InterFi NETWORK

SMART CONTRACT AUDIT

interfinetwork

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PREPARED FOR

HASHVOX AI

INTRODUCTION

Auditing Firm	InterFi Network
Client Firm	HashVox AI
Methodology	Automated Analysis, Manual Code Review
Language	Solidity
Contract	0x6371D7eBd6851B2f6C688081d34EDf230332FD00
Blockchain	Ethereum Chain
Centralization	Limited privileged access
Commit	94a3530c0436ee6d681e4aaedc7494ad7cec2c9a
Website	http://hashvoxai.com/
Telegram	http://t.me/hashvox_ai/
X (Twitter)	http://x.com/hashvox/
Report Date	May 20, 2024

ℹ️ Verify the authenticity of this report on our website: https://www.github.com/interfinetwork

EXECUTIVE SUMMARY

InterFi has performed the automated and manual analysis of solidity codes. Solidity codes were reviewed for common contract vulnerabilities and centralized exploits. Here's a quick audit summary:

Status	Critical 🔴	Major 🟠	Medium 🟡	Minor 🟢	Unknown 🟤
Open	0	0	1	4	0
Acknowledged	0	0	1	2	1
Resolved	0	0	0	1	0
Smart contract ownership is renounced. `onlyOwner` privileged roles are inaccessible					
`_taxWallet` Privileges	`manualSwap, clear`				
`manualSwap` function, as it is callable by `_taxWallet`, can potentially be used to manipulate price					

ℹ️ Please note that smart contracts deployed on blockchains aren't resistant to exploits, vulnerabilities and/or hacks. Blockchain and cryptography assets utilize new and emerging technologies. These technologies present a high level of ongoing risks. For a detailed understanding of risk severity, source code vulnerability, and audit limitations, kindly review the audit report thoroughly.

ℹ️ Please note that centralization privileges regardless of their inherited risk status - constitute an elevated impact on smart contract safety and security.

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SCOPE OF WORK

InterFi was consulted by HashVox AI to conduct the smart contract audit of their solidity source codes.

The audit scope of work is strictly limited to mentioned solidity file(s) only:

- HashVoxAI.sol

ℹ️ If source codes are not deployed on the main net, they can be modified or altered before main-net deployment. Verify the contract's deployment status below:

Public Contract Link	
https://etherscan.io/address/0x6371d7ebd6851b2f6c688081d34edf230332fd00#code	
Contract Name	HashVoxAI
Compiler Version	0.8.23
License	MIT

AUDIT METHODOLOGY

Smart contract audits are conducted using a set of standards and procedures. Mutual collaboration is essential to performing an effective smart contract audit. Here's a brief overview of InterFi's auditing process and methodology:

CONNECT

- The onboarding team gathers source codes, and specifications to make sure we understand the size, and scope of the smart contract audit.

AUDIT

- Automated analysis is performed to identify common contract vulnerabilities. We may use the following third-party frameworks and dependencies to perform the automated analysis:
  - Remix IDE Developer Tool
  - Open Zeppelin Code Analyzer
  - SWC Vulnerabilities Registry
  - DEX Dependencies, e.g., Pancakeswap, Uniswap
- Simulations are performed to identify centralized exploits causing contract and/or trade locks.
- A manual line-by-line analysis is performed to identify contract issues and centralized privileges. We may inspect below mentioned common contract vulnerabilities, and centralized exploits:

Centralized Exploits	○ Token Supply Manipulation ○ Access Control and Authorization ○ Assets Manipulation ○ Ownership Control ○ Liquidity Access ○ Stop and Pause Trading ○ Ownable Library Verification

Common Contract Vulnerabilities	○ Integer Overflow ○ Lack of Arbitrary limits ○ Incorrect Inheritance Order ○ Typographical Errors ○ Requirement Violation ○ Gas Optimization ○ Coding Style Violations ○ Re-entrancy ○ Third-Party Dependencies ○ Potential Sandwich Attacks ○ Irrelevant Codes ○ Divide before multiply ○ Conformance to Solidity Naming Guides ○ Compiler Specific Warnings ○ Language Specific Warnings

REPORT

- The auditing team provides a preliminary report specifying all the checks which have been performed and the findings thereof.
- The client's development team reviews the report and makes amendments to solidity codes.
- The auditing team provides the final comprehensive report with open and unresolved issues.

PUBLISH

- The client may use the audit report internally or disclose it publicly.

ℹ️ It is important to note that there is no pass or fail in the audit, it is recommended to view the audit as an unbiased assessment of the safety of solidity codes.

RISK CATEGORIES

A successful external attack may allow the external attacker to directly exploit. A successful centralization-related exploit may allow the privileged role to directly exploit. All risks which are identified in the audit report are categorized:

Risk Type	Definition
Critical 🔴	These risks pose immediate and severe threats, such as asset theft, data manipulation, or complete loss of contract functionality. They are often easy to exploit and can lead to significant, irreparable damage. Immediate fix is required.
Major 🟠	These risks can significantly impact code performance and security, and they may indirectly lead to asset theft and data loss. They can allow unauthorized access or manipulation of sensitive functions if exploited. Fixing these risks are important.
Medium 🟡	These risks may create attack vectors under certain conditions. They may enable minor unauthorized actions or lead to inefficiencies that can be exploited indirectly to escalate privileges or impact functionality over time.
Minor 🟢	These risks may include inefficiencies, lack of optimizations, code-style violations. These should be addressed to enhance overall code quality and maintainability.
Unknown 🟤	These risks pose uncertain severity to the contract or those who interact with it. Immediate fix is required to mitigate risk uncertainty.

All statuses which are identified in the audit report are categorized here:

Status Type	Definition
Open	Risks are open.
Acknowledged	Risks are acknowledged, but not fixed.
Resolved	Risks are acknowledged and fixed.

AUTOMATED ANALYSIS

Symbol	Definition
🛑	Function modifies state
💸	Function is payable
🔒	Function is internal
🔐	Function is private
!	Function is important

Context	Implementation			
└	_msgSender	Internal 🔒		
IERC20	Interface			
└	totalSupply	External !		NO!
└	balanceOf	External !		NO!
└	transfer	External !	🛑	NO!
└	allowance	External !		NO!
└	approve	External !	🛑	NO!
└	transferFrom	External !	🛑	NO!
SafeMath	Library			
└	add	Internal 🔒		
└	sub	Internal 🔒		
└	sub	Internal 🔒		
└	mul	Internal 🔒		
└	div	Internal 🔒		
└	div	Internal 🔒		

Ownable	Implementation	Context		
└	<Constructor>	Public !	🛑	NO!
└	owner	Public !		NO!
└	renounceOwnership	Public !	🛑	onlyOwner
IUniswapV2Factory	Interface				
└	createPair	External !	🛑	NO!
IUniswapV2Router02	Interface				
└	swapExactTokensForETHSupportingFeeOnTransferTokens	External !	🛑	NO!
└	factory	External !		NO!
└	WETH	External !		NO!
└	addLiquidityETH	External !	💵	NO!
HashVoxAI	Implementation	Context, IERC20, Ownable		
└	<Constructor>	Public !	🛑	NO!
└	name	Public !		NO!
└	symbol	Public !		NO!
└	decimals	Public !		NO!
└	totalSupply	Public !		NO!
└	balanceOf	Public !		NO!
└	transfer	Public !	🛑	NO!
└	allowance	Public !		NO!
└	approve	Public !	🛑	NO!
└	transferFrom	Public !	🛑	NO!
└	_approve	Private 🔐	🛑	
└	_transfer	Private 🔐	🛑	

| └ | min | Private 🔐 | | |

| └ | swapTokensForEth | Private 🔐 | 🛑 | lockTheSwap |

| └ | RemoveLimits | External ❗ | 🛑 | onlyOwner |

| └ | sendETHToFee | Private 🔐 | 🛑 | |

| └ | OpenTrade | External ❗ | 🛑 | onlyOwner |

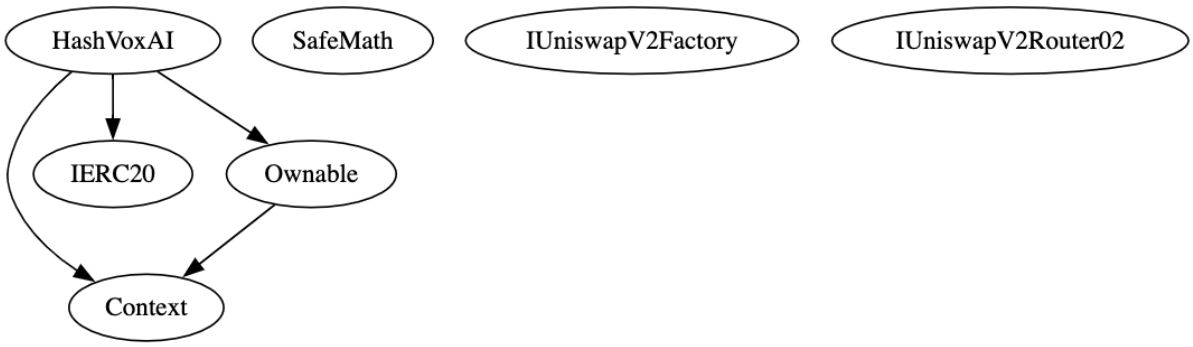
| └ | <Receive Ether> | External ❗ | 💵 | NO❗ |

| └ | manualSwap | External ❗ | 🛑 | NO❗ |

| └ | Clear | External ❗ | 🛑 | NO❗ |

| └ | manualSend | External ❗ | 🛑 | onlyOwner |

INHERITANCE GRAPH



MANUAL REVIEW

Identifier	Definition	Severity
CEN-01	Centralized privileges	Minor 🟢

Important `onlyOwner` centralized privileges are listed below:

```
renounceOwnership()
RemoveLimits()
OpenTrade()
manualSend()
```


RECOMMENDATION

Securing private keys or access credentials of deployers, contract owners, operators, and other roles with privileged access is crucial to prevent single points of failure that can compromise contract security.

Use of multi-signature wallets is recommended – These wallets require multiple authorizations to execute sensitive contract functions, reducing the risk associated with single-party control.

RESOLUTION

HashVox AI team has renounced contract ownership.

Identifier	Definition	Severity
CEN-02	Initial token allocation	Medium 🟡

Upon deployment, all initially minted tokens are transferred to the contract deployer. It could be an issue as the deployer can distribute tokens without consulting the community.

```
uint256 private constant _tTotal = 100000000 * 10**_decimals;
    emit Transfer(address(0), _msgSender(), _tTotal);
```


RECOMMENDATION

Establish transparent tokenomics model that involves community input in the decision-making process regarding token allocation.

ACKNOWLEDGEMENT

HashVox AI team has clarified that initial token allocation will adhere strictly to pre-determined tokenomics outlined in project documentation.

Identifier	Definition	Severity
CEN-07	Authorizations and access control	Medium 🟡
HAS-01	Market manipulation risk	

`_taxWallet` only controlled privileges are listed below:

```
clear()
manualSwap()
```

Market manipulation risk:

`manualSwap` function, as it is callable by `_taxWallet` - can potentially be used to drain liquidity and manipulate token price.

`swapTokensForEth` function transfers ETH to `_taxWallet`. This operation decreases contract's token balance by `requiredBalance` and increases its ETH balance.

RECOMMENDATION

Marketing wallet's private-keys should be secured carefully. This address can have a single point of failure that compromises the security of the project. Manage privileged roles carefully.

Implement multi-signature wallets: Require multiple signatures from different parties to execute certain sensitive functions within contracts. This spreads control and reduces the risk of a single party having complete authority.

Identifier	Definition	Severity
LOG-02	Potential front-running	Minor

Potential front-running happens when an attacker observes a transaction swapping tokens or adding liquidity without setting restrictions on slippage or minimum output amount. The attacker can manipulate the exchange rate by front-running a transaction to purchase assets and make profits by back-running a transaction to sell assets. Below mentioned function is called without setting restrictions on slippage or minimum output:

`swapExactTokensForETHSupportingFeeOnTransferTokens()`

RECOMMENDATION

Functions that execute critical state changes should enforce minimum output thresholds. Setting these minimums above zero can deter malicious actors by reducing the predictability and profitability of front-running strategies.

Implement commit-reveal schemes or transaction ordering to protect against front-running.

ACKNOWLEDGEMENT

Front-running is not avoidable on public blockchains. HashVox AI team commented that, most EVM chains are prone to some sort of front-running and external manipulation.

Identifier	Definition	Severity
COD-01	Authorization through `tx.origin`	Minor

Using `tx.origin` for authorization could make the contract vulnerable as it refers to the original external account that started the transaction.

RECOMMENDATION

Avoid authorizations via global variables wherever necessary.

Identifier	Definition	Severity
COD-02	Timestamp dependence	Minor

Be aware that the timestamp of the block can be manipulated by miners. Since miners can slightly adjust the timestamp, they may influence contract outcomes to their advantage.

RECOMMENDATION

Avoid relying solely on timestamp of the block for critical contract functions. Follow 15 seconds rule, and scale time dependent events accordingly.

ACKNOWLEDGEMENT

Timestamp of the block is not used to generate random numbers.

Identifier	Definition	Severity
COD-04	Missing or inaccurate error messages	Minor

Below mentioned functions have missing or inaccurate error messages:

`_transfer()`
`clear()`
`manualSwap()`

RECOMMENDATION

Provide accurate information strings for `require` related errors.

Identifier	Definition	Severity
COD-10	Third Party Dependencies	Unknown
COD-11	Reliance on DEX Router and ERC20 token contracts	
COD-12	Reliance on *OpenZeppelin* tools	

Smart contract is interacting with third party protocols e.g., market makers, front-end decentralized applications, open zeppelin tools. The scope of the audit treats third party entities as black boxes and assumes their functional correctness. However, in the real world, third parties can be compromised, and exploited. Moreover, upgrades in third parties can create severe impacts, e.g., increased transactional fees, deprecation of previous routers, etc.

RECOMMENDATION

Inspect third party dependencies regularly, and mitigate severe impacts whenever necessary.

ACKNOWLEDGEMENT

HashVox AI team will inspect third party dependencies regularly, and push updates as required.

Identifier	Definition	Severity
COD-12	Lack of event-driven architecture	Minor

Smart contract uses function calls to update state, which can make it difficult to track and analyze changes to the contract over time.

RECOMMENDATION

Use events to track state changes. Events improve transparency and provide a more granular view of contract activity.

Identifier	Definition	Severity
VOL-01	Irrelevant code	Minor

Redundant code in `SafeMath`

RECOMMENDATION

Remove redundant and dead code.

DISCLAIMERS

InterFi Network provides the easy-to-understand audit of solidity source codes (commonly known as smart contracts).

The smart contract for this particular audit was analyzed for common contract vulnerabilities, and centralization exploits. This audit report makes no statements or warranties on the security of the code. This audit report does not provide any warranty or guarantee regarding the absolute bug-free nature of the smart contract analyzed, nor do they provide any indication of the client's business, business model or legal compliance. This audit report does not extend to the compiler layer, any other areas beyond the programming language, or other programming aspects that could present security risks. Cryptographic tokens are emergent technologies, they carry high levels of technical risks and uncertainty. You agree that your access and/or use, including but not limited to any services, reports, and materials, will be at your sole risk on an as-is, where-is, and as-available basis. This audit report could include false positives, false negatives, and other unpredictable results.

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ABOUT INTERFI NETWORK

InterFi Network provides intelligent blockchain solutions. We provide solidity development, testing, and auditing services. We have developed 150+ solidity codes, audited 1000+ smart contracts, and analyzed 500,000+ code lines. We have worked on major public blockchains e.g., Ethereum, Binance, Cronos, Doge, Polygon, Avalanche, Metis, Fantom, Bitcoin Cash, Velas, Oasis, etc.

InterFi Network is built by engineers, developers, UI experts, and blockchain enthusiasts. Our team currently consists of 4 core members, and 6+ casual contributors.

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SMART CONTRACT AUDITS | SOLIDITY DEVELOPMENT AND TESTING

RELENTLESSLY SECURING PUBLIC AND PRIVATE BLOCKCHAINS