

# Pi Network: The Possibility of a Mobile Cryptocurrency

## Introduction:

In the 21<sup>st</sup> century, currency has entered the digital age with the invention of cryptocurrency. USNews writes "The idea behind Bitcoin was introduced to the world on Oct. 31, 2008, at the depth of the financial crisis by a pseudonymous person called Satoshi Nakamoto," (USNews). In a paper titled "Bitcoin: A Peer-to-Peer Electronic Cash System." Nakamoto outlines the concept for a decentralized digital currency; meaning an online currency supported by peer-to-peer connected computers. By having these computers compute transactions, Bitcoin's ecosystem is supported anonymously by users called "miners". Ever since the launch of Bitcoin, the price has climbed since eventually reaching \$50,000 in 2021. Now, two Stanford Ph.D. graduates have created a blockchain model that can be mined using mobile phones. Dubbed Pi Network, the company believes that Pi will be the "cryptocurrency of the common people" with users being able to get paid for using their phone's computing power. However, there are numerous concerns including the long-term effects of mining on hardware, the currency's lack of value, and the potential damage it may have on mobile devices.

## Abstract:

In this age of digitization, many aspects of life that were commonly done in person now have modern online solutions. For example, whereas it was customary to shop in person, online shopping has flourished as abandoned malls slowly become Amazon Fulfillment Centers. In 2010, the first digital currency Bitcoin became available on public exchanges. The price of the currency soon inflated to the point where, as of March 2<sup>nd</sup>, 2021, the price of a single Bitcoin is

around \$50,000. Despite being a very popular currency, Bitcoin is not without its problems. The blockchain that Bitcoin operates on requires computing power as users called “miners” use their hardware to help complete transactions in exchange for Bitcoin. This process is called “mining”. Mining Bitcoin does take a toll on hardware as it can lead to faster degradation of chips. Currently, mining is done on systems using graphics processing units (GPUs), but it takes multiple chips to mine effectively as mining generates a huge power output. The solution, two Stanford Ph.D. graduates are currently working on a new cryptocurrency, called Pi Network that would be mined by phones. Like Bitcoin in its early inception, Pi currently has no value, but a working blockchain model where users can mine on their phones. The goal of this paper is to examine if mining cryptocurrency on phones can be a viable cryptocurrency for the future.

## Technical / Scientific:

To understand cryptocurrency, the first step that must be taken is to understand what exactly a blockchain is. Investopedia explains “A blockchain is a type of database... One key difference between a typical database and a blockchain is the way the data is structured. A blockchain collects information together in groups, also known as blocks, that hold sets of information. Blocks have certain storage capacities and, when filled, are chained onto the previously filled block, forming a chain of data known as the blockchain.” (Investopedia). When a new transaction is entered, the transaction is sent to a network of peer-to-peer computers supplied by miners. The computers compute the transactions in order to validate the transaction. Upon completion, the transaction is stored into blocks which are then added to the blockchain, completing the transaction, and storing the transaction in the blockchain as well. Because miners can be located anywhere, the blockchain model is decentralized meaning that

it is not controlled by a single entity. If Bitcoin was owned by a company for example, the company would have to purchase servers capable of computing all Bitcoin transactions. While possible, many computers would be required to match the computing power that miners currently supply to Bitcoin.

Currently, Bitcoin miners use GPUs to mine for the blockchain. Originally the Central Processing Unit (CPU) was used, but BitcoinWiki notes “A CPU core can execute 4 32-bit instructions per clock (using a 128-bit SSE instruction) or 8 via AVX (256-Bit), whereas a GPU like the Radeon HD 5970 can execute 3200 32-bit instructions per clock (using its 3200 ALUs or shaders). This is a difference of 800 (or 400 in case of AVX) times more instructions per clock.”. With this discovery, miners shifted to using systems setup with multiple GPUs to mine. This attributed to Bitcoin’s surge in price; as miners were able to complete more transactions faster for the platform, increasing Bitcoin’s market viability. In 2013, when this model was adapted, Bitcoin’s price surged from the \$100 range up to the \$1000 range.

Pi Network’s blockchain model differs from Bitcoin’s in different ways. Pi Network explains on their website “Such algorithms don’t have energy waste, but they require exchanging many network messages in order for the nodes to come to “consensus” on what the next block should be. Each node can independently determine if a transaction is valid or not” (Pi Network). Pi has been optimized in this regard to double spending where Bitcoin must constantly ask for affirmation from computers for which block is the next block in the blockchain. However, Pi still has one flaw that is a main selling point of Bitcoin: centralization. Pi Network specifies “One major criticism of BFT [Byzantine Fault Tolerance] is that it has a centralization point: because voting is involved, the set of nodes participating in the voting “quorum” are centrally

determined by the creator of the system in its beginning.” (Pi Network). One algorithm that Pi uses, Byzantine Fault Tolerance, creates a voting group to rule what the next block in the blockchain will be. The catch, however, is that this voting group is decided by the creator, vastly differing from the decentralization model of Bitcoin. Pi is also based on the Stellar Consensus Protocol (SCP), noting “SCP has been extensively tested for several years as part of the Stellar Network, which at the time of this writing is the ninth largest cryptocurrency in the world.” (Pi Network).

## Analysis, Discussion, Conclusions:

Pi has been touted by its creators as the next modern cryptocurrency, being able to mine from a mobile device, but at the moment there are concerns about its viability. Whereas Bitcoin is mined primarily using GPUs, Pi relies on mobile devices to mine. Rakesh Kumar, an associate professor of Electrical and Computer Engineering at the University of Illinois notes “We are hitting fundamental limits,” Kumar said. “It’s a problem with the entire industry, not just [bitcoin] mining, but the entire semiconductor industry...We need a new kind of device.” (Coindesk).

Bitcoin mining has also been shown to take a toll on GPUs and degrades them faster. Since the process of mining keeps GPUs running for long periods of time, the mechanical fans attached to the GPUs will wear down faster. If this process is so demanding for such powerful hardware, the damage may be worse for phones. Mobile phones do not have any form of active cooling such as fans like GPUs have, meaning that they may be more prone to overheating. In addition to this, mobile phones are powered by lithium-ion batteries. These batteries may degrade with

overheating, leading to the battery holding less of a charge. In Bitcoin mining, the devices are plugged in, never relying on a battery. This in term allows for the devices to demand more power when necessary. Mobile phones may struggle with this as if the device is not plugged into a charger but still requires more power, the phone's battery will drain.

Another advantage Bitcoin now has is its adoption by the mainstream. Bitcoin can now be traded on not only stock platforms such as Robinhood and Fidelity, but even PayPal, while Pi is still in the development phase. One of the main appeals of Bitcoin, is its decentralization, but Pi, as previously mentioned, is not completely decentralized. The reason for decentralization being so crucial to Bitcoin's success, is that Bitcoin can not be traced back to the original purchaser. This allows for payments for anyone with less than ethical pursuits. This decentralization has made Bitcoin a beacon for criminals such as hackers. Ransomware, malware that takes control of a computer and will not allow the user to access it without a payment specifically asks for Bitcoin. The reason being that the currency cannot be traced back to them. This market of consumers would not use Pi as the company would be able to trace their Pi payments leading to their arrest. Besides criminals, individuals who would not like their money being traced would not use Pi for that very same reason.

Because mining constantly requires the device to be running, the lifespan of the device could be drastically reduced. Mobile phones, unlike GPUs do not have any active cooling such as fans, meaning the phones will overheat more easily. Pi, similar to Bitcoin in its inception, does not currently have a value and has the risk of never being valuable. In conclusion, while Pi may have an optimized blockchain model, there are still concerns with the long-term effects of mining on

hardware, the currency's lack of value, and the potential damage it may have on mobile devices.

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