

# TRADING SYSTEM FOR CRYPTOCURRENCIES: PROJECT ENZO

**EB**

Document V1.2

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## Our Goals

The objective of ENZO is to produce a fully-autonomous trading system, specialized in trading cryptocurrencies for a profit.

Our goal is to start showing profits within a few months of operations, while working on increasingly advanced trading algorithms and types of trades, as the internal research and development continues.

We plan to leverage the team's extensive development experience in the world of high-performance real-time applications and financial applications, to realize a trading system that is capable of earning profits on a daily base initially, and at high-frequency (intra-minute) as a future potential goal.

## Reasons for a Trading Bot

Autonomous trading has increasingly been taking over much of the day trading activity. While it's still possible for a person to be successful at day trading, it's undeniable that it's a very time-consuming and error-prone.

Nowadays, most human traders are better off working with positions that are weeks or months long, where fundamental human knowledge and in-depth market research can truly give an insight on future events to unfold. In the specific case of cryptocurrencies, however, it's not clear that long-term positions can be held with enough confidence, due to the generally unstable situation of the market.

Price volatility means potential high rewards but also potential high risk, that can only be mitigated by constant monitoring of the market 24/7. Furthermore, with certain popular cryptocurrency exchanges, during critical peaks of action, human reaction is often impaired by server overloads that can render the UI inoperable, making it harder to get out of a dangerous position or to lock-in a profit.

For these reasons, we believe that it is safest to operate with an automated system, at intra-day frequency or higher.

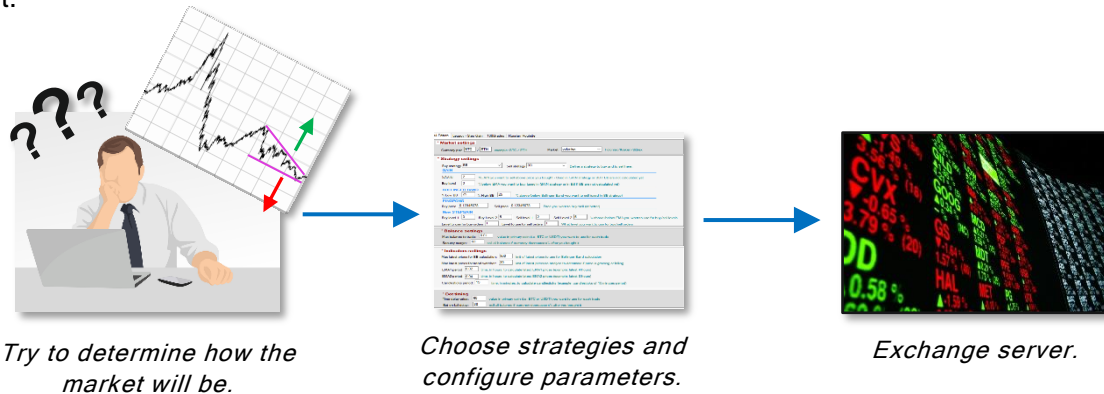
## Advantages of ENZO

Algorithmic trading is nothing new and it's a very well-developed field. However, while there's much knowledge on the general concepts, individual solutions are kept confidential, because they can easily be exploited by the competition. For this reason, closed internal R&D is necessary to truly obtain an efficient system.

## Truly Autonomous

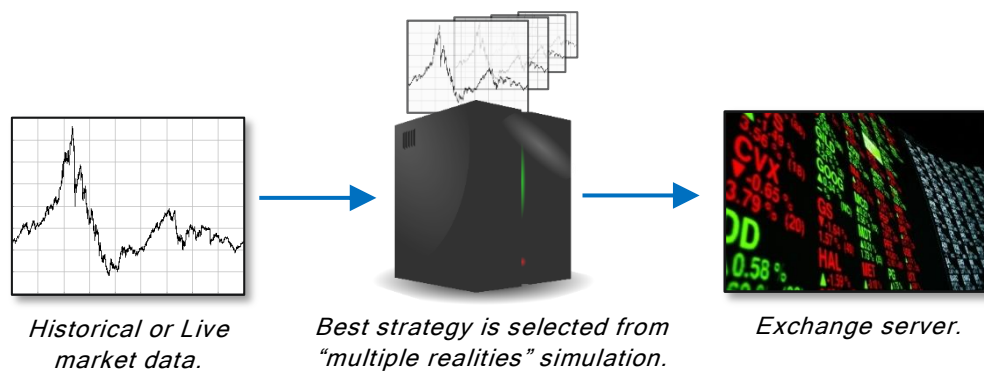
We decided to focus on the cryptocurrencies because the market is new, volatile and there is a relative lack of competition.

Commercial and even open-source trading bots for cryptocurrency already exist but they are extremely simple in nature, requiring a human to analyze the ongoing market and to respond by manually selecting algorithms and choosing from a slew of parameters, that he or she feels may turn a profit.



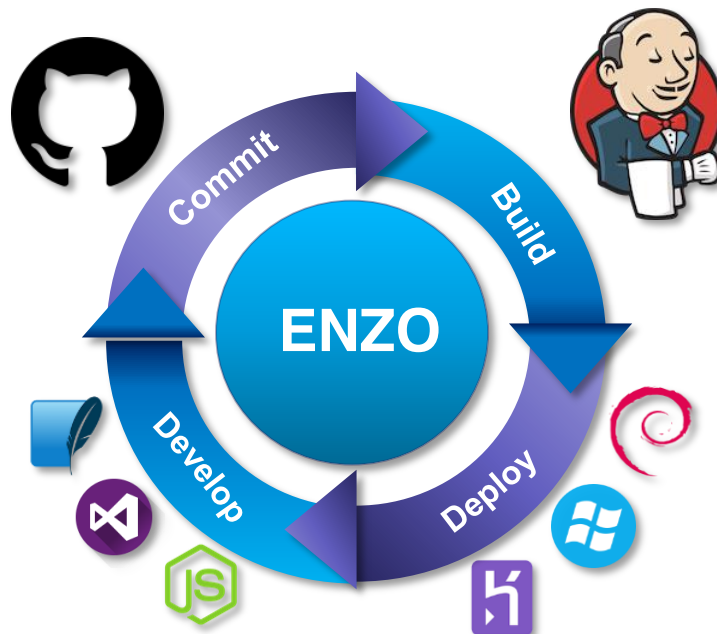
What we offer, instead, is a truly autonomous approach with elements of Machine Learning. We build fundamental algorithms based on certain indicators and through techniques of signal filtering. However even the best algorithms need to be adapted for new and evolving market situations. It is then essential to tune algorithms and their relative parameters constantly, both with recent historical market data, but also during live trading.

We use an agent system that constantly judges the performance of each possible algorithm and its hyperparameters and selects the best performer for the next trade. A manager spawns multiple variations of the same algorithm and simulates their performance in real-time. When an algorithm claims that it would have fared better than the current one trading, that algorithm is transferred from the simulation to live-trading. Meanwhile all the existing simulations continue to be performed in the background.



## A Solid Back-end

Another critical piece of technology of ENZO is the back-end infrastructure that we built to automate and simplify the development. At the core, there is a dedicated continuous-build system that constantly generates and tests fresh builds. This system also periodically gathers market data and readies them for further testing. The ability to continuously test performance on past and recent market data is an essential building block both to maximize stability of the software and to improve the final market performance.



A dedicated Linux VM utilizes Jenkins to perform continuous integration, as well as periodically updating an internal database of market data, utilized to back-test our algorithms.

The VM setup is tracked on an independent Git repository, as well as being periodically backed-up, for extra safety.

## The Team

Such a project is only possible with a team that is capable of both developing complex software and advancing internal independent R&D.

We believe that our background in IT, finance, high-performance computer graphics, signal processing and aeronautical engineering, gives us plenty of tools to tackle the field, as demonstrated by the quick results obtained in the first quarter.

## Target Audience

We started this project to support our own trading desk. Our ultimate goal is indeed to earn directly from the system. We don't intend to open this project to the mass market, as it would generate too much similar traffic in competition to our own desk.

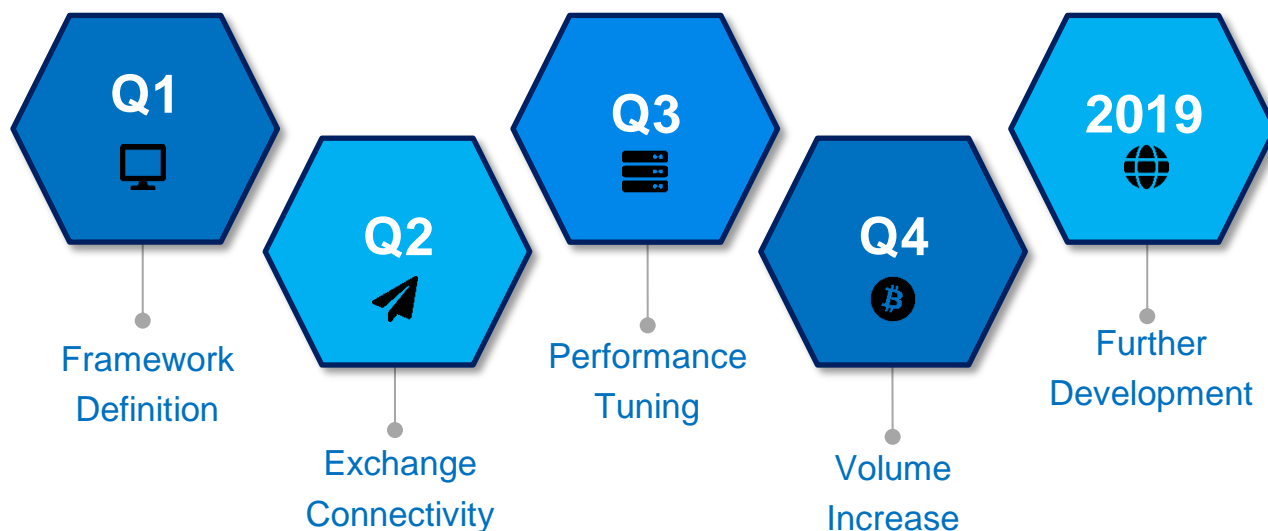
However, in order to support this early stage of development, we're now opening access to the project to selected third parties that believe in the mission of the project and that believe in the team.

Prospective investors would receive periodical builds of the system that will allow them to profit from live trading as well as performing internal back testing.

Additionally, we will provide confidential access to periodical technical reports on the findings of the team in regard to applied methods and algorithms and their relative performance.

## Development Plan

First year of activity at a glance:



## 2018 First Quarter

Actively starting from February, for Q1 we successfully set up a basic infrastructure and created a trading bot that demonstrated the potential of making a profit on the market, via back-testing on actual market data of the BTC/USD pair (our primary focus for the time being).

Potential profit is shown both in up-trend and down-trend markets. Our current simulations show average monthly returns ranging from a minimum of 3% to over 15% (simulating weekly sessions; simulation includes per-trade fees and some slippage).

Being a work in progress, results may vary sensibly based on ongoing changes, however much effort

is being made into building a system that is as robust as possible and that can give consistent returns on different types of market.

While testing, we also started implementing an exchange interface (currently for Binance). Implementation is now nearing completion, with first live trades schedule for the second week of April.

Regarding the infrastructure, we built a dedicated Linux virtual machine that manages a continuous build system for regression testing. We also started collecting and processing historical data, implementing an interface to CoinAPI, CSV parsers and ultimately an SQL database of trades and relative queries to build minute-data currently used by the bot algorithm.

Fundamental insight was gathered while doing back-testing. Many subtle details can have strong effects on predicted results. Testing in itself is a major topic that in some ways requires first-hand experience to be done successfully. We foresee more work in this direction.

During this time, we developed a couple of viable trading algorithms and recognized some major indicators that give consistent results.

We also implemented a basic Machine Learning system that allows multiple competing algorithms (competing agents) to run simultaneously in order to select the best one for the current market. The major benefit of ML that we have seen is the ability to get more consistent results with varying markets, without human intervention.

Results of those ML approaches are promising and will most likely be integrated into the first production release.

Deep Learning techniques have also been partly explored but this is a more advanced field of research that will take more research before being applied in production. The “black box” nature of neural-network-based systems means that potential risk can’t easily be evaluated by a human developer and thus additional scrutiny is necessary.

## 2018 Second Quarter

For the second quarter, we aim at having an alpha version of the trading bot, capable of autonomous operation on the Binance exchange focusing on the BTC/USDT pair.

This will still be a testing phase, as we’ll need to compare our models and simulation with actual live-trading performance. Issues such as network latency, slippage and relation of slippage to volume traded, will need to be accounted for and integrated both in the models and utilized to perfect the simulation infrastructure.

General improvements to testing, basic algorithms and Machine Learning will also be required. ML should also both be applied off-line, for general training and tuning of algorithms, and also on-line, to further improve reaction to the market.

## 2018 Third Quarter

By the third quarter we should have a working system capable of turning consistent profits, albeit at limited volume.

Priority at this point should be on tuning the system for performance and robustness on the preferred pair (BTC/USD). At the same time, we should start exploring other potential pairs in order to allow a more diversified portfolio.

Additional research in ML and the fundamental algorithms, will be important to move to the next level.

Support of one other major exchange service would be ideal. However, this will also depend on the resources available to the team.

## End of 2018

By the fourth quarter, we expect to have a robust system capable of bringing consistent profits of trades with considerable volume.

On and beyond the fourth quarter, there are many aspects which we'd like to explore. Such as "market making" arbitrage systems, intra-minute high-frequency trading, sentiment analysis, a market screener capable to riding instant opportunities, further work on Deep Learning, usage of GPU-based high-performance computing and more.

At the base however, there'll be fundamental research on trading algorithms and optimization. Constant improvements and adaptations will be necessary.

The degree of improvements will depend however on the financial support that we receive both from direct trading with the system and externally.



# Founders

The ENZO Trading System project was founded in February, 2018, by Davide Pasca and Marco Azimonti.

**Davide Pasca (45)** has worked professionally from the age of 18 as a software engineer. In 1995, five years into his career in Italy, he moved to the United States to work in the videogame industry, focusing on 3D engine development, game console hardware emulation and image compression.



In 2001 he moved in Japan where he currently resides. In 2009 he left his R&D Lead position at Square Enix and founded OYK Games, an independent game development and publishing label focused on high-quality 3D and VR mobile titles and flight simulators.

Davide's major skills are in low-level, high-performance code optimization and real-time 3D graphics. He also has a strong knowledge of image compression algorithms, VR, 3D animation, flight simulation and first-hand experience with small business management. His language of choice is C++. His main interests are in technology, engineering and physics.

Spoken languages: Italian, English and Japanese.

See more at: <http://linkedin.com/in/dpasca>

**Marco Azimonti (40)** is an Aerospace Engineering graduate from the Polytechnic University of Milan. After a brief stint at Rolls-Royce UK as an Industrial Trainee, he moved to Japan, to work as a Graduate Researcher on rocket propulsion at the University of Tokyo.

He has worked in finance since 2003 and he's currently Head of Organization and Methods at BNP Paribas Securities.

Marco has a strong background in mathematics, physics, engineering and computer programming as well as proven experience in the world of finance, as a program manager, covering all aspects of corporate and investment banking. He's also highly skilled in Linux systems administration and security.



Spoken languages: Italian, English, French and Japanese.

See more at: <http://linkedin.com/in/marcoazimonti>

An aerial night photograph of a city skyline. The image is dominated by several tall, modern skyscrapers with their windows glowing with warm yellow and white light. The buildings are set against a dark, clear night sky. In the foreground, a large, dark blue rectangular box is superimposed over the image, containing white text. The overall scene conveys a sense of a bustling, modern urban environment at night.

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