

Creating a Physical Wallet for Cryptocurrencies

Daniel Kolev, Martin Kostov, Fabien Kunis*

125 SU "Boyan Penev", Sofia, Bulgaria

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ABSTRACT

Crypto Pi is a hardware crypto wallet that has different benefits. The wallet aims to show the users how a hardware wallet works. It is an alternative to Trezor Model One, so it has all its benefits. It is not hard to use or set up. We chose to work on this project because we believe in the future potential of using cryptocurrencies as a form of payment.

Keywords: CryptoPi, Blockchain, Bitcoin, Ethereum, Cold wallet, Hot wallet, seed phrase, Trezor, Crypto, Raspberry Pi Zero,

INTRODUCTION

Crypto Pi is a hardware crypto wallet that has different benefits. The wallet aims to show the users how a hardware wallet works. It is an alternative to Trezor Model One, so it has all its benefits. It is not hard to use or set up. We chose to work on this project because we believe in the future potential of using cryptocurrencies as a form of payment. The project has the goal of showing how cryptocurrencies work and where they are stored. Let us start by explaining what crypto is. Cryptocurrencies, in short, crypto - are an alternative to the traditional fiat currencies - like the dollar and the euro. Cryptocurrencies can be different in form, network, and purpose.

For example, Ethereum at the time of writing is in the top 2 of the market cap, just behind Bitcoin. It runs on its blockchain while also having a complementary subnetwork called ERC20 for tokens on the Ethereum network. Another notable example is the Binance Coin (BSC) crypto network. Of course, this is a small percentage considering all the other coins and tokens out there, each with its technologies and purposes. Now you might ask for the use case of cryptocurrencies and why they are used. In short - crypto aims to be a more secure & more private alternative to the traditional banking system, all while not having to rely on a centralized authority - like a bank. The idea of the first cryptocurrency

*Correspondence to: Fabien Kunis, 125 SU "Boyan Penev", 1 Nikola Genadiev str., 1784 Sofia, Bulgaria,
E-mail: f.kunis@125su.com

- Bitcoin - started shining in 2009, created by an anonymous person with the nickname “Satoshi Nakamoto” [1]. The adoption of bitcoin quickly skyrockets as people realize its power and potential, so naturally, other forks, copies, and generally different cryptocurrencies show up shortly after [2]. The spotlight of all crypto coins is currently Bitcoin, Ethereum, Litecoin, Tether, etc. They all have their mission pursuits which make them unique and different from each other. The one thing that unites them, however, is that they all run on blockchain technology. Some cryptocurrencies have blockchains like Litecoin, and Ethereum, and of course Bitcoin has its blockchain [3]. Blockchain is a system that relies on cryptography to check, authenticate and validate all pending transactions [4]. The benefit of this technology is that it is challenging to commit fraud in it since it is peer to peer and all transactions are stored in a public ledger, which then verifies the authenticity of the said transaction. The blockchains work 24/7, day and night with downtime being pretty rare. The portfolio assets and value of the users are also saved on this blockchain. The wallet only serves the purpose of displaying an interface for managing your portfolio. There is a 12/24 word passphrase of randomly generated words in the English language which essentially serves the purpose of a “password”. The random string of values, which is called an address, uses a public key to function. It can be changed anytime. For instance, the Bitcoin cryptocurrency has extra functionality to change the receiving address of the user after each successful transaction. This however is up to the wallet to implement and can help with anonymity and privacy [5]. There are two types of wallets - “hot” and “cold” wallets. Hot wallets are usually an *app* that can be downloaded but requires an internet connection to function. Cold wallets, on the other hand, are pieces of hardware that store your private key and guarantee more security since if malware infects your device it is very, very unlikely it will

also spread to the hardware wallet because it is isolated. Hot wallets are usually recommended for small sums of money, while cold wallets are meant to be used for large sums of money which is crucial to be protected. Notable hot wallets include Exodus and Trust wallet. The main players in the hardware wallet industry are Ledger and Trezor. Ledger supports more altcoins, while Trezor has less support for altcoins [6], but the Trezor firmware is open source, unlike Ledger. It is important to note that both Ledger’s and Trezor’s software interfaces are open sources. There are hundreds of wallets out there that we would not mention here, so it is important to investigate and ensure the quality of the wallet before using it.

EXPERIMENTAL

Crypto Pi is built on the base of Raspberry Pi Zero and it uses the open-source firmware provided by Trezor. Crypto Pi has all the benefits of the Trezor Model One and it is even cheaper to build one yourself. Here are all the parts that are required to build it yourself:

- Raspberry Pi Zero
- Micro SD Card
- Buttons
- OLED Display (optional)
- Additionally, you can 3D print a case just like we did.

If you decide not to purchase the display it can work just as well by using an HDMI cable and an external monitor. We recommend at least 8/16GB for the SD card.

RESULTS AND DISCUSSION

Crypto Pi is a hardware wallet, it is based on Trezor Model One. The wallet itself has various advantages and therefore has all the advantages of the Trezor Model One. Some of the advantages are that the wallet has a different set of cryptocurrencies - Bitcoin, Litecoin, Bitcoin Cash, Ethereum, Dash, etc. The wallet can be used through Trezor Suite, as well as various software

that allows its management. Also, it can be used as a U2F key, PGP key, and password manager. One of the great advantages of the Crypto Pi is that all the information is stored on an SD card that can be removed - hence the crypto stored on it can be accessed via another Raspberry Pi Zero without any problems. Another advantage is that the cost to assemble a Crypto Pi does not exceed \$30. In comparison, the cost of the Trezor Model One is 75\$, which allows the project itself to be

implemented without problems and difficulties from a financial point of view.

Fig. 1 shows the final product - the Crypto Pi hardware wallet in the specially printed 3D case. Next to it, Fig. 2 shows what the Crypto Pi looks like without the case. Fig. 3 shows the screen image that the user sees when the application is running, and Fig. 4 shows the menu for entering the password for Crypto Pi, so you can manage your finances at any time.



Fig. 1. Crypto Pi in 3D case.

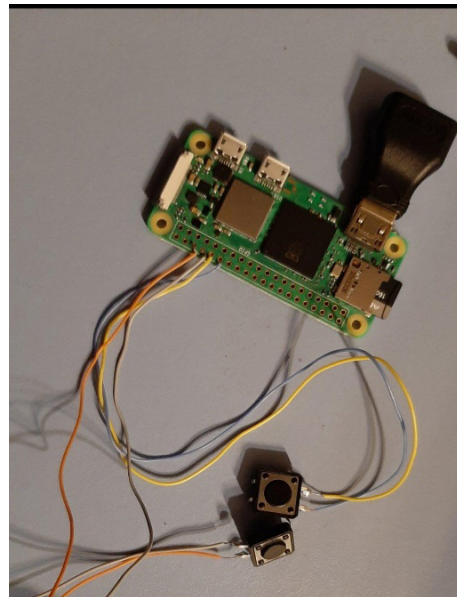


Fig. 2. Crypto Pi without case.

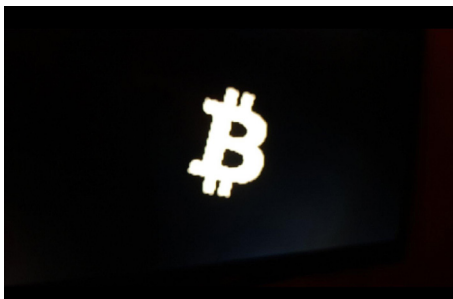


Fig. 3. Screenshot of Crypto Pi.

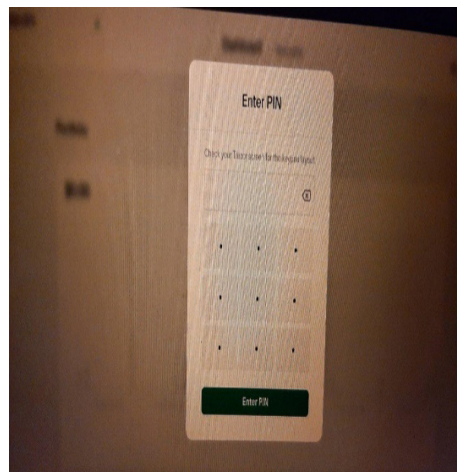


Fig. 4. Password entry menu for Crypto Pi.

CONCLUSIONS

Crypto Pi is an interesting, entertaining, and casual project. It aims to show how cryptocurrencies, blockchains, and different wallets work. Crypto Pi of course cannot replace established hardware and software wallet makers and we advise you to make sure you save your password and/or private key before using Crypto Pi.

REFERENCES

1. Andy Greenberg, Cryptocurrency, Forbes.com
2. Altcoin, Investopedia.com
3. Bitcoin white paper, bitcoin.org
4. Blockchains and electronic health records (PDF), mcdonnell.mit.edu
5. Lily Hay, How to Keep Your Bitcoin Safe and Secure, Wired.com
6. Trezor Suite: Privacy made easy, blog.trezor.io