

## PROPOSITION OF A TRADING BOT FOR CRYPTOCURRENCY MARKET

### KRİPTO PARA PİYASASI İÇİN ALIM SATIM BOTU ÖNERİSİ<sup>1</sup>

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#### Abstract

Blockchain technology opens up new business opportunities, and the market capitalization of the industries it connects has been growing quickly in recent years. As cryptocurrencies gain popularity, trading them are growing in importance. Due to the market's great volatility, trading carries a very high risk, and many new traders face financial losses. Furthermore, seasoned traders are unable to work nonstop and thus, lose out on some trading opportunities. The aim of this study is to design a trading bot for the cryptocurrency market. There are currently a lot of trading bots in use on the crypto exchange markets. They never pass up a trading opportunity that comes around in a day. Both new and seasoned traders can use automated trading bots, depending on their needs. However, most of these bots are not free to use and their free features are very limited. This study aims to fill this gap by designing a free trading bot for the cryptocurrency market. MACD and RSI indicators will be used while designing the trading bot. As a result, a simple bot which both new and seasoned traders can easily use will be available.

**Keywords:** cryptocurrency market, trading bot, blockchain, system development

<sup>1</sup> Özgün Makale

## Özet

Blockchain teknolojisi yeni iş fırsatları yaratmaktadır ve bağlantılı olduğu endüstrilerin piyasa değeri son yıllarda hızla artmaktadır. Kripto para birimleri popülerlik kazandıkça, bunların ticaretinin önemi de artmaktadır. Piyasaların büyük değişkenliği nedeniyle, alım satım çok yüksek bir risk taşır ve birçok yeni yatırımcı finansal kayıplarla karşı karşıyadır. Ayrıca, deneyimli yatırımcılar durmaksızın çalışamazlar ve bu nedenle bazı alım satım fırsatlarını kaybederler. Bu çalışmanın amacı kripto para piyasası için bir alım satım botu tasarlamaktır. Şu anda kripto borsalarında kullanılan çok sayıda alım satım botu mevcuttur. Bunlar gelen bir alım satım fırsatını asla kaçırmazlar. Hem yeni hem de deneyimli yatırımcılar, ihtiyaçlarına bağlı olarak otomatik alım satım botlarını kullanabilirler. Ancak bu botların çoğunun kullanımı ücretsiz değildir ve ücretsiz özellikleri çok sınırlıdır. Bu çalışma, kripto para piyasası için ücretsiz bir alım satım botu tasarlayarak bu boşluğu doldurmayı amaçlamaktadır. Alım satım botu tasarlanırken MACD ve RSI göstergeleri kullanılacaktır. Sonuç olarak hem yeni hem de deneyimli yatırımcıların rahatlıkla kullanabileceği basit bir bot mevcut olacaktır.

**Anahtar Kelimeler:** kripto para piyasası, alım satım botu, blockchain, sistem geliştirme

## 1. Introduction

Blockchain technology launches new business options, and its connected industries' market capitalization has been expanding rapidly in recent years. Markets for cryptocurrencies are becoming more significant as they gain acceptance. Assessing the viability of the cryptocurrency ecosystem and how design decisions impact market behavior can be aided by understanding the dynamics of these marketplaces. Dramatic swings in traders' desire to purchase or sell are one existential threat to cryptocurrencies. Trading is an extremely risky job due to the tremendous volatility of the cryptocurrency market, and many inexperienced traders lose money. Additionally, experienced traders are unable to work around the clock and miss out on some trading possibilities (Andrianto and Diputra, 2017; Krafft et al., 2018).

Automated cryptocurrency trading bots are a group of computer programs designed to automatically execute pre-established trading strategies by submitting sell or buy orders to exchanges on behalf of their users (Jazayeriy and Daryani, 2021). Numerous trading bots are now in use on the crypto exchange markets. They never miss a trade opportunity within a day. They also never give in to human emotions like fear, greed, or any other. Depending on their demands, both novice and experienced traders can employ automated trading bots (Jazayeriy and Daryani, 2021). Most of them work with follow orders. It is focused on performing a purchase or sell transaction based on data from technical indicators when circumstances are met.

It is critical to trade the stock market using financial technical indicators. In this study, some of the most prevalent indicators will be used to create more accurate predictions and boost profits. RSI (Relative Strength Index) and MACD (Moving Average Convergence Divergence) will be used among these countless indicators. The bot will be trained on previous data by adding these indicators and using algorithmic methods. The learning process takes time, but trained algorithms perform better and faster than human beings in the end.

The major exchange platforms where anyone trades, such as Binance, aim to blow up these bots on a regular basis. As a result, it appears that trading bots with huge volumes that use a simple strategy over a lengthy period will struggle to outperform these markets.

In this study, the aim is to construct a lay low trading system for the crypto exchange markets. In order to avoid blowing up the system in exchange platforms, huge volumes are not going to be handled instead the focus will be on low volumes with more trades to close the gap. Previous data will be used to train the system and to try to outperform the market. The user will be provided with the opportunity to choose the crypto coin they want to use. In addition, it will have the ability to choose the period to open a trade with the indicators it will use. Moreover, it will be free to use since many trading bots are not free.

By integrating the risk reward system, the user's gain and loss will be kept on a certain scale and possible dangers will be minimized. Since transactions are opened via Binance API, there will not be any security problems. It is a known fact that Binance is the most reliable exchange platform, besides, since the volume used by the trading bot is negligible, the probability of the trading account being blown up by the Binance system is minimized.

The study is structured as follows. Next section explains the other trading bots in the market along with the literature available. Third section mentions the methods. Fourth section states the design and architecture of the trading bot and finally, last section discusses the conclusions.

## 2. Literature Review

Crypto market is very young since bitcoin theory was suggested in 2008 (Nakamoto, 2008). There are other trading bots available in the market but many of them are not very free. In addition, they still need more effort to reach higher quality since the market is still very young (Bigiotti and Navarra, 2018). Below are the most used platforms with trading bots for the cryptocurrency market.

### 2.1 Crypto Trading Bots in the Market

Pionex is a cryptocurrency exchange with built-in trading bots. There are 18 different trading bots to choose from, and registration is free. These bots allow customers to automate their investing approach so that customers don't have to keep an eye on the market all the time. Pionex offers reduced trading commissions as well as a fully functional mobile app. Pionex is an excellent choice for high-volume, mobile investors. Pionex's major offering is their trading bot selection, which facilitates manual trading via crypto-to-crypto conversions. When precise, pre-defined market conditions are met, a bitcoin trading bot is an automated program that executes buy and sell orders without the need for manual input (Pionex.com). However, the downside of Pionex is that there is no demo account so it may be difficult for beginners to learn trading and test their strategies.

Coinrule's collection of preset trading methods are difficult to top when it comes to delivering the most options. Users can tailor their investments with more than 150 trading templates that are automatically performed when market conditions meet predefined criteria. Coinrule is regularly adding new templates to its platform, ranging from accumulating to long-term holding techniques and stop-loss settings (Coinrule.com). The downside of Coinrule is that only the starter package is free, and it doesn't work with smaller exchanges.

Cryptohopper is a trading bot that is available 24 hours a day, 7 days a week and runs purely on cloud storage. When customers rely on a bitcoin trading bot, even brief periods of inactivity can result in lost gains. This means there is no downtime for the bot, and updates are delivered without disrupting customers trade or putting customers account on hold. Customers Cryptohopper account will continue to function even if your network is down (Cryptohopper.com). However, the free mode of Cryptohopper is very limited in functionality making it difficult for beginners to learn trading and test their trading strategies.

Wunderbit is a certified Estonian-based bitcoin exchange, regulated, and accredited cryptocurrency trading platform. Clients can purchase and sell Bitcoin safely and securely at the best exchange rates through the organization. WunderBit supports social trading, so the users can sign up as a trader or an investor. Investors might hire other users to manage their investments, if the users register as a trader. As an investor, customer can choose to follow one or more traders and duplicate their trading techniques in exchange for a commission deducted solely on profitable trades (Wundertrading.com). Similar to Cryptohopper, the free mode of Wunderbit is also very limited in functionality.

## 2.2 Related Literature

The appeal and value of Bitcoin and other cryptocurrencies are fundamentally based on blockchain technology. As the name suggests, a blockchain is a network of connected blocks, or an electronic ledger. Each block consists of a group of transactions that have all been individually verified by each network participant. Since each node must validate a new block before it is verified, it is nearly impossible to fabricate transaction histories (Nakamoto, 2008). An online ledger's contents must constantly be approved by the whole network of the computer or node that maintains a copy of the ledger.

Since cryptocurrencies make it simpler to transfer money between two parties without the use of a reliable third party like a bank or credit card provider, they have emerged as the newest trend in investment and money management. Such decentralized transfers are secured using public and private keys, as well as various incentive programs like proof of work and proof of stake (Nakamoto, 2008).

The industry that was traditionally dedicated for trading stocks or other traditional market securities has experienced competition from an emerging crypto market, with Bitcoin leading the way as the most valuable asset storage (DeVries, 2016). Hundreds of different cryptocurrencies are currently accessible for trading. As a result, there is a lot of volatility, which implies that money can be easily made and lost.

“Investors who experienced more intense emotional reactions to gain, and loss were poorer performers than those with more attenuated emotional responses.” (Fenton-O’Creevy et al., 2012). This reminds that in order to improve as a trader, one must learn to control his/her emotions. This can only be done with any sense of certainty if the human factor is removed from the equation. If it an environment where one has more control over the result can be created, more profits can be made in the end. Thus, trading bots started to become popular to automate trading and remove the human factor. There are many trading bots available in the market but unfortunately, there are not many scientific studies related to crypto trading bots.

Jazayeriy and Daryani (2021) has a study on developing a trading bot for the cryptocurrency market. The authors of the research suggest a bot that can purchase and sell utilizing a dynamic price-action technique. The proposed bot successfully used the traditional price-action technique for trading in bitcoin markets, according to experimental data from back-testing. Fibonacci numbers were applied to narrow the search space for the optimal parameter values in the suggested algorithm. To determine the parameters' ideal value, a more precise and thorough analysis is required because their study was a limited one.

Krafft et al. (2018) made an experimental study of the market dynamics of cryptocurrencies. To investigate how susceptible traders in these markets are to peer influence from trading behavior, researchers ran an online experiment. Over the course of six months, they developed bots that carried out over 100,000 transactions in 217 cryptocurrencies for less than one cent each. They discover that each every "buy" move resulted in a rise in purchase-side activity that was hundreds of times larger than their interventions in the short term.

## 3. Methods

A technical method to trading heavily relies on monitoring of a set of data signals known as technical indicators. In order to cope with the quick speed shifting of market price, they are created by aggregating security data using specific mathematical formulas (Chen, 2021). This makes it quicker and more complete for one to pick out the trend and price movement of a security from a brief look. Relative Strength Index (RSI) and Moving Average Convergence Divergence (MACD) are two of the most popular indicators. Traders often decide which ones to employ based on their objectives and chosen techniques. The RSI and MACD indicators are used in the experiments conducted for this study.

In this research, trading choices are made using two different approaches: conventional trading indicators and an algorithmic learning model that predicts the price and then acts accordingly. In this study there are 4 actors. First of them is customer who is the only human being. The second actor is Binance, the exchange platform. The third actor is the trading bot which is the center of the study where the data is compared. The fourth actor is the e-mail which the customer gets the information when the conditions are met. There are 5 cases that are used in the study. First step is getting the API from Binance and entering this API to the trading bot. Second step is the trading bot gets the data from the cryptocurrency exchange platform Binance. In the third step the customer enters the settings of the indicator. The fourth step is that the trading bot compares the data it gets from Binance with the chosen settings from the customer. The fifth and last step is, if the conditions are met the trading bot sends a signal through e-mail to the customer. Figure 1 below shows the use-case diagram.

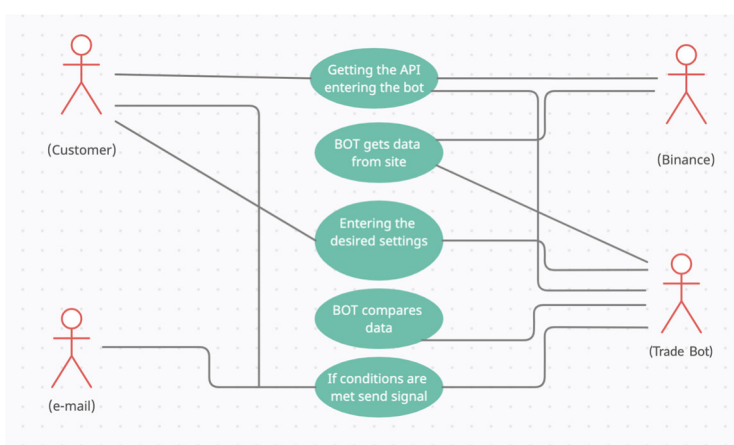


Figure 1. Use- Case Diagram

#### 4. Design of the Study

##### 4.1. System Architecture

PyCharm uses a Python script to interface with the Binance API, which is how this study works in general shown in Figure 2. This is a back-and-forth situation. The exchange is used to get the pricing data. After that, the trading bot uses the RSI to determine where the price is. The trading bot examines the RSI to determine whether the current price is closer to the middle band, upper band, or lower band. It then locates various scenarios. It sends an email to the user once it gets a signal. The python script handles this process. The purpose of this email is to let the customer know instantly so that s/he does not miss the opportunity of making the transaction. The script is run every minute since it trades on the minute chart.

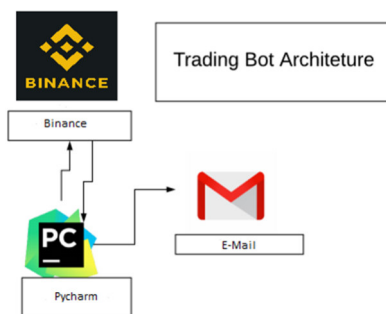


Figure 2. System Architecture

#### 4.2 Detailed Architecture

There are two classes, 'Customer' and 'Strategy'. The Customer class contains two functions: one that retrieves the customer's API address and another that creates the connection.

In the other class, 'Strategy', there are 3 functions, the first of which is the indicator function. The indicator to use is chosen in this function. In the second function, the mathematical formula is applied to the selected indicator. Lastly, the third function ensures that the received data is processed with indicators.

Apart from these, there is a function that pulls information from the file where the API is saved, and there is a function where the time frame can be selected together with the parity to be traded. There is another function that allows to extract the graph, and finally, there is a function that sends this graph via e-mail.

#### 4.3 Interface Design

The below figure shows the interface of our trading bot. It is the 1-minute chart of Bitcoin with MACD indicator. As it can be seen from the figure, there are green and red dots. Green dots represent the moment the end user needs to buy Bitcoin because it will go up and as opposed, red dots represent the moment the end user needs to sell Bitcoin because it is expected to go down.

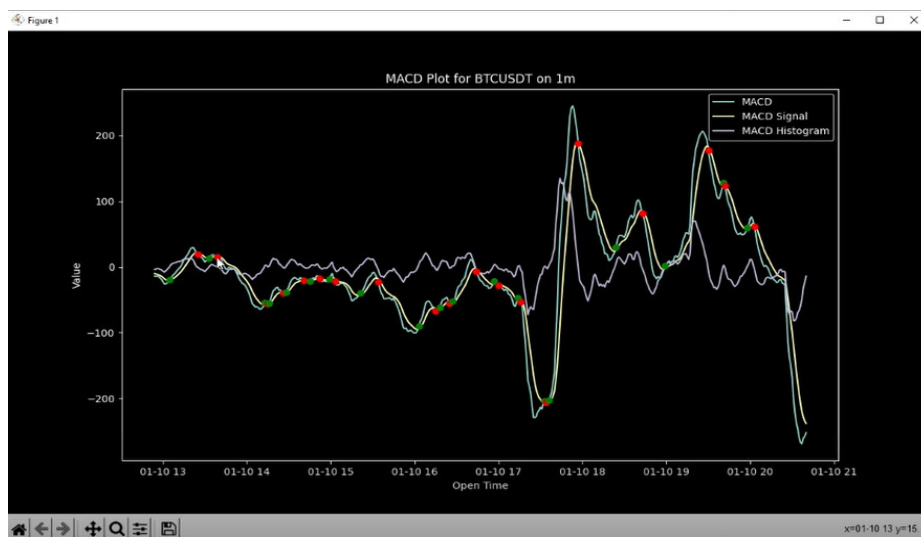


Figure 3. MACD Plot for Bitcoin

Below Figure 4 shows the actual graph of Bitcoin for the same time frame and it is almost the same with Figure 3, the one which the indicator predicted. According to this comparison, it can be understood that the trading bot is reliable.

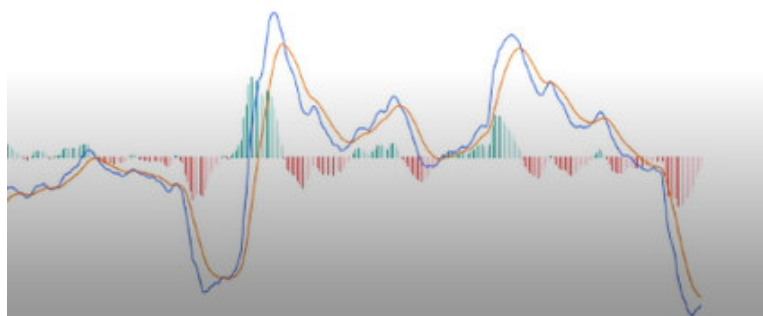


Figure 4. Actual graph for Bitcoin

## 5. Conclusion

The trading bot did make a profit in the end, although it was a modest profit. A few changes had to be made to this design to increase the profit. For example, many additional trades can be set up. This trading bot's parameters are set to sell every time it makes a 1% profit. This is a rather insignificant profit but over time, these 1% profits will accumulate and expand the portfolio. However, even 1% profit will satisfy the user due to the increased transaction volume.

Other studies can make changes with time that will offer the users a broader perspective. As a result of the percentage rates of the trades made before, other studies can change the risk reward rate up to date. In this way, the opportunity to find less risky trades can be found, so higher profitable trades can be released. The 1% profit rates received per transaction can be replaced by 2%- 3% profit rates by time.

The limitation of this study is that only 2 indicators were used for this study. Other studies may also try to repeat the study using different indicators. In order to prevent the previously described blow up strategy from being caught by the growing trading volume, other studies can open a variety of trades using indicator combinations for which the winning rates should be updated. In this way, the volume will not be collected in a single transaction but will be shared among different currently changing transactions.

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