

PyPouch: A Smart Contract for Simplified Aave Yield Accounting

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Abstract

PyPouch is an on-chain smart contract designed to facilitate the management of PYUSD savings by interfacing directly with Aave. Users can seamlessly deposit and withdraw PYUSD while earning yield. The contract automates yield accounting by checkpointing balances during each user transaction (deposit, withdraw, send, receive), emitting events to log interest accrued between transactions. This ensures that users can easily track their earnings on-chain without manual calculations. PyPouch provides a streamlined, transparent, and secure solution for decentralized savings management.

1 Introduction

In decentralized finance (DeFi), many users seek the ability to earn yield on their assets. Aave, a widely-used DeFi protocol, enables users to deposit assets and earn interest. However, keeping track of the yield earned between transactions can be complex. Users often require manual methods to account for interest accrued on their deposits, making it difficult to manage savings effectively.

PyPouch solves this challenge by offering an on-chain smart contract that automates the process of managing PYUSD deposits with Aave. PyPouch users can deposit, withdraw, send, and receive PYUSD, with the contract automatically calculating and recording yield accrued between each transaction. This system provides a user-friendly interface for savings management, allowing savers to focus on growing their assets without worrying about manual yield accounting.

The user interface of PyPouch, as shown below, offers essential features like depositing, withdrawing, sending, and receiving PYUSD. It also includes real-time yield tracking and transaction history.

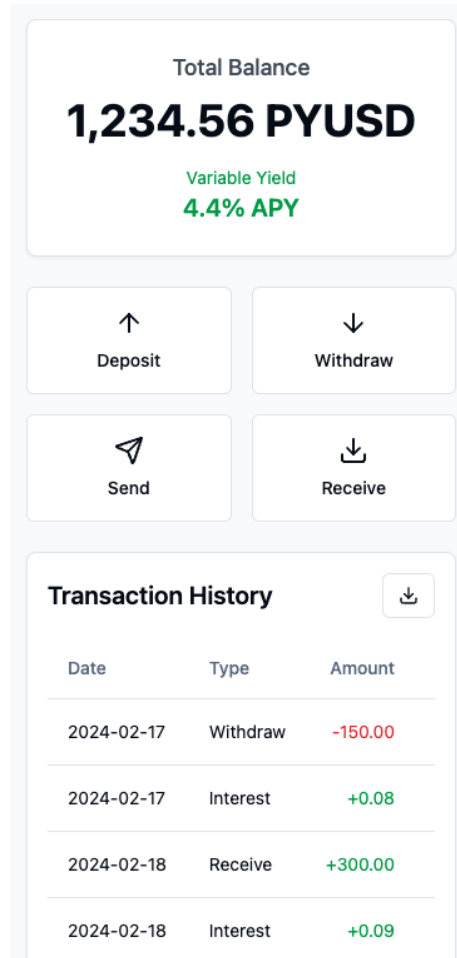


Figure 1: PyPouch Application Interface

2 Key Features

2.1 Deposit and Withdraw from Aave

Users can deposit their PYUSD into PyPouch, which automatically deposits the funds into Aave, starting the process of earning interest. Likewise, when users wish to withdraw their savings, the contract withdraws the corresponding amount from Aave and returns it to the user. This seamless interaction with Aave eliminates the need for users to manage DeFi protocols manually.

The following diagram outlines the step-by-step process of deposit and withdrawal interactions between the user, PyPouch, and Aave:

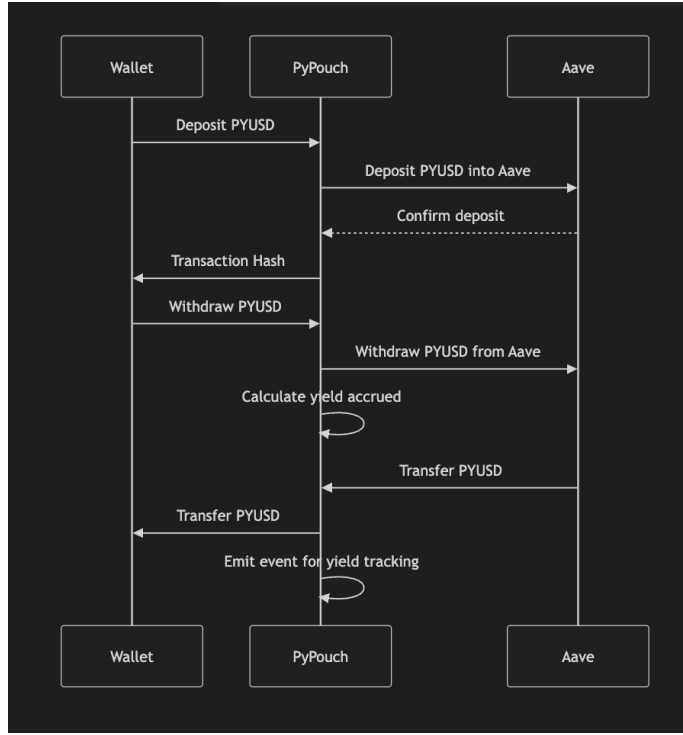


Figure 2: Deposit and Withdraw Process with Aave

2.2 Event-Driven Yield Accounting

PyPouch introduces a key feature that simplifies yield tracking by emitting an on-chain event for every user transaction, whether it's a deposit, withdrawal, send, or receive. The event logs the interest accrued since the last checkpoint, providing users with a transparent and immutable record of their earnings.

By automating this process, PyPouch eliminates the complexity associated with calculating yield. Users can confidently manage their savings without the need for off-chain calculations or external tools.

The diagram below visualizes the process of yield calculation and event emission that occurs during any transaction:

3 Architectural Design

3.1 Smart Contract Overview

The PyPouch smart contract serves as an intermediary between users and Aave. It facilitates PYUSD deposits, withdrawals, transfers, and yield tracking. The contract is designed with the following components:

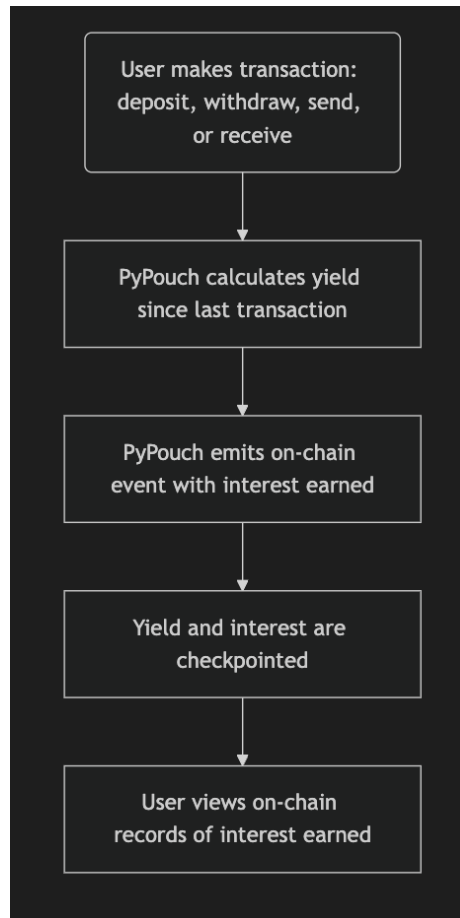


Figure 3: Event-Driven Yield Accounting Process

- **Deposit Function:** When a user deposits PYUSD into the PyPouch contract, the contract deposits the funds into Aave, beginning the yield accrual process.
- **Withdraw Function:** The withdraw function allows users to withdraw their PYUSD from Aave via PyPouch. This process includes recalculating the user's balance based on the interest earned since the last checkpoint.
- **Send and Receive Functions:** Users can transfer PYUSD to other users, either via a direct address or QR code, with the contract recalculating the balance and yield at each transaction.

3.2 Event Emission for Yield Tracking

One of the defining features of PyPouch is the emission of on-chain events. Each event is triggered by a user action (deposit, withdraw, send, receive) and logs the interest earned between transactions. This ensures users can easily track and verify their yield, with every checkpoint stored immutably on the blockchain.

4 Benefits

4.1 Simplified User Experience

PyPouch abstracts the complexities of interacting with Aave, providing a seamless and transparent user experience. Users no longer need to interact with Aave directly, and all yield accounting is handled automatically by the PyPouch contract.

4.2 Transparent Yield Accounting

Through event-driven tracking, users can verify their earnings in real-time. The on-chain record of yield accrued between transactions ensures full transparency and trust.

4.3 Secure On-Chain Management

As a smart contract-based solution, PyPouch ensures that all user actions, from deposits to withdrawals, are handled securely and transparently on the blockchain. Users retain full control over their assets, with no reliance on intermediaries.

5 Future Work

5.1 Expansion to Other Aave-Listed Assets

In the future, PyPouch will expand its offerings to support other assets listed on Aave, enabling users to deposit a wider variety of tokens beyond PYUSD. This will allow users to benefit from Aave's yield opportunities with various stablecoins and tokens, providing a more diverse savings platform.

5.2 Enable Borrowing Against Savings

A key enhancement for PyPouch in the future would be to allow users to borrow against their PYUSD savings held within the PyPouch contract. By enabling borrowing, users could maintain their savings while also accessing liquidity without needing to withdraw from Aave.

The borrowing functionality would let users take out loans using their PYUSD savings as collateral. The system could be configured to allow borrowing up to

a specific limit, such as 75% of the user’s total PYUSD balance deposited in PyPouch. This approach gives users the ability to utilize their savings more effectively while still accruing interest from Aave.

The PyPouch contract would track the user’s collateralization ratio to ensure it stays within the allowed borrowing limit, and if the value of the collateral falls too low, the contract could automatically liquidate a portion of the savings to cover the loan.

5.3 Credit Delegation and Enhanced Borrowing Power

In addition to enabling direct borrowing against savings, PyPouch could integrate with Aave’s **credit delegation** functionality, allowing third parties, such as PayPal, to delegate credit to users. Through credit delegation, PayPal or other institutional lenders could offer users borrowing power beyond the limit of their savings.

For example, PayPal could delegate credit through PyPouch, enabling users to borrow 100% or more of their savings. With this functionality, users could access greater liquidity without the need to fully collateralize their loans, leveraging the reputation and trustworthiness of PayPal as the credit provider. This feature would introduce an entirely new class of under-collateralized loans, making borrowing more accessible while still offering security through the PyPouch smart contract system.

Through credit delegation, PyPouch would act as the intermediary between borrowers and credit providers like PayPal, providing a seamless and decentralized borrowing experience while adhering to DeFi’s core principles of transparency and efficiency.

6 Conclusion

PyPouch represents a significant advancement in decentralized savings management. By automating yield accounting and providing transparent, on-chain records of earnings, PyPouch empowers users to manage their PYUSD savings effortlessly. With future expansions into new assets, swap functionality, and borrowing capabilities, PyPouch is poised to revolutionize how users interact with DeFi savings platforms and manage their finances.