What Proof of Human Existence Can Do. Victor, Founder of Humanode

[00:00:00] **Eric:** This is Eric Hess with The Encrypted Economy. This week. We have Victor, the founder of Humanode on our podcast. Now, despite the innovation in proof of stake and proof of work mechanisms, there are inherent limitations in each, as we all know, proof of stake is largely analogous to shareholder voting in a company.

It's familiar and it's one approach to governance. Now we also had Richard Yan from Vite Labs awhile ago on the podcast where he talked about proof of stake models and how to scale them. One of the innovations we talked about was quadratic voting, which is one tool to equalize voting between large token holders on one side and smaller holders on the other.

As you start to approach more egalitarian voting models, the value of which can be dependent on the individual project. They start to run the risk of abuse or even a Sybil attack whereby an actor could take control of the network or a voting system on a network by forging identities. And this could be executed through an army of bots.

It's not all that hard to, to spin up or to execute. So very excited about having Victor on the podcast to talk about the use of biometrics, to validate that the node is in fact a human. And the model also has other implications in, for their monetary system known as Fath, which Victor discusses Victor is a unique blend of developer and economist.

So be prepared for discussion that spans not only human node validation and biometrics, but privacy and macro economics. So if you like this episode, please share it. We continued to pick up more and more supporters every week and listeners. So it's exciting, but get it out to one person in your network who you think could benefit from it.

We got a lot of content, so I think it'd be a good share anyway. I think you're really going to enjoy this episode predictor, founder of Humannode.

So this is Eric with The Encrypted Economy, and I'm so excited today to have Victor from Humanode on the podcast. At a high level Humanode can prove the identity of users through a novel authentication schemes and grant permission to

launch a node and verify transactions running through a network based on human existence.

It aims to create a solution to the, plutocratic systems created with modern proof of stake and proof of work networks. This validation alternative uses the combination of proof of uniqueness and proof of existence.

But I am going to let Victor explain that during the course of those podcasts. So with all that said, Victor, welcome to the podcast.

[00:02:54] **Victor:** Thank you very much, Eric. It's a pleasure to be here, especially hearing your recent podcasts, where you dive really deep into the topics of law and economics of crypto.

[00:03:06] **Eric:** Yeah. Well, thank you. Thanks so much. So, before we get into it, why don't you tell us about your background and what brought you to where you are?

[00:03:15] **Victor:** Well, sure. I was born in Moscow. I'm not there anymore though, but I lived there for the whole of my life. I was born a in middle-class family and, actually, probably this is why I've been mostly interested in economics since I was 12 years old.

Because I couldn't believe how volatile the economy is and why so many people suffer because of it. Eventually I got to the university to study economics, on the international level and micro economics in particular. And, I never wanted to become a consultant or a banker. I was, creating startups, since university times with Datto.

Uh, my co-founder at Humanode. And, uh, eventually we ended up creating more than 10 projects or supporting them from the very beginning. But it was 2016 when. You know, crypto was not finally, only about sending transactions, but if Ethereum was launched, we said, okay, we understand its full potential now.

And we basically sold everything we had from traditional IT businesses and went fully crypto. But without starting the company right away, that would be too stupid to think that we're ready to go like that. And, we started Research Institute, which is still working. Funny thing that back in 2016, we called

[00:05:00] it paradigm until, you know, many others paradigm emerged in crypto industry.

And, well, we were researching crypto all throughout publishing reports and daily basis. That's what we still do. Looking for new things out there. Uh, we ended up establishing a proof of stake company, when testnet launched and many, many other networks followed. And, well back in 2017, and now I'm already talking about Humanode.

We already understood that despite the fact that all these networks are called decentralized, the actual decision makers who decide on how the protocol will evolve, what other rules of the protocol. And when you got your proof of stake, now the big validators even decide on emission schedules and amounts.

Ee understood that. Well, it is still very centralized. And if you look at it, it is even more centralized that the current, U.S. dollar global economy. So when I understood that there should be a solution where one human can set up only one node to make it fully distributed, but we had no idea how to do that back then in 2017.

Well, uh, last year, you know, looking through all the researches that we were doing, not only in crypto do about another conversion sciences. So to say, because all of those fields were eventually converted. And a little bit later, I will tell you why. For example, the general artificial intelligence can't exist with the solution like we're proposing and it will just destroy us.

Eell, we went on to create the first, uh, crypto biometric protocol because we saw the increases in accuracy of biometrics. And especially when you think in biometrics, Cold Liveness detection. So why don't we understand their potential and the fact that they can eventually provide even more security than current capital based solutions.

Can we finally start to make our dream come true and build an at-work where one human can have only one node. So. The in short, that's our story, the story of our life.

[00:07:45] **Eric:** Excellent. So, that's very exciting. When you think about it, particularly, you know, when you run the risks of even bots becoming involved in the governance process and the way that it could be distorted.

And so it seems like Humanode really is aimed at sort of. In many ways, achieving the vision that even like Vitalik Buterin and in his recent postings on it, raised, the vision that, that maybe proof of stake and doesn't exactly work due to some of the some of the issues in terms of.

Its distorting the governance process. I hope to talk more about that on this podcast. So a Humanode is broken into a few different segments. It's certainly a big undertaking. One is known as the Vortex. The other is known as Fath. I might not be missing a couple, but maybe if you could give us a little bit of background on each of those, that'd be great.

[00:08:50] **Victor:** Sure. well basically Vortex is what we call our decentralized autonomous organization and a Fath is the economic theory that we also created a few years ago, I would say it's not a theory. It's a hypothesis. Has now been tested out before and, this is a new way how we could structure a crypto economy and incentivize all the people in it.

That's essentially fighting the devaluation of the token holders in comparison to active talking holders who participate in governance. Well I would start. Okay. If we start from the Vortex. So we still have to stress out what technology, such as a DAO, where one human equals one node is based on. And this is all about biometrics.

A little bit of an intro into biometrics. It stands on two main pillars. One of those is a search and matching that's basically when you have a database, all encrypted, biometric templates off people's faces. And I should tell you that eventually we will use many other modalities, but facial recognition for now is the most accurate one.

And, the other pillar is called liveness detection. It can tell whether this is like exactly the same person in front of the camera, because this is what search and matching does. And liveness detection gives us the possibility to find out if this is a real human being in front of the camera, or a spoofed identity created out of nowhere through deep fakes or through Wachsberger.

Or through 3d masks that you can print already, even at your home. And basically that's how we find out with lots of encryption layers in order for people to stay private while using these technologies. If it's the same person in front of the camera, and if this person is unique. And is a living human being, not a creative identity.

So, the thing about our decentralized organization is that we want to look basically it would be in the financial network and to have a really distributed financial network, you should have more and more people involved in it. Right. But unfortunately for now, We don't have the consensus mechanisms that allow for millions of people becoming a node and validating transactions in the network because it makes the network unusable.

I mean, it will be slow. It will crash. And, for now, thanks to recent advances in consensuses made by the. Researchers who created, for example, Avalanche or Solana. We finally can have thousands of nodes in the network and, without doing things the, you know, iOS or Tron way, but at the same time, we can guarantee that everybody who wants to become a Humanode we'll join the network.

Because if you have millions of people who want that, they will just tell the network. So, this is something we are aiming to solve. We, the decentralized organization, by introducing the concepts that you wanted to discuss, like those many proofs that we have apart from proof of uniqueness. And, you know, proof of leaving human beings in front of the camera.

So to say, and, uh, these are the concepts of proof of time and proof of devotion. So I'm delving into proof of time. It's pretty easy. They say it is how long you actually run out. Of course, there should be requirements for people. So that we won't have 10% or 20% of the network just go offline one day, because these can cause a lot of technical issues.

And that is why we are tracking how long the person is running the node correctly with the good uptime. And if the person fails. He first, gets slashed and in our world, slashing is like bending cure, biometric identity from validating the networks transactions for a certain period of time. And the other concept is proof of devotion.

So basically that means that if you want to join the network, And, if we have a great combination of people who want to join the network, we somehow have to choose people who will be running nodes inside of entire network and who will be outside of the like validators upset. So we do that by tracking whether a person had his proposal approved by the decentralized organization or not.

And whether he executed this proposal or not. And, you know, by using these proofs, we went to, they have at least enough people who are. Well prepared to become Humanodes and help us create a new distributed economy compared to

all the others who want to join the network, but don't want to do anything with it in fact, and just, you know, reap the rewards.

[00:15:30] **Eric:** Excellent. So, circling back to the whole biometric component of it, what types of encryption technologies do you use? Because I imagine if you're capturing facial likenesses and such that could be seen as private information. Obviously it needs to be protected.

[00:15:51] **Victor:** Well, actually there are five primitives tubes that we use and, I don't want to delve into the details of each and every of them, but I can give you a general overview of what happens.

So when the user first scans his face. We encrypt his biometric template. This is what comes from the neural network algorithm, and then a basically encrypted form it's sent to the network of nodes. The thing is that, when it goes through the search and matching mechanism to decide whether you're a unique person or not simply by comparing your biometric template to all the other people.

We have to encrypt each and every layer of the neural network. And for now there are about 40 of those because the more layers you have in the neural network, the more accurate it is. And once these processes complete the nodes send zero knowledge proof to each other. That the process of biometric search and matching was complete and equally successful, basically encrypting the score and sending the proof was it yes.

Or was it no, to all the other nodes and it does the same for Liveness detection and actually liveness detection. They say it has even more networks inside than the search and matching operations, because, you have to check out how the light falls on the person's face, how sometimes we'll also track the movement of the person's mouth.

And, eventually when we will add additional layers of security, We will also ask people to smile in front of the camera to move their hat around, giving them, random challenges that will help possibly even more accuracy say that this is a real human being in front of the camera. Well, I would finally say that we have the whole white paper and 20% of it is about how we increase the biometric.

You see all the enterprise biometrics, they use just a honeypot where they store all the biometric templates and compare to each other, but decrypting them

before comparing. And this is not how we want to do that. This is not how things are done in crypto because,because people want to stay private in crypto.

That's what it's all about. And, we are basically the [00:19:00] first bonds who are building the private neural network as punished, especially designed for biometrics. Why? Because if you take the general privacy solutions, like a secure enclaves, that means that you have security by hardware. And not cryptographically, mathematically, guaranteed security and privacy of your biometrics.

And, the other reason for that, because it has, well, it needs more computation to carry out. And for enterprises it means more costs and you know, the development of such a solution. We'll take 5 to 10 more time than the development of regular biometric neural networks.

[00:19:55] **Eric:** Okay. Excellent. Um,and, With regards to thebiometrics, obviously it's done initially at validation when you're validating a node, are those biometrics then used to authenticate every single time there's an engagement or a vote?

Or with regards to proof of devotion?

[00:20:22] **Victor:** Well, actually if we see any attacks like those in the network, we will require that every time, but there is always a trade-off between costs of those verifications and the number of verifications that, you have to do. And, eventually with all the partners, when we thought about how we'll do that, we came to the idea that that's enough to make it just once a month.

And, that's actually the only requirement we have for. In terms of biometrics just once a month, you have to update your biometric template. And once a month, you again, have to prove that you're a living human being. And, this is mostly because the algorithm that we use keeps updated every month and we can increase the security of the network every month.

[00:21:30] **Eric:** Excellent. And then shifting into the governance model for the one human one vote. Could you give us an overview of the different levels and how the proof of devotion actually factors into that model?

[00:21:50] **Victor:** So I would say that Vortex, as it looks like now, Is just the decentralized organization and deep that eventually any protocol could

implement using our technology, because for an hour now, proof of devotion is just, is just the mark.

Like you haven't, or you don't have it. But for many, many years, we wanted to create a decentralized structure that is not based on capital because in a sense, there is not much difference between proof of stake and just having equity in the company. Right. And if you don't have money, you don't have a vote.

And you don't get engaged. Eventually people without money get engaged by being specialties who have celery. And that really doesn't change the power structure at all. So, what we will do later is of course that we won't just have proof of devotion as yes or no. But we will create more accurate algorithms to find out.

I mean, how valuable was your devotion, but these will require. Thought and the work of political scientists and economists to figure out the best way. And I think that we will have a lot of upgrades and debates once the network is launched for an hour, it's pretty simple. You just propose a solution, you write it on a chain, then you have an on chain voting of all the Humanodes.

And, eventually you get that proof of default.

[00:23:52] **Eric:** Right. And, certainly that enables other models like proof of reputation. Do you want to talk a little bit about how the Humanode solution could help advance the ability to build reputation specific members and accord them a greater vote?

[00:24:15] **Victor:** So, as I said for now, proof of devotion is, just if you've done it or not. And what I said will be developed later, which we eventually want to call something like proof of intelligence, right? Is that yes, you will need to have a complex reputation algorithm, but. We've been thinking about it for years.

And, we still see a lot of flaws in those things compared to when you just have yes or no, because this is highly subjective and it's hard to control whether this reputation thing is well truthful. Or not because of all the manipulations that you may have in the network. And that's why before having that proof of reputation thing for an hour reputation is just based proof of the emotion.

Yes or no for how long you've been running the node and for how long you're participating in governance. And they think I want to talk about a little bit as

well, because it's how we fight the voter apathy, actually in our DAO that you can see right now, a great example of the failure of current protocols is when.

The protocol can launch a decentralized organization because it doesn't have enough votes. And this happened many, many times in crypto.

[00:25:53] **Eric:** And what do you see the solution to dealing with the tragedy of the commons where you don't have that active participation?

[00:26:03] **Victor:** So, our solution here is that if you do not govern at all, You are not taking into the quorum at all.

So that's pretty simple. And, this is what we do. It's still called proof of time in our concept, right? Because this is the time of how long you have been governing, but any person that wants to stay among the governor. He needs to vote at least 22% of their proposals. And if he doesn't do that, he gets out of the quorum.

So basically those people who have that willness of voter apathy, they're not voters anymore. Uh, as simple as that,

[00:27:05] **Eric:** Excellent. and, and how do you see the use of proof of devotion and proof of time has eliminating the conflicts of interest? I mean, sort of stemming from what you were just talking about, the tragedy of the commons.

[00:27:23] **Victor:** So, well, that's a good question.

I think that. There will be a lot of conflict of interest in the network. And well basically eventually if we have too many people who want to become Humanodes, right. But our network capabilities do not allow for that yet. The people who are less active than the others. They even can't do a transactions on the network.

And that means they're also not getting their share of fees coming through the network. So this is not like a park, where every citizen can go. These are a little different thing where the entrance to the park, is a prohibited for those who compared to others, don't do as much as those who are really devoted and who really do something for the protocol.

[00:28:41] **Eric:** Right. And with regards to the way your current data is structured. Do you want to talk a little bit about that?

[00:28:52] **Victor:** Yeah, sure. It's, pretty simple. So there are three things in our DAO. First, when you have the proposal, you put the proposal into the pool. So we call it the proposal pool. It's like the first stage of voting where you either. Upvote or download the proposal. Any Humanode can do this and we have no delegation at this stage at all.

So if you vote, you vote, you have only one vote there. Basically then the proposal gets to the Vortex, itself, which is where the final decision is made, where we already have delegation. So for those people who couldn't vote in these proposals for these proposal in their proposal pool, now their vote will be counted because [00:30:00] a, if they delegated their vote while they're away, for some reason, Now you have like more, people eventually revolting through delegation.

And then the proposal finally gets into the thing we call formation because sometimes people have proposals, but. They are not the ones who execute on their proposal to, and make it develop and make it come true. That's when those people who propose something can find team members and, share the rewards that they might get for executing the proposal.

One important thing about the structure of the DAO. So we have different tiers. Of those who participate in the DAO, depending again, on those proof of time and proof of devotion and, use to you have the same one person, one vote. But if you don't have a tier high enough, you can't propose on crucial matters.

As for example, the change of monetary policy. Or like math to change the DAO itself. You're just not allowed to, because you haven't been in the network and the protocol for a long enough time to understand all the caveats of changing the protocol as a whole, by implementing something on those levels as the change of DAO or the change of the economic structure.

And the thing is that if you propose something great, in terms of those higher level changes. You can become like the one whose proposal gets accepted. But first it has to be promoted by the person who has long, long ago contributed to the decentralized organization. So the only change again, the only difference between the different tiers of the members of the DAO.

Is the right to propose on crucial matters. And we have those four tiers to control that new commerce can really do something if they want to. But eventually we won't get stupid proposals even in the DAObecause they won't go through the proposal pool.

[00:32:40] **Eric:** So, what about Fath? Could you explain what Fath is and the economics of Fath?

[00:32:50] **Victor:** Sure. first of all, I'd like to tell you why this word. Fath comes from the word Fathom and it actually means why something happened. So we were looking into the history of economics and the monetary policies.

Actually, I think that the macro economics is the least developed science in the world. And, well, billions are suffering because of that every day. So when we were exploring the topic of the currency, devaluation the topic. That you know, is broadly covered by crypto market, but we still have that devaluation actually.

And the thing about the, the affiliation is that when your economy growing, for sure you need new money coming into the economy to account for the value of growth. Otherwise, the prices of the products will always go up and you can't leave in it because it's a deflationary economy. Okay. So, I mean, why would you buy something today?

If it will be cheaper tomorrow, why would you create it. That will create a product in three months, but in three months it costs already less than it was like when you started creating it, you can't leave in the system like that. That's why you do have to print money, but you can't print money for the sake of the growth of the economy when it falls down.

I mean, there should be always a reason to create. And to create the monetary supply and to grow the monetary supply. So we found out that, economies did very well and there was almost no devaluation of people, meaning that their purchasing power was, at least stable, not, not falling down only when, The printing of the new, the creation of new monetary supply was after the economic growth.

And if your monetary supply growth is higher, the rates of eight or higher than the growth of the economy. Well, your people are in trouble. And the purchasing power of the regular farmer or a soldier failed down drastically. And sometimes

people don't mention that because they are active economic agents just for 30 to 50 years in their life.

But if you look at eight over the course of hundreds of years, The numbers will be awful. And we are really convinced that food would be pretty much free if we had proper macro economic policies throughout these. So the thing about five, well, I'm talking about Fath, you know, international scale here, because this is how it was first developed in our head.

[00:36:31] **Eric:** Can I actually pause on the food being free? Obviously farmers and such the producers would have to be incentivized to produce it. So would that mean that it would effectively be subsidized by government.

[00:36:51] **Victor:** Well, it's, it will be almost free compared to like 30, 50% of salary that people spent today on food.

Right. They would spend like small fraction, three to 5% on. If everything was down the other way around, but as I told my career economics, the least developed science in the world. And there wasn't such a science 200 years ago. What we're talking about here is the devaluation ethic of the regular people.

When the monetary supply grows enormously and, as you know, the, what happened last year, he was like the, the last thing that could happen is that now if you're a bank, you can keep 0% of the reserves in your bank and give out credits right. And left through everybody without any reserves. And that's when you have.

The well, the most horrible devaluation ethic on regular people. So let's now get back to crypto. The thing is that things are different than crypto, but you still have the devaluation of the holdings of regular people who buy Bitcoin by the, by those who. Mine Bitcoin, right? Or by those who stake any proof of stake, coin or delegated.

So it doesn't cure anything. And, what we came up with is that, imagine that you have GDP in the country, right? If you have GDP in the country, why can't you have the GDP of the crypto network. I mean, this is all the goods and products sold in the network for one year. So you take these number., actually it's pretty easy to count when your network has a special purposes like ours, its a compatible network, so you can run smart contracts on it.

Yeah. Pay the fees for the smart contract. And at the same time, it's the crypto, the biometric network, which processes biometrics. And basically these is the product and the output of the network, total fees collected by the network. So if you take that number in year one, and you take that number in year two and compare them to each other.

You will find out whether you had the growth of production off your network or the followup production of your network. So the most stupid things that happens in our world is that when we have the fall of GDP of the country, the cure for it right now is having more monetary supply in order to keep the economy going.

And that what brings the devaluation, because if you have less, goods and products flowing through the economy, you don't need that much money anymore. And you actually have to shrink the monetary supply. As we are now living in the crypto world, of course we can create, you know, the self audit-able system, which tracks all the smart contracts that you have and all that operations in the network and count that number.

And then what we do is that if the [00:41:00] economy of the crypto network grew, we would rebalance every account. Of the protocol by that amount. So again, if, for example, we call it gross network product increased by 2%. That means that if you had 100 tokens on your wallet, it will be rebalanced and you will have 100, two tokens on your wallet

so, what we say here is that, well, you could actually see it as helicopter money because everybody gets that money. Right. And, everybody gets them proportionally depending on how much you have at the moment. And, the other thing about it is that when you have the fall. Of the, you know, the output off your network.

In the second year, we will shrink the monetary supply by that number and each, and every balance will decrease by that percent because you have to shrink your monetary supply. If your economy fell down,

I hope I'm pretty clear here, but you can, you can ask any questions. You, it's not clear yet.

[00:42:33] **Eric:** No, it on some level it's, strikes me as being somewhat similar to modulating, supply and demand, in like seigniorage, right? Like in a seigniorage as your model for a currency,the seniority holders would have to

buy when the economy is contracting and sell. When the economy is expanding to maintain the peg, Is that sort of similar in concept?

[00:43:00] **Victor:** Well, I would say it's a bit different because, actually. I don't think that it pegged currency is something you can have stable because if your economy falls down, you have to support the peg, eventually losing all you have.

So what we have here is I would call its an anti peg because well, if your economy is falling, that means that. Well, actually what it makes eventually it's making the prices more stable in the economy. So in that sense you're right. Yep. Because for every product you have, you have the same amount of money at any given year,

[00:43:52] **Eric:** right? It's, similar to if the economy, if the GDP is growing, that means there's a lot of demands. For the monetary supply in your issuing into it, instead of requiring purchases, you're basically issuing more to facilitate the supply. Whereas if the economy is shrinking you're effectively burning it. So, that there is your number one, there's not as much demand for it.

And by burning it, you're creating more demand for the currency that remains.

[00:44:31] **Victor:** And the final goal is to have, the currency. I mean, that has 100% reserve ratio. And at the same time to be able not to fall either into super inflation or into deflationary system and keep prices for the same amount of goods as stable as possible.

And if the economy has the stable productivity growth rate, that means that eventually your monetary supply will be always be rebalanced around that productivity growth, because that's the only learn term real growth that we have in the economy.

[00:45:29] **Eric:** Right. Interesting. Would it work with a crypto project or a token that came to you and said, we want to work with you to deploy the Fath model. Would you work in conjunction with that token to apply those economics?

To their, to their ecosystem. So to speak,

[00:45:49] **Victor:** the thing is that, it is impossible to implement such a model. If you have network based on like proof of stake or proof of work, because for

those, you would always need the block rewards to keep the network running and blocker words mean that. Some part of talking holders always get devalued by the others.

You see. So actually human owned for now is the only network that is capable of supporting such an economy where there is no actor who gets devalued by the system. Right. Essentially creating a gap between those who are at the top being validated. Decision-makers and at the bottom, you will always have an outflow of capital from those on the lower level to those on the apple level.

And that's how current cryptocurrency works. So,[00:47:00] I'm completely screwed. That's it's impossible, you know, to go from proof of stake, to something, something like Fath. Without completely changing how the network works and without having the network where one human equals one node.

[00:47:21] **Eric:** Got it. And actually, if you could help explain the, the relationship between Fath and Vortex and how it is only possible to have Fath on vortex or on a, on a Humanode type network.

[00:47:39] **Victor:** Well, again, it is only possible just because of the fact that, to keep the capital base network running, you need to have the rewards for those who run the network, in human health. We also have the rewards, but they're not just coming out of some number of tokens [00:48:00] that we reserved for the next 100 years in order to pay out those rewards.

No, it doesn't work like that. 'cause in human OD, we came up with something, we call the cost-based fee system and that's why we don't need block rewards. So when you have the network where all the nodes are equal, that means that every node encouraged pretty much the same cost for running the node.

Right. And you don't have all of those differences. How many blocks do I validate compared to how many blocks you validate and, the difference in rewards, you don't have it all. That's why, what we can do is that at any given moment in time, we can find out the actual costs for writing the node. There is the.

Computation part of it [00:49:00] and there is storage part of it. So we will take the data through articles directly from for example, cloud service provider. Right. And, we can have those numbers in dollars, then we will say, okay, if you want to send a transaction on the Humanode, You would just pay for the costs,

the computation and storage of the nodes that they incurred for, you know, running that transaction.

you will ask me, where is the incentive here to run a Humanode, right? Where is the economic reason to become one? And the reason is pretty simple because when you send a transaction, you pay for the. Perpetual storage because blockchain stores your data forever. Right? [00:50:00] And you have to pay upfront as it always happens in current networks.

But if you look at those who run the nodes, they don't pay for, you know, forever to store your data on the cloud. Provider, right. They paid at the exact moment of time. And the difference between those two numbers is actually the incentive grant of Humanode. And until there are at least two Humanodes in the network, the network will still guarantee that these data stored forever.

[00:50:41] **Eric:** Right. And in addition to even just the cost of storage, there's also implicit in that as the, the cost of security, which a lot of, um, a lot of analysts have stated it, you know, basically security, you know, the ongoing maintenance of securityisn't often built into the upfront, [00:51:00] transaction fees.

[00:51:02] **Victor:** Well, I would say that, if you have a crypto biometric network, um, your.

The quality of your biometrics is the security of your network. So the actual security cost of the Humanode that work is continuous development of the crypto biometric technology and the continuous increase in accuracy of those biometrics. And if we talk about the network that has the accuracy like we are having now, Because, you know, we have different biometric providers.

Who've been working for years already to become more accurate than what you have, on your Android or your, or your apple device. And I mean, the accuracy is a 100 times higher. If you [00:52:00] count the costs of attacking such network, because spoofing identity is really costly and almost impossible. you will have the number of billions of dollars, which compares only to top 40 proof of stake networks.

And this is what we already have now. And these number, I mean, the accuracy of biometrics increases at least two fold each year. If you look at 10 year timeframe, so. Um, if the protocol's steel has money and resources to carry on

the development and the upgrades of the network, that means that security grows after.

[00:52:49] **Eric:** Excellent. So, um, and then looking ahead, let's talk about, um, I guess both the, the economic model and biometrics, maybe starting with biometrics, what do you see [00:53:00] is the future for, you know, the notion of. Human, verification validation, you know, the liveliness, Hey, where do you see it? You know, how do you see it sort of, um, impacting the whole crypto space?

Because arguably, you know, in, in certain networks, it's going to be more critical to be able to value, that human participation than others, but it really doesn't exist. Today, so much. So how do you see it impacting the, the whole, you know, digital asset space and the whole, um, basically the, the decentralized, system ecosystem.

[00:53:41] **Victor:** So I would say that biometrics is the most viable way to finally connect our physical body. With what we have in the digital space, you have a well, other approaches like building [00:54:00] social graphs, where one person should validate another person, but only biometrics are synonymous and have much higher accuracy that don't allow.

I mean, to, for us to collude.

[00:54:23] **Eric:** Do you think like, um, social graphs, which you certainly, we actually did do an episode withJenil Thaker, from Coinvise while that covered social graphs. Do you think social graphs could actually be combined? Yeah, that would probably, that would actually. You know, that would basically certify the reputation.

Like indeed is the same person with that reputation. And then you attach a social graph. And so that would, that would allow somebody to have a much more, a much higher degree of assurances that in fact, the person with that social graph was in fact, the same person

[00:54:58] **Victor:** and not what, [00:55:00] what, what, Kevin from, Gitcoin he's already doing, because he creates a framework for digital passport.

Where the person is digital passport can have all those ways of authorization to have, you know, a higher level of prove that he's the same unique human being. So of course the combination of those. And if you look at the network security, I

won't say that Humanode will eventually replace all their proposed state protocols, but if you have the security of both of the world, You have the most secure network.

So, and, if you look at the crypto space, basically biometrics is something that crypto space is really missing right now. And, we're happy to become pretty much the first crypto biometric company [00:56:00] in this space. And as we see. Well, everybody needs that from defi protocols where you can do the credits coring to a decentralized social networks that for sure need to somehow fight the bots because they can just ban people like current social networks.

And, of course there is a big problem. Yes. You can have a decentralized organization that is completely based on stake, but if you have DAO to DAO communication, you have to open up a new channel doc based on stake, because these are two different networks, right? And that's when the biometric technology comes handy as well.

I mean, we can talk about use cases for hours. You Poping up every week. I think we have at least have more than 20 of those, but [00:57:00] first of all, this is cyber resistance for those protocols who need it, like from Parker to social networks. And then it's a. DAO new kind of dose who will finally have greater community inclusion, then those apathic networks we have right now.

[00:57:23] **Eric:** Right. Right. And when you think about things like social tokens or tokens that are built around communities, you know, where, where the people who are engaged, you know, it's important to know who they are. Um, and it's important to make sure that you're not getting. You're, you know, you're not being DDOSed, you're not having people who are, you know, basically getting excluded that then popping up again under a different synonymous identity or anonymous identity.

Um, certainly, the biometrics would, would be key in ensuring that. That you can effectively trust that community. [00:58:00] Um, and that the people you think are engaged are in fact, the people who are engaged. So excellent. And then, and then in terms of Fath, what do you see as the future of Fath? Do you see, how do you, do you see it sort of playing out, you know, on a side-by-side basis with other, token offerings and token economics?

[00:58:22] **Victor:** Well, frankly speaking, I don't know how it will work out for the other top 10 economies, but, because we're the first one to conduct that experiment and we'll see how it goes. Um, eventually what Fath can allow you

to do is to create a network that, an economy that has stable. Without the, if you look at current like microeconomic situation, it really looks like pump and dump [00:59:00] and Fath doesn't allow that to happen because it's a rule based monetary policy.

 And, I really hope one day to see one country to implement something like Fath,

[00:59:13] **Eric:** right. I mean, I would think with, with a lot of token projects, I mean, you're relying on. They're burning when there's too much, supply and issuing when there's not enough, but in the absence of a, you know, Defined rule around it.

What's the visibility, you know, in it. So to the extent that you're establishing hard and fast rules that are objective and always initiate. It does, you know, it does provide sort of a clear path forward.

[00:59:44] **Victor:** Yep. And it does a lie, the incentives of those people who come to the network because everybody understands that if we don't make this network grow, we will have our balances decreased [01:00:00] after one.

[01:00:02] **Eric:** Excellent. Excellent. So, this was a great episode before we go. Is there anything that I didn't ask you about that, you know, I should have,

[01:00:13] **Victor:** well, we were thinking about the, you know, that when I, graduated from the university, I spent the whole year just sitting at home. And I was, and I still am a big fan of the, different theories on the general artificial intelligence, because I do think that eventually it will come to the level where it will take a lot of work that we're now doing.

And you know, all the economic optimizations that we're doing to the economists. Um, and the question is how can we [01:01:00] create that general artificial intelligence without losing control over rate? If you have a capital base network? Well, we will lose pretty quickly, right? It will just create a lot of mining equipment and capture the Bitcoin network.

That's it. We're done. improv stake. Buys as out. Okay. So eventually if you think about it, that if you want to have the control over the giant artificial intelligence or many of those that we might have in the future, the only thing for people to, to stay in control, isn't solution like human. Where the network

belongs to people and, well, and the other thing is the economy, which is not captured by those [01:02:00] who have money.

The only way to have, you know, de decentralized social structure or even governmental structure that is not captured only by those and to have the call ownership.

Of the social structures that we have is to have a way to prove that, well, this is one human he's unique. He's living human being. That's why he has the same voice as everybody else. And he controls that structure with the same power as everybody else

[01:02:42] **Eric:** based on contribution and not just pure. So excellent.

Well, Victor, a, a lot of things to think about, and it's going to be very interesting to, to see how, um, biometric validation becomes more important in some of the decentralized networks that we're building. [01:03:00] So thank you for coming on the podcast.

[01:03:02] **Victor:** Thank you very much, Eric, don't forget that there are already 50 Humanodes running on the test net and anybody can try and be counted.

[01:03:13] **Eric:** Excellent. I'll have to make sure we get the, the right links in the podcast as well in the show nodes.

[01:03:18] **Victor:** Okay.