

# Automated Liquidity-Detection Trading on the Ethereum Network: An Innovative Approach to Maximizing Profits

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## 1 Introduction

Cryptocurrency is becoming an increasingly popular way to invest and trade. However, the high market volatility can make it difficult for traders to make timely transactions. In this project, I aimed to solve this problem by creating a system that enables the instantaneous execution of smart contracts on the Ethereum network. Specifically, the system will call a pre-deployed smart contract with user-specified arguments upon detecting desired liquidity pool addition.

## 2 Ethereum

Ethereum is an open-source, decentralized blockchain platform that enables the creation of smart contracts and decentralized applications (DApps). It was created by Vitalik Buterin in 2013 and is powered by the cryptocurrency Ether (ETH). Ethereum allows developers to create smart contracts that execute automatically when certain conditions are met. Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code.

## 3 Smart Contracts

A smart contract is a self-executing contract with the terms of the agreement between buyer and seller being directly written into lines of code. They are designed to facilitate, verify, and enforce the negotiation or performance of a contract. Smart contracts allow for the automation of many traditional contract functions, such as payment processing, and can be used to execute complex financial transactions without intermediaries. Smart contracts are a fundamental building block of many decentralized applications on the Ethereum network.

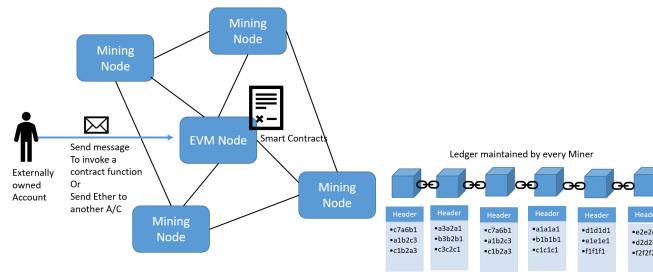


Figure 1: This is the caption

## 4 Liquidity Pairs

In automated market markets, liquidity refers to the ease with which an asset can be bought or sold without significantly impacting the price. Liquidity is an essential concept in the world of cryptocurrency, as it affects the market's ability to absorb large buy or sell orders without causing significant price fluctuations. Liquidity providers are individuals or entities that provide liquidity to a market by placing orders to buy or sell assets.

In a liquidity pair, two assets are paired together to provide liquidity to the market. For example, a common liquidity pair on the Ethereum network is ETH/USDT. This means that Ether (ETH) and Tether (USDT) are paired together to provide liquidity to the market. Liquidity providers can earn fees

for providing liquidity to a market, as traders pay a small fee to trade on the market.

## 5 Maximizing Profit with Liquidity Pools

In the world of cryptocurrency, early purchases can often benefit buyers by allowing them to acquire assets at a lower price before they become more widely adopted. This is because as demand for an asset increases, the cost of that asset often goes up. Buyers can potentially realize significant gains as the asset price increases over time by purchasing an asset early. In addition, after a liquidity pair is added, the faster you buy a token from the pool (i.e., being included in the same block), the lower the price you get. This is because the price increases as more buyers purchase the asset. Therefore, early and fast buying tokens from the liquidity pool can potentially yield significant profits for the buyer. However, it is essential to note that liquidity pools can be volatile and require careful monitoring to ensure profitability.

## 6 Development Process

During the development process, I discovered that firing a transaction in parallel with the liquidity pool addition transaction with the same gas price and Gwei significantly increased the likelihood of both transactions being mined in the same block. This strategy helps to reduce transaction confirmation times, increase profitability, and improve overall system performance. By carefully selecting the gas price and Gwei, users can increase the chances of their transactions being prioritized by miners, thus improving their chances of being included in the same block as the liquidity pool addition transaction.

The initial version of the project used the UI of Uniswap to detect desired liquidity pool additions. Later, a WebSocket (WSS) service provider was utilized to connect to the Ethereum chain. Finally, I created a custom server that uses the Ethereum JSON-RPC API to detect liquidity pool additions and call the pre-deployed smart contract.

## 7 Server Setup

To facilitate the instant execution of smart contract calls, I remotely set up a powerful server with 128GB of RAM running the Ubuntu operating system in the US to further decrease network latency. This server is connected to the Ethereum network and is configured as a Blockchain node. I have also established a secure connection between the server and my local machine using the ssh protocol. I utilized multiple systems concepts such as Operating Systems, Computer Networks, and Database management, to minimize latency across the board and optimize server workload.

## 8 Smart Contract Execution

To execute the smart contract, I designed a Node.js program that runs on the server. This program continuously scans the Ethereum mempool for user-specified transactions. When a transaction is detected, the program extracts the necessary arguments and instantaneously calls the pre-deployed smart contract (deployed using Remix IDE) on the Ethereum network.

## 9 Success and Future Work

Starting with an initial investment of USD 300, I made over USD 400,000. This success has enabled me to work closely with one of the world's leading crypto exchanges as part of incubation to drive the project forward and bring it to new heights. This includes turning it into a user-oriented trading platform with many more functionalities like integrated price charting, pair explorer, NFT explorer, price protection, delayed transactions, and Multiswap.