4. Zleć wypłatę reszty .
BILANS:
Wpłacono: 0.0585 GAL
KONTAKT:
W przypadku problemów prosimy o kontak:
Nazwa firmy
tel. 123456789
mail: mail@poczta.pl
ZWRÓC ŚRODKI
ZAKUP PRODUKT
STATUS:
WPŁACONO ŚRODKI O WARTOŚCI 0.0585 GAL

Performance tests

Time between sender initialising the transaction and the receiving receiving confirmation of the transaction being finalized.



Future

The product is already in late stages of development and its current capabilities seem very promising.

However there is still a long road ahead of us and we still need to complete the following:

- Improving the system
- Adding support for other reliable, fast and environment-friendly cryptocurrencies
- Switching to a much cheaper microcontroller: ESP32
- Integration with systems developed for H2020 projects, including inspection robot
- Development of new demonstrators

Thank you for your attention!

GDAŃSK UNIVERSITY OF TECHNOLOGY

RESEARCH UNIVERSITY
EXCELLENCE INITIATIVE
Ministry of Science and Higher Education