

# Lyra Network – Vega AI – HFT App

Machine Learning Applications for High Frequency Trading

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## The Developers Have Your Back Here

Our first and foremost goal is to have your back as any single one of us with the same optimism and experience in the cryptocurrency world. We believe in the technology and funding to expand the success of it just like every single one of you. This is a simple summary and ideology to take problems that exist today and resolve them from a user configuration stand-point and utilize machine learning to assist in making the best possible decisions.

## Abstract

Machine learning is fast-becoming standard tool in any company's arsenal to make smart decisions at the optimal time and to increase their profits and avoid losses in their businesses. Data science uses various methods which include machine learning to analyze massive amounts of data at any scale, train that data, and then make predictions within each possible dataset. There are various algorithms that machine learning can utilize to train the data. This white paper is a summary of the top algorithms combined with our unique approach to cryptocurrency trading. Our company's vision is simple and complex at the same time. Most importantly, optimistic to resolve the greatest challenges and invite challengers today in cryptocurrency. The abstract is to create a network of open integration software from a foundation standpoint that utilizes multiple machine learning platforms and optimizes the artificial intelligent technology for each user's best interest, whether that be investment opportunities through or scalable technology advisement and integration with their current applications.

Many startup companies today have potential to improve upon their own ideas utilizing machine learning software. That's where my company comes in to consult and scale the platform we create to utilize specific software scenarios. Creating one "Super Computer" is irrelevant because everyone has different technology standards, best practices, and functionality that cannot scale to their business needs. We plan to create a very community-driven and open-integration platform from scratch that is tailored toward shared business needs per functionality of their product requirements. Similar to certain existing A.I. or brain systems we are willing to utilize the initial funding to recreate that ideology and work with serious affiliates with a passion to improve upon their vision. In our upcoming Medium blogs and newsletter releases, we plan to make it very clear to all of you why we are taking this approach and why this is the best approach for our customers. With one application, we plan to create the most transparent reliable automated asset financial advisor of all time. We all want exactly what you want, which is confidence in our investments.

## Agile and Test Driven Development in Vega Vision

Before we get into the details of release, technology we use, and the development standards towards any of our specific products, we want to make one thing very clear and concise about how we develop. We use Agile development strategies and methodologies in parallel to Test-Driven Development, if not recognized as the same thing. Brian Carter whom has studied in detail and implemented this methodology across corporate teams, is a believer and evangelist in the idea that it brings more up-front quality, improved support, and faster more easily-refactored development code. Unit testing is what drives the quality, user-interface automation testing and manual exploratory testing is what accepts the product. Please look into this development strategy as you will find many great sources out there explaining the

basics. Check any upcoming progress or look for the already released video blogs on why and how it is supposed to work in our fast improving development industry.

If you are a firm believer in Waterfall methods, we urge you to not continue in reading this even if you think we are being biased in our development vision. This is how our software will plan, develop, and accept upcoming features while still being able to resolve escalated defects. If you do not understand this process, you must before you consider this company as a viable option for you. How we will move forward with this project will be very transparent and clear. We will not release on pure speed but instead quality that reduces technical debt and improves scalability to a many platform services among our market.

The idea behind this whitepaper is to be transparent to you and we promise to give you the resources in our own productivity from a Product Owner, Architect, and CEO standpoint. It is our firm belief in truth and confidence for our idea. So we thank you for keeping an open-mind and patience in the development of something greater than any one dimensional product. Let us all work together with Agile from developer to consumer by creating something more efficient and driven towards quality of user experience and coding.

## Cryptocurrency Markets and the Challenges

We are the future to resolve outstanding problems today in the market we all participate in. Cryptocurrency markets have evolved beyond the capabilities of individuals or even groups of individuals with the need to predict the performance of entities, the losses and gains, pump/dump fluctuations, and need for automated user-driven investing which encompasses optimal decisions on when to buy or sell. Our system not only leverages current methods in analyzing stock performance, but also utilizes various machine learning methods to predict cryptocurrency stocks and real world currencies such as some of the largest entities you are familiar with. Granted there are companies doing cryptocurrency analysis in the market, but the key difference in our approach, is that it utilizes a decentralized model/P2P cooperation and discussions in which we can apply to machine learning methods and become more powerful in our everyday expenses. The biggest problem we are solving here with crypto and global marketable investments is the underlying problem that we just do not have the time to keep track of every single minute of every item.

Our software not only backfills historical data and is continuously/simultaneously being trained from the news, media, and speculations around those market items, but it stays current, and uses that information to make the best possible decision from any given user's best interests for investments. No it will not be a certified financial advisor A.I., but maybe in the future it will be well optimized that it may have the ability to do reach higher levels of algorithms we as humans cannot calculate and factor in. Our software will serve the user as a consultation and create "buckets" or portfolio smart solutions that will be configured toward your requests and information, as far as you wish to share in a secure web-space, while decentralizing your portfolio and utilizing that towards a high-frequency and automated trading system.

I've seen some software today that are astounding new technologies with similar objectives. One for instance is Acorn, which has the ability to take your everyday expenses and round-up to the whole currency and automatically invest with their affiliate programs. However, we want our software to give more power back to the user where they have best interests in the market and create an un-biased portfolio with machine learning analytics. You will be able to set your criteria and optimize your own portfolio,

whether you are asleep at night or busy at work. A hands-free process that is reliable and intuitive is our goal for our buyers and supporters. Many of us can relate to the same problems in the industry. Let us pull the weeds, per say, and help you invest into a technology that blooms. Machine learning can foresee patterns like this even within an ICO. We want to give users the ability to discuss and review their funding experiences. We like to believe the most important aspects that set those apart from others in this market are transparency of development, visibility to tech, and real people that show their faces on the market to uphold the integrity of their own product. We will take all of this into consideration when optimizing the artificial intelligence advisor that is Vega AI.

## Trading Problem and Solution

There is a growing problem within cryptocurrency and even real-world regulated markets that keeps every buyer up at night or does not create the secure feeling to keep us from constantly watching our investments during the day. We find ourselves going about everyday life as usual to find the next morning our investments have fallen victim to the media and possibility of capsizing for various reasons. Especially in cryptocurrency markets where there seems to be more manipulation and volatility than ever before. We want to eradicate those various possibilities with machine learning, customer contributions, and reduce that risk through analytics and community inputs through the Vega AI. We believe that transparency, credibility, and production take priority into your investment opportunities that our network and applications decipher and prioritize.

## Similarly Implemented Prediction and Analysis Systems

I know that is quite a bit that you think about on the daily basis, but the solution is automated so you do not have to think about it in our shared approach. Create an interest into opportunistic items and configure your spending opportunity buckets, let our Vega AI application do the rest for you even while you sleep at night. You as a user should never worry about their commodities and lost opportunities constantly, because when we have machine learning and efficient algorithms that can predict and analyze real-time data in comparison to its historical data that is effectively correcting decision and creating predictions with real-time data. Allow the automation process, create a bold portfolio, with already proven to be useful technology and algorithms that have shown us effectiveness in investing today.

Think about the chess computer that calculates your move possibilities and beats the user 90% of the time, unless you are a chess genius that developed the automated and a bot program on “impossible” settings. There are other games that use the same algorithms like Starcraft, yes we are all gamer nerds here, and even games with mods like Counter-Strike harnessing developers of new A.I. enemies that even Brian Carter cannot be given the chance to turn a corner without getting shot in the face if less than a millisecond reaction time. He hates it trust me, but good practice nonetheless that improve our very own reaction times. The bots exists, and so does the algorithms and technology, let us apply this to your everyday life to reduce your own human mistakes and stay with your best interests and instincts our shared best interests.

## Next Generation Currency Prediction and Analysis

As mentioned previously, our unique approach utilizes a decentralized model where contributors can choose to pool their resources together to maximize their profits and reduce their losses. The users will be able to apply their own configurations to create different tolerance levels for risk vs. reward and gather

useful real-time market data provided by the A.I. with suggestions. Over time this training in the neural network to the machine learning will allow for predictions and probabilities not just real-time reactions. The user will have available options to allow the A.I. to make smart-decisions and have it automatically place trades for them. The peer to peer ability (P2P) of our application uses the blockchain and latest technologies so that the user knows where each trade is being placed and trace the ongoing equity transactions. In doing so, the investors using our application will have a more intuitive understanding of the market. Hosting on an IPFS network can be used to increase the privacy of those transactions and accelerate the performance, which will be later explained. Our partnership allows this to integrate with the Novusphere. We look to secure all transactions, decision-making, and non-sensitive data on this platform.

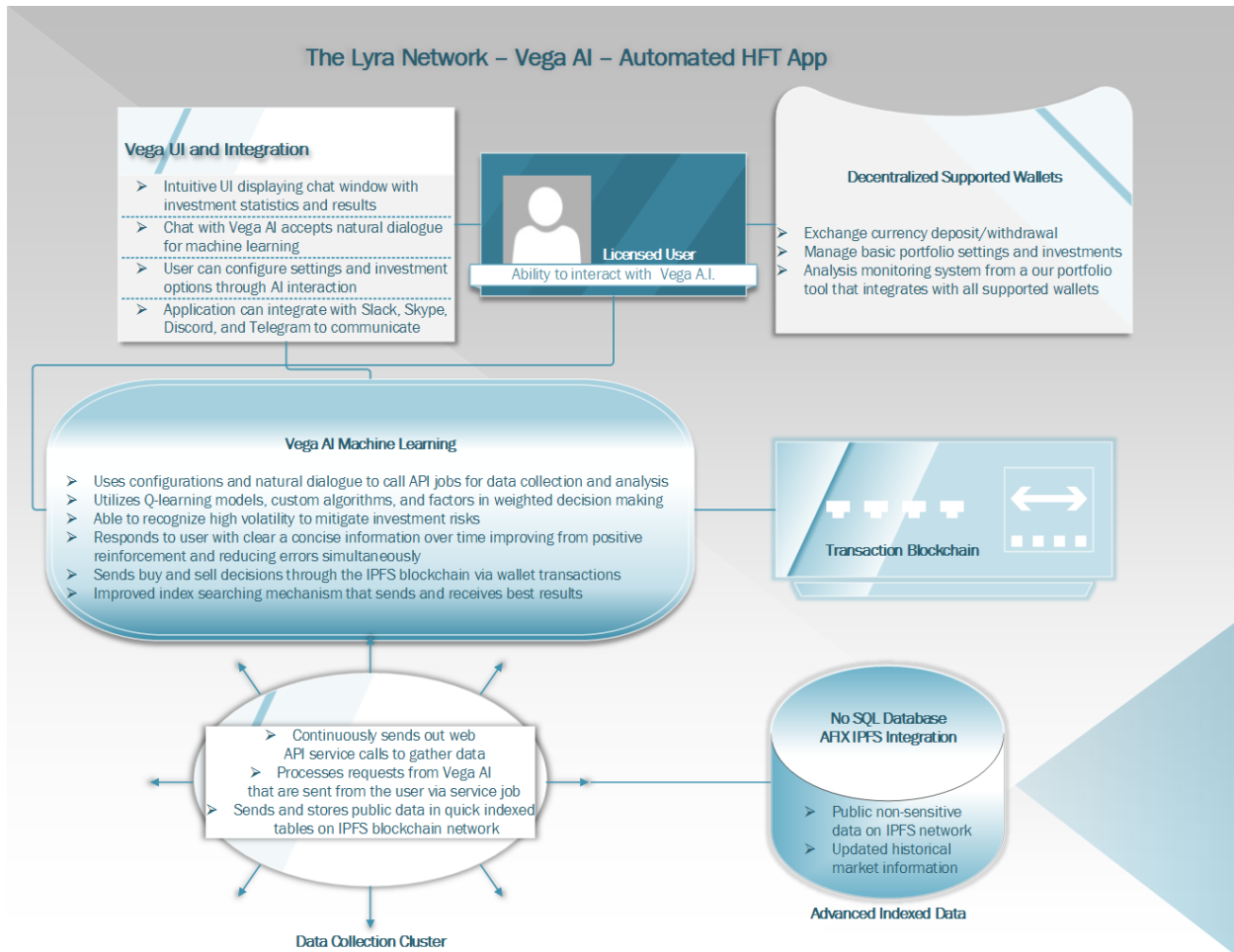


Figure 1 above describes the main parts of the application. The user will be able to interact with the A.I. and once they make their choices and requests we store this all in a data configuration settings and wallet only accessible to the user. The selections are then pumped into the neural network which performs operations to call data collectors, or node event-driven workers, to find the best portfolio item, using various algorithms to determine the best decisions, predicting the best possible pump and dump in the market. Once decisions are made it will pass on information from there to data that transacts information for the bot for placing the trades. If storing long term history is needed, we will use a decentralized big table indexed technology like AFIX for creating a storage with the same objective. The data collectors on the left of this model, will constantly be analyzing market data, real-time, and store that data and then

send it back through the neural network. Lastly the algorithms calculator will allow the application to utilize various data science/machine learning methodologies based on what the user wants for their portfolio. We also want the ability to contribute your own algorithms into our open integration platform. With proof of capabilities and code review from our developers and top customers to give us quality feedback, we will decide if it is viable code to be integrated based off of a ranking system.

This system uses the community-driven platform containing many reliable sources of information with historical and current data that is captured by our machine learning Vega AI platform. Much of the data will be continuously captured for every market data item via Twitter official accounts from developers or consumer announcements, Slack open discussions, Discord discussions, Investing.com top reliable writers, SimpleFX statistics, articles in Medium.com blogs, as well as Bitcointalk.com forum posts from developers, etc. We want to take advantage of all publicity opportunities and analyze that data into factual and reliable information for investors. We want the user at the end of every day to be confident and have the most valuable information and the machine learning available at their fingertips using the Vega AI to get those data feeds while analyzing the cause and effects over time. More importantly now than ever, that kind of data is crucial to backfill and use as a prediction for the future of any similar kind of cryptocurrency and or global market item. Users will also be confident in their decisions by having the ability to configure or parameterize inputs into a commodity or item opportunities to find specifics they are interested in. The machine can create the most optimistic secure decision for an investment bucket within the crypto technology or current global market data that is advancing their technologies through similar communication systems.

## The Vega AI and Lyra Network Design for the HFT Application

Figure 1 may be very complicated to understand at first. The reason is that machine learning is a difficult thing to understand and our company supports the education on it, which we will gladly be sharing through free documents, videos, and live webinars. The key factor is how you use the “brain” of the system. In this model you see us defining how it works only for this application. But everything outside of it is very scalable to be integrated with all platforms because of the foundation we plan to build on capability. Scalability is our goal for long-term consulting and integration solutions. We can create multiple “brains” within our neural network for specific user and business needs, which is honestly how it should be done. Information can be shared across indexes and databases or even the “brains” themselves. Vega AI is a combination of different optimized brains that can share those learning algorithms and capabilities within the Lyra Neural Network, even allowing learned data to transfer between one another across different platforms. You can see in the fig. 1 above that we created a large data table of information just for the HFT application with split flat tables for many record items or market shares. We are constantly updating real-time data to query and send back to Vega to analyze and learn. The more data the better it can learn the buy or sell points. Optimizing using existing algorithms for gradient and Q-learning methodologies we can begin to rank datasets to users on risk, reliability, visibility of plans, transparency of owners, and even eliminate those all-to-familiar pump and dump market items.

There is so much we can optimize on the back-end and configure with the front-end. Performance will not be a problem as we do asynchronous calls to the data collection web service clusters with API jobs on each node. Indexes and encrypted data can easily be updated through a blockchain process. We at Vega Intelligent Solutions feel that some of this data is already public which is why those market data items will have information be public on our network. The decisions will made by Vega AI on those data



sets will be secure for user with automated market transactions. As a supporter or contributor to our software application and network, you will have that kind of information available to you through the blockchain process we create interactively from the front-end of the application. Most importantly a user-friendly and configurable application whether mobile or desktop will be priority across all possible browsers and operating systems. That is a challenge we look forward to implementing seamlessly across platforms in the most secure and private way possible for supporters and contributors.

## Machine Learning and Neural Network of Lyra Overall Vision

We have looked at all services, Google and Azure or even AWS, all great machine learning beginner platforms for machine learning and cloud services. Vega Intelligent Solutions has a vision to be unique, create our own AI from scratch derived from proven to be useful algorithms with our own fine-tuned adjustments made over time. We want our application tailored towards this community of cryptocurrency and global-market items and commodities. We want to give you the resources to work with encrypted and decentralized data transfer in existing integrated platforms hosted by our affiliates which we will gladly announce with our own system as development continues.

Brian Carter and Ryan Schreck have worked with Azure recently and most powerful platforms for machine learning today based off of the scalability of service fabric calls that can do multiple data analysis and return calculations simultaneously with GPU processing. Microsoft's partnership with NVidia and platform utilizing Lucene syntaxes with service fabric nodes creates many endless possibilities for solutions. The major problem is you are stuck with that certain syntax that you have to create a score identifier for specific jobs you want the machine learning to use or boost, which is being upgraded to an internal more efficient training program for the "brain". As soon as you customize the queries or API calls, you begin to get different results per query, you may even have to code around on the front-end to return certain results you want creating a complexity and non-scalable code base for unit testing.

The Vega application that is not limited to the just the syntax of learning, but instead is configurable and intuitive for whatever the user expects from a company is developing in performance, security, or updated technology. In our vision we want to utilize CPU and GPU processing for calculations but make a platform that can easily combine possible algorithms to meet the users need. In doing so we need to take indexed secure data to break down simplicity and allow configurable algorithms.

This is the power of creating an open integration platform (OIP) and even shared code solutions that we want to resolve especially in the blockchain technology world. Blockchain to us is just a stepping stone into the future, but using machine learning to decipher jobs sent through blockchain is next level utilization of the best technology. Microsoft nor Google can be used to do this efficiently and decentralized. Which is why Vega AI is dedicating our code, starting from scratch with our software for all upcoming businesses that want to utilize machine learning with little to no knowledge at all on how to do so. This is quite the effort, but we have already done our research on how to implement it in a timely manner with user-friendly applications. Even a simple intuitive interface or IRC that processes natural language and sets parameters can teach our AI "brain" everything needed with little to no effort at all to set the process up.

We as company believe there is no blockchain advancement without machine learning. Those that use the idea of a "Super Computer" to control all AI machine learning are mistaking the process of product ownership and specific user-driven functionality that can apply to ML methodologies. We want



to be different and focused on one area for now to create different “brain” or intelligent shared networks for each software company’s needs! Many solutions can be applied to improve performance, functionality, auditing, or security. The power of machine learning and capabilities are endless.

## Machine Learning areas and algorithms

Machine learning is a maturing discipline that uses advanced math to optimize data sets by using training data and then going through iterations to improve its models. It has been used to train computers to not only play games but find the optimal way to win at those games. A few examples would be Chess and the popular strategy game called Star Craft. Machine Learning is so flexible that we can apply it to a multitude of problems like predicting pricing and variables like house size vs price or when to sell or buy any type of stock. In this case the focus will be applied to investors in the Cryptocurrency arena. Due to the high volatility of currency trading Machine Learning is the perfect set of tools to analyze the trading data and make some very potentially profitable decisions for the investor and his peers. Machine Learning can outperform a single person or even a company dedicated to investing because it can find patterns that only a computer can possibly do. There are various algorithms that we can utilize such as learning machine training methods like decision trees, Ordinary Least Squares Regression, Logistic Regression, Support Vector Machine, gradient learning and Q-learning. In the unsupervised learning space, we can utilize Clustering algorithms, Principal Component Analysis, Singular Value Decomposition and Independent Component Analysis (Le, 2016).

Natural language processing (NLP) is also a sub area that allows the user to submit free text searches or analyze documents for keywords and other useful information. NLP is important because the currency and trade bots will need the ability to interact with the user or group of users which is why we have decided to include this area in our system. A well-known NLP algorithm named Gradient Descent is also an optimization algorithm used for determining predictions with data like house size vs pricing or other variables. There are many APIS on the market and we plan to utilize as many as possible.

## HFT App Challenging Ideology – Very Original Approach

We are building this application which is only one of the many around criticism, speculation, and efficiency. We plan to eradicate and solve all of those main concerns with a multitude of machine learning algorithms and credible risk management from them. As an believer and buyer myself, my company wants to rely on this as a central open information system that is analyzed over historical time and stays current with latest fluctuations to build my portfolio. Our company for this specific application, the HFT app from Vega will be tailored towards the real market and the optimistic technology funding of all credible, reliable, and transparent profitable opportunities. Our company has people just like you daily that has the same concerns and looks for solutions.

We are the solution to a multitude of problems on the market today. Not only are we implementing machine learning to assist our portfolios, but we plan to bring in expertise into our software from a certified financial advisor. Then we allow open-source algorithms proven to work within our platform to reduce the risk of and improve the analytics of user-driven quality for a single portfolio management software. To summarize, we believe in technology that is not speculation-based, we provide the best options for you as a buyer to feel confident in the community that is infinite in creation as far as we all believe. There is no ceiling to improvement. We firmly believe we can decipher the good

technological ideas from the bad unworthy ones. At the same time we want you to feel the media and market trends do not have as much of a drastic effect on your Vega belief as other tech savvy companies. We want to be independent and reliable with shared information. We also hope that you grow your value with us and ideology in doing so.

## Vega Token

Vega is a token fueled by ETH that will help our developers stay motivated toward future application releases. The token will utilize the Smart Contract system which can be transferred from peer to peer and within our own ecosystems. This token allows token holders to have influence and stake within the Lyra network for utilizing all upcoming features and contributing towards the development. This also allows us to create many systems around improving our own open-integration contributions by offering resolution bounty systems. Our goal is to adhere to as many demands as we can process on the improvement of the platform. The Vega token will in the future will support other smart contract systems.

## A Summary of HFT Application – Why Contribute?

We are unique in our idea of valuing the transparency, credibility, and risks into our software that is both user-driven and scored by the AI machine itself. We plan to implement and build upon many features in our platform to support that idea. You may or may not have seen that with the power of machine learning for making predictions and why you as the supporter should partner with us to build this system to analyze the crypto currency market. Our solution will go beyond the normal standards of analyzing crypto currencies and leverages a decentralized/P2P model in which machine learning plays a critical role for every day investors and speculators in the markets.

We are excited to work on this opportunity and we look forward to working with you. Our plans are to create a platform with open integration, user-powered reviewing systems, and explore the most optimal solutions using machine learning to solve our everyday cryptocurrency, personal, and business problems. Artificial intelligence is the future, and we hope to consult or program platforms around that. We appreciate your best interests. Please feel free to give any criticism or feedback to improve our systems on a daily basis. Our goal is performance and hands-free automated usability configured by each user through intuitive applications. We hope to speak with you all soon and take your suggestions and criticism into consideration. We are solving the internet and everyday life by utilizing Lyra Neural Network to integrate with multiple platforms and affiliate companies and use Vega AI and the brain to create everyday complex infrastructure yet simple solutions to the user of software.

## Disclaimer

Statement of Purpose The purpose of this document is to share information about the operation of Vega Intelligent Solutions, LLC: the merchandise ad network, and to introduce Vega coin as the recipient considers partnership or participation in the sale or pre-sale of Vega coin. There is sensitive information enclosed and it is understood this packet will be used solely for the aforementioned purpose. It is not for public consumption or consideration. Forward-Looking Statement Disclaimer Certain matters discussed in this document are about our future performance including, without limitation, the future revenues, earnings, strategies, and prospects of Vega Intelligent Solutions, LLC. All statements that are not purely historical constitute “future-looking statements” within the meaning of the Private Securities Litigation

Reform Act of 1995. Such forward-looking statements are subject to one risks and uncertainties which could cause actual results to differ materially from those anticipated. Such statements are based on management’s beliefs as well as assumptions made by and information currently available to management. When used herein, the words “anticipate,” “intend,” “estimate,” “believe,” “expect,” “should,” “potential,” “forecast,” “project,” variations of such words and similar expressions are intended to identify forward-looking statements. Readers are cautioned not to place undue reliance on these forward-looking statements in making any personal decision. Disclaimer The Securities Act of 1933 sec. 2 (a) defines “security” as: “any note, stock, treasury stock, security feature, security-based swap, bond, debenture, evidence of indebtedness, certificate of interest or participation in any profit-sharing agreement, collateral-trust certificate, preorganization certificate of subscription, transferable share, investment contract, voting-trust certificate, certificate of deposit for a security, fractional undivided interest in oil, gas, or other mineral rights, any put, call, straddle, option, or privilege on any security, certificate of deposit, or group or index of securities (including any interest therein or based on the value thereof), or any put, call, straddle, option, or privilege entered into on a national securities exchange relating to foreign currency, or, in general, any interest or instrument commonly known as a “security,” or any certificate of interest or participation in, temporary or interim certificate for, receipt for, guarantee of, or warrant or right to subscribe to or purchase, any of the foregoing.” The Vega coin or token is not an investment-grade security of any kind. The Vega coin is a digital token for participation and use of the Vega Intelligent Solutions, LLC and Lyra Neural Network merchandise advertisement network and does not confer ownership of a stake in the business. In recognition of the fact that the United States government has not provided guidance or law around the sale of digital tokens, we believe it best that United States-based individuals do not participate in the purchase of Vega coin. It is generally to be used by the partners, brands, vendors, and publishers who are a part of the Vega Intelligent Solutions, LLC merchandise ad network, described herein.

Sincerely,

Brian Carter  
CEO Founder, Architect Manager  
Vega Intelligent Solutions, LLC

## Contacts

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| Website    | <a href="http://www.vegais.com/">http://www.vegais.com/</a>                                       |
| Affiliates | <a href="https://novusphere.io/">https://novusphere.io/</a>                                       |
| Roadmap    | <a href="https://goo.gl/A4STKb">https://goo.gl/A4STKb</a>   |
| Twitter    | <a href="https://twitter.com/VegaAISolutions">https://twitter.com/VegaAISolutions</a>             |
| Facebook   | <a href="https://www.facebook.com/VegaAISolutions/">https://www.facebook.com/VegaAISolutions/</a> |
| Discord    | <a href="https://discord.gg/V7ejpEg/">https://discord.gg/V7ejpEg/</a>                             |
| Medium     | <a href="https://medium.com/@VegaAISolutions">https://medium.com/@VegaAISolutions</a>             |

## References

Anonymous, 2017, IPFS.io articles retrieved from <https://ipfs.io/>

Le, James kdnuggets.com 2016 article retrieved from

<http://www.kdnuggets.com/2016/08/10-algorithms-machine-learning-engineers.html>

Shin, L. 2015, Forbes.com retrieved from

<https://www.forbes.com/sites/laurashin/2015/12/31/want-to-own-bitcoin-heres-how-to-buy-invest-in-and-store-it/#33fa0f26b9ef>