

SMART WILL

Converting the Legal Testament into a Smart Contract

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Abstract— A proposal is made to use blockchain technology for drafting and probating 'wills'. Using blockchain technology for drafting and probating wills makes them tamper-proof, secure, transparent. Furthermore it increases the speed of probation without dealing with the tribulations caused by the current system.

Keywords— Blockchain, Smart Contracts, IPFS

I. INTRODUCTION

Blockchain is the underpinning technology that has created the most popular cryptocurrency, the bitcoins. The heart of blockchains potential lies in the unique properties of a distributed database and how they can improve transparency, security, and efficiency. One of its technical features is that it enables reliable transactions without a centralized management system even if there are untrusted participants in the network. A smart contract, also known as a cryptocontract, is a piece of software that deals with the transfer of digital currencies or assets between parties under certain conditions. A smart contract once triggered works autonomously according to the conditions set on it.

A will or testament is a legal document by which a person, expresses his or her wishes as to how their assets is to be distributed at death. Today a will is written in a piece of paper and is highly vulnerable be tampered or even destroyed. Also the legal complications in the processing of a will takes a lot of time, paper work, etc. We put forth a new concept for drafting the will into the blockchain to keep it secure and tamper-proof and making the process of probation faster when compared to date.

II. LITERATURE SURVEY

A. Blockchain

A blockchain is a distributed database working in the concept of distributed consensus. It uses cryptography to allow each participant on the network to manipulate the ledger in a secure way without the need for a central authority. To ensure reliability, when a new block is added to the previous block, a little special process of solving a puzzle, called proof-of-work, is needed and this puzzle is not easy. This is because this process can prevent attackers from forging the blockchain on their own. With the number of bitcoin transactions becoming larger and larger, discussion of blockchain applications other than those for currency has been thrust into the spotlight. This is because the reliability of the technology has been maintained even when it is put to use on a large scale. [1].

Blockchain is not just about disintermediating the middleman. In some cases, blockchain could disrupt markets and existing participants, while in others, it promises to help drive cost savings by reducing labour-intensive processes and eliminating duplicate effort. And in some instances, it can create new markets by exposing previously untapped sources of supply. Enabling a fundamentally new type of database technology that can be distributed across organizations, blockchain creates the foundation for problem solving or snatching opportunities that have baffled current systems.

Blockchains transparency, security, and efficiency make it a particularly good choice for reshaping businesses that are bogged down by inefficiencies, and for enabling new business models based on distributed marketplaces and technology. Blockchain is not a cure all or a substitute for fixing broken business processes, but we believe it is particularly well suited to address a variety of problems[5].

B. Smart Contracts

Paper contracts can take weeks to travel around the globe, while digital documents are uncomfortably easy to forge. Is there a way to automate transactions to make them smoother, more efficient, and more secure for all parties? Leaders are looking at blockchain and smart contracts as a viable solution. [3]

Smart contracts have taken blockchains from a financial transaction protocol to an all-purpose utility. They are pieces of software, not contracts in the legal sense, that extend blockchains utility from maintaining a ledger of financial transactions to automatically implementing conditions of multiparty agreements. Smart contracts are executed by a computer network that uses consensus protocols to agree upon the series of actions resulting from the contracts content. The result is a method by which parties can agree upon terms and trust that they will be automatically executed, with less risk of being tampered with. Technology giants anticipate many applications for blockchain-based smart contracts, from validating transactions to executing supply chain agreements between various parties.

Without blockchain this type of smart contract was not possible because parties to an agreement of this sort would require maintaining separate databases. With blockchain and smart contracts all parties validate the outcome right away without the need for a third-party emissary. The blockchain thereby provides a secure, legitimate, and smart contracts au-

tomate approvals, calculations, and other transacting activities that are prone to lag and error. [3].

C. IPFS

The InterPlanetary File System (IPFS) is a distributed, inter-peer file system that connects all computing equipments with the same system of files. In some ways, IPFS is identical to the Web, but IPFS could be seen as a single BitTorrent swarm, exchanging objects within one Git repository. In other words, IPFS provides a high through-put content-addressed block storage model, with content-addressed hyper links. This forms a generalized Merkle DAG, a data structure upon which one can build versioned file systems, blockchains, and even a Permanent Web. IPFS combines a distributed hashtable, an incentivized block exchange, and a self-certifying namespace. IPFS has no single point of failure, and nodes do not need to trust each other[8].

IPFS and the Blockchain are a perfect match! You can address large amounts of data with IPFS, and place an immutable, permanent IPFS hash into a blockchain transaction. This timestamps and secures your content, without having to place the data on the chain itself.[8].

Each file is given a unique digital fingerprint called a cryptographic hash. IPFS removes redundancies across the network and tracks version history for every file. Each network node stores only content necessary, and some indexing information that helps to figure out who stores what. Every file can be identified by human-readable names using a decentralized naming system called IPNS.[8]

D. Ethereum

Ethereum is a public, open-sourced, blockchain-based distributed computing platform that has smart contract functionality. Ethereum also provides a cryptocurrency token called "ether", which can be transferred between participants and is used to compensate participant nodes for computations performed. It provides a decentralized virtual machine, the Ethereum Virtual Machine (EVM), which can execute scripts using a network of public nodes. Gas, an internal transaction pricing methodology, is used to prevent spamming the network and allocate resources equally to the incentive offered by the request.[7].

Ethereum was proposed by Vitalik Buterin, a cryptocurrency researcher and programmer. The system went live on 30 July 2015 but was later hard forked on July 20, 2016. This resulted in two separate blockchains: Ethereum and Ethereum Classic. Ethereum Classic came into existence as the original unforked blockchain, unifying members of the Ethereum community who rejected this fork on metaphysical ground.

III. PROPOSED METHODOLOGY

A. Problem Description

Even though our government and judiciary are very well

advanced their approach to drafting and probation of a Will is rather subdued. Government systems are highly vulnerable and is also a victim of corruption, biasing etc. Justice takes a lot of time to be served even after the presence of a sophisticated judiciary.

The Will of a person is still written in a piece of paper which makes it highly vulnerable to being tampered with. Even if the Will gets registered there is always a possibility of a biased official with whose help the Will can be tampered with or even destroyed.

The probation of a Will approximately takes upto 6 months even if there are no objections. The legal complications, notary etc consume a lot of time. Any person can object or raise a challenge to a Will which leads to further complications and return taking making years to serve justice. The people really associated with the testator has to bear the twinge of fighting for their rights bearing the pain of the sad demise of the testator.

B. Current System

Creating a will gives you sole perspicacity over the distribution of your assets. It lets you decide how your assets, should be distributed after your death. If you have a business or investments, your will can direct the smooth transition of those equities. If you have minor children, a will lets you provide for their care. If you have children from a prior marriage, even if they are adults, your will can dictate the assets they receive. Creating a will also minimizes tensions among survivors. Relatives quarreling over your assets can lead to chaos in the family. If you are charitably inclined, a will lets you direct your assets to the charity of your choice. Similarly, if you desire to leave your assets to an institution or an organization, a will can see that your wishes are fulfilled.

A person dies intestate if he does not have a will. In such a case, the government oversees the distribution of your assets. The government however does not inherit your assets, but rather distributes them according to a set of conditions. Usually half of your estate goes to your spouse and the other half goes to your children. Such a scenario can result in the events that negatively affect the family. This can create financial and emotional difficulties, particularly if your spouse was counting on the bulk of your assets to maintain his or her standard of living. Further aggravation arises when your children are minors, as the court will appoint a representative to look after their interests. Tax considerations are another important issue to consider, as a properly prepared will can minimize tax liability. This is particularly important to people with large estates. In the U.S., an estate tax return must be filed on estates valued at \$5,450,000 or more (as of 2016); but no federal estate tax is due if the estate is worth less than that amount. In India if one dies without a Will then the assets are distributed equally among the legal heirs. The line of legal heirs is clearly defined under Succession law. As per it the

mother and children have equal share. So in your case the fixed deposit will be distributed equally among you and your mother. Now if there is a nominee in the account then bank will transfer the assets to the nominee after submitting death certificate. From nominee then it goes to legal heirs as per succession rule. If there is no nominee then you will have to produce a succession certificate from the court to claim the FD amount. All this process takes a lot of time,(even years).

1) **DISADVANTAGES OF THE CURRENT SYSTEM:** Will is stored as a hard copy in safes or a soft copy in a server and is highly vulnerable to get destroyed/tampered with either intentionally or otherwise. The processing of a will faces a lot of legal complications, which involves a lot of time, even years. Writing a will involves money as a fee for registration, also a lawyer to deal with the legal issues. Probating a will including transactions take a lot of time and money as it is all carried out manually.

C. Assumptions

It is mandatory that everyone should hold a blockchain account (say bitcoin account) and that details should be kept by the government just like how an Adhaar card works in India. An Adhaar card holder provides a bank account no. along with other details, similarly a blockchain account should also be given and all legal transactions must be via this account should also be made mandatory. The details of every person in the country should be maintained in a log (like SSN in America) so that the person can be searched for using the internet to get all his details including the blockchain address he holds ,his existence etc. This log should be made available to public by the government. People can search for any other person by providing his details.

D. Working

Initially the testator should have all the public address of the people who he would like to give assets i.e. the beneficiaries in handy.It can easily be obtained from the log provided by the government like SSN. The testator should access Smart will either via browsers that have an inbuilt wallet to hold your public and private key that acts as a local node in the blockchain or use any extensions like "metamask" that has the same functionality. Smart Will has 3 main phases in its working:Create will, Update will and Probate will.

a) **Create Will:** When he submits the will and states transactions to take place, the will, will be uploaded into IPFS(Inter Planetary File System) and a hash to its location is retrieved. A Smart contract is created which will have all his transactions set and the retrieved IPFS hash ,all put under the condition of deployment with the testators death. There exists a death flag in the contract which will be set only after checking with the government site to confirm his existence.

After confirming to draft the will, the created Smart contract will then be deployed into the blockchain where it is safe and tamper-proof and its location in the blockchain is retrieved as a hash. Smart will manages another smart contract(Server contract) that maintains a log of the public addresses and a mapping to the will(Smart contract hash), from that address.

b) **Update Will:** The testator can update the will according to his needs and then submit to save the new updated will, which will then be deployed to the blockchain. The Dapp will get the public key from the local node in the browser and using it will check if a current will exists from the addr smart contract location mapping and will then the app will display an update will portal. The testator is authenticated from the running local node in the browser and he gets permission to edit his will. The smart contract location is retrieved and opened and the testator can update his transactions. If he wants to update his written will then he can retrieve the IPFS hash from the smart contract and then re-edit his will, and will upload the new file, to get a new IPFS hash which will be put into the smart contract replacing the old one. When he finally submits,

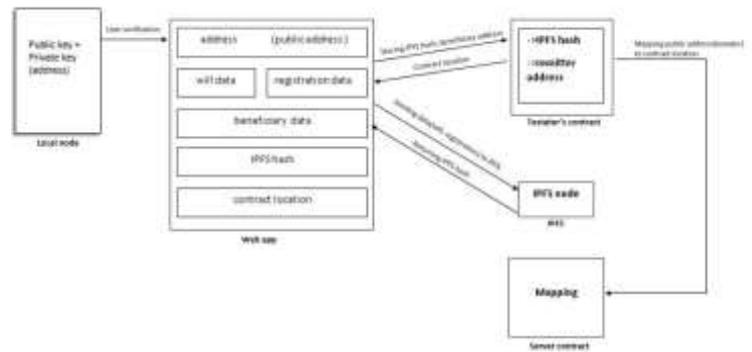


Fig. 1.Illustration of how a will gets created

the new smart contract will be deployed and the new location will be updated into the server contract.

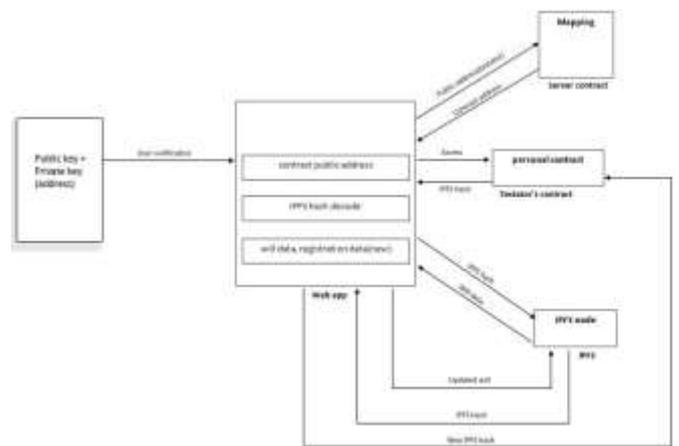


Fig. 2.Illustration of how a will gets updated

c) Probate Will: Any person or beneficiary can probate a will by just inputting the public key of the testator and a valid death certificate id. The Dapp will check if a Will for the entered public address exists and then will trigger the smart contract thereby leading to all transactions to occur within minutes and also a copy of the written Will, will be displayed on screen. After a Will has been probated if anyone inputs the public key of the testator his Will, will be displayed as all transactions had successfully occurred.

In the app the beneficiary inputs the public key of the testator and which will be used to retrieve the smart contract location from the server contract. The smart contract is retrieved and the inputted death certificate id is checked for validity by the smart contract using oracle to retrieve data from the government log and a boolean is returned and if the boolean is yes the death flag in the smart contract is set forever. All transactions will then take place accordingly and if a certain transaction fails retriggering the contract will need not verify death again as the death flag is permanently set and the transactions that had failed alone will be done again. The IPFS hash will be returned to the Dapp. Dapp will then retrieve the contents of the will from the IPFS and display it in the UI. If the same public key is entered by any person the fact that Will was probated will be shown and the copy of the written Will is displayed.

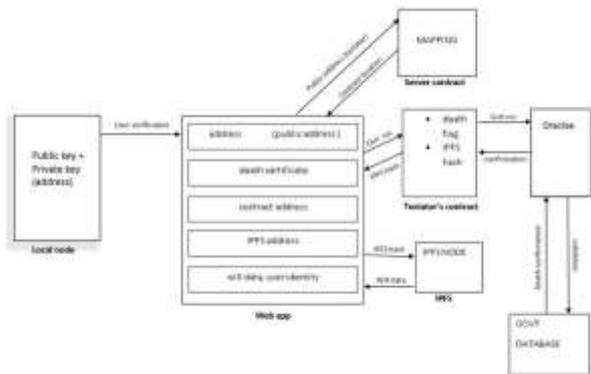


Fig. 3. Illustration of how a will is probated

IV. RESULTS AND DISCUSSION

After the text edit has been completed, the paper is ready for the template. Duplicate the template file by using the Save As command, and use the naming convention prescribed by your conference for the name of your paper. In this newly created file, highlight all of the contents and import your prepared text file. You are now ready to style your paper; use the scroll down window on the left of the MS Word Formatting toolbar. Using Smart Will lets the government monitor all transactions done by the processing of will as blockchain is completely transparent. Thus the beneficiaries cannot evade the land transaction fees or any other taxes.

Probation of Will is faster compared to current system and the necessity of a court can be dispensed. Since blockchain technology is used the will is totally tamper-proof and secure. Writing the will becomes easy with the smooth and very user-friendly UI of smart will and the testator can be at peace as his assets will surely be inherited to the right hands.

V. FUTURE WORK AND CONCLUSION

A. Future Work

a) Proposed Property Management System: The government will initiate a project to put all the details of land in the country into the IPFS in the form of textual document. The government will then perform transactions to the owners which contains the ipfs hash of their property which makes the root node of every property as the government. The government will then maintain a smart contract (server contract) which maintains a mapping between public addresses of people and the IPFS hash of their property. The owner can now transfer his property to anyone he desires thus transferring the ownership. The transfer of the property can be authenticated by checking the root of the block chain thereby detecting frauds. If the owner of a property dies without a Will then the property will automatically be transacted to the government address and then government can transact to the legal heirs of that property.

b) Proposed System for handling Taxes: The government should make a rule that all asset transactions should be made using the blockchain account linked in Aadhaar in order to be considered legal. Since blockchain is transparent the government can monitor all transactions enabling the government to check on tax payments. Furthermore a smart contract template can be made mandatory which calculates and transfers tax to government address autonomously.

B. Conclusion

The use of blockchain technology for drafting Wills is the best way to maintain security and faster probate of the testament. The current system is very vulnerable to biasing and corruption that most of the deserving heirs of assets do not get them fast. Any person with the intention to hurt can easily intervene in the system and cause chaos. This leads to a long time in processing the will, due to a lot of legal complications. For people with a lot of net worth having a proper will is really necessary for the right inheritance of their assets as they have a lot of rivals.

Blockchain technology is a future technology and a blockchain revolution is expected to occur soon in the near future. The idea of distributed consensus is proving to be a prime substitute to maintain security. The introduction of smart contract has set a fire across the contract market. People are

opting to use a smart contract instead of a traditional contract as it is pretty safe, tamper-proof and have a wide variety of functionality.

Using Smart Will for drafting the Will ensures that the Will gets probated faster and there is no need for any legal complications or extra time for reference so that the beneficiaries can be freed from the pain of fighting for their rights bearing the pain

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