

# SuperHeroDoge

## SMART CONTRACT AUDIT REPORT



Prepared by:  
**BlockAudit**

Date Of Enrollment:  
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## SUMMARY

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This Audit Report mainly focuses on the extensive security of **SUPERHERODOGE** Smart Contracts. With this report, we attempt to ensure the reliability and correctness of the smart contract by complete and rigorous assessment of the system's architecture and the smart contract codebase.

The auditing process pays special attention to the following considerations:

- Testing the smart contracts against both common and uncommon attack vectors.
- Assessing the codebase to ensure compliance with current best practices and industry standards.
- Ensuring contract logic meets the specifications and intentions of the client.
- Cross referencing contract structure and implementation against similar smart contracts produced by industry leaders.
- Thorough line-by-line manual review of the entire codebase by industry experts.

The security assessment resulted in findings that ranged from critical to informational. We recommend addressing these findings to ensure a high level of security standards and industry practices. We suggest recommendations that could better serve the project from the security perspective:

- Enhance general coding practices for better structures of source codes;
- Add enough unit tests to cover the possible use cases;
- Provide more comments per each function for readability, especially contracts that are verified in public;
- Provide more transparency on privileged activities once the protocol is live.



# OVERVIEW

## Project Summary

Project Name	SuperHeroDoge
Logo	
Platform	BSC
Language	Solidity
Code Link	<a href="https://bscscan.com/address/0x5c450344b9191fb59f546d4a8b15337b1dda0b1b">https://bscscan.com/ address/0x5c450344b9191fb59f546d4a8b15337b1dda0b1b</a>

## File Summary

ID	File Name	Audit Status
SHD	SHD-SuperHeroDoge.sol	Failed

## Audit Summary

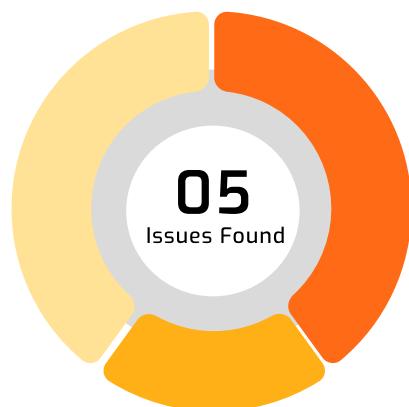
Date of Delivery	11 Aug 2021
Audit Methodology	Code Analysis. Automatic Assesment, Manual Review
Audit Result	Failed ✗
Audit Team	BlockAudit Report Team





# FINDINGS

■ Critical	0 0.0%
■ High	2 40.0%
■ Medium	1 20.0%
■ Low	2 40.0%
■ Informational	0 0.0%
■ Ownership	0 0.0%
■ Gas Optimization	0 0.0%



## Vulnerability Findings Summary

ID	Type	Line	Severity	Status
SHD01	Reentrancy	661-697	■ High	Reported
SHD02	Functions that send Ether to arbitrary destinations	1036	■ High	Reported
SHD03	Divide Before Multiply	701	■ Medium	Reported
SHD04	Missing Events For Critical Parameters	975 / 1002 / 1006	■ Low	Reported
SHD05	Missing Zero Address Validation	993	■ Low	Reported



# SHD01

Type	Centralisation Risk
Severity	■ High
File	SuperHeroDoge.sol
Line	661-697
Status	<b>Reported</b>

## Description

`_transfer(address,address,uint256)` performs state variable changes after external calls, making it a potential target for a reentrancy attack if the inputs are malicious contracts.

## Remediation

Update all bookkeeping state variables before transferring execution to an external contract or use Openzeppelin's ReentrancyGuard.

## Snapshot

```
function _transfer(
    address from,
    address to,
    uint256 amount
) private { ... }
```



## SHD02

Type	Functions that send Ether to arbitrary destinations
Severity	■ High
File	SuperHeroDoge.sol
Line	1036
Status	<b>Reported</b>

### Description

transferToCharity(uint256) sends funds to charityAddress that is initialized in the constructor. charityAddress can be changed through setCharityAddress(address) function but does not check if the input is zero address. In that case, calling transferToCharity(uint256) would send funds to zero, and they are lost forever.

### Remediation

Check the validity of charityAddress before sending funds.

### Snapshot

```
function transferToCharity(uint256 amount) private {
    payable(charityAddress).transfer(amount);
}
```



# SHD03

Type	Divide before multiply
Severity	■ Medium
File	SuperHeroDoge.sol
Line	701
Status	<b>Reported</b>

## Description

Solidity integer division might truncate. As a result, performing multiplication before division can sometimes avoid loss of precision.

## Remediation

In general, it's usually a good idea to re-arrange arithmetic to perform multiplication before division, unless the limit of a smaller type makes this dangerous.

## Snapshot

```
function swapTokens(uint256 tokensToSwap) private lockTheSwap {  
    uint256 halfLiquidity = tokensToSwap.div(_totalFee).mul(_liquidityFee.div(2));  
    uint256 withoutHalfLiquidity = tokensToSwap.sub(halfLiquidity);  
    uint256 initialBalance = address(this).balance;  
  
    swapTokensForEth(withoutHalfLiquidity);  
    uint256 bnbAmount = address(this).balance.sub(initialBalance);  
  
    uint256 onePart = bnbAmount.div(_totalFee.sub(_liquidityFee.div(2)));  
    uint256 bnbForLiquidity = onePart.mul(_liquidityFee).div(2);  
    uint256 bnbForCharity = onePart.mul(_charityFee);  
  
    transferToCharity(bnbForCharity);  
  
    addLiquidity(halfLiquidity, bnbForLiquidity);  
    emit SwapAndLiquify(halfLiquidity, bnbForLiquidity);  
}
```



# SHD04

Type	Missing events for critical parameters
Severity	■ Low
File	SuperHeroDoge.sol
Line	975 / 1002 / 1006
Status	<b>Reported</b>

## Description

the functions below does not emit an event so it is hard to keep track of those critical parameters.

## Remediation

Emit an event for critical parameter changes.

## Snapshot

```
function setMaxTxAmount(uint256 maxTxAmount) external onlyOwner() {
    _maxTxAmount = maxTxAmount;
}

function setNumTokensSellToAddToLiquidity(uint256 _minimumTokensBeforeSwap) external onlyOwner() {
    minimumTokensBeforeSwap = _minimumTokensBeforeSwap;
}

function setBuybackUpperLimit(uint256 buyBackLimit) external onlyOwner() {
    buyBackUpperLimit = buyBackLimit;
}
```



# SHD05

Type	Missing zero address validation
Severity	<span style="color: yellow;">■</span> Low
File	SuperHeroDoge.sol
Line	993
Status	<b>Reported</b>

## Description

setCharityAddress(address) does not check if \_charityAddress is zero address. So if Bob inputs zero address. funds can be lost.

## Remediation

Check for zero address validation

## Snapshot

```
function setCharityAddress(address _charityAddress) external onlyOwner() {  
    charityAddress = payable(_charityAddress);  
}
```



# APPENDIX

## Auditing Approach and Methodologies applied

The Block Audit Report team has performed rigorous testing of the project including the analysis of the code design patterns where we reviewed the smart contract architecture to ensure it is structured along with the safe use of standard inherited contracts and libraries. Our team also conducted a formal line by line inspection of the Smart Contract i.e., a manual review, to find potential issues including but not limited to

- Race conditions
- Zero race conditions approval attacks
- Re-entrancy
- Transaction-ordering dependence
- Timestamp dependence
- Check-effects-interaction pattern (optimistic accounting)
- Decentralized denial-of-service attacks
- Secure ether transfer pattern
- Guard check pattern
- Fail-safe mode
- Gas-limits and infinite loops
- Call Stack depth

In the Unit testing Phase, we coded/conducted custom unit tests written against each function in the contract to verify the claimed functionality from our client. In Automated Testing, we tested the Smart Contract with our standard set of multifunctional tools to identify vulnerabilities and security flaws. The code was tested in collaboration of our multiple team members and this included but not limited to;

- Testing the functionality of the Smart Contract to determine proper logic has been followed throughout the whole process.
- Analyzing the complexity of the code in depth and in detail line-by-line manual review of the code.
- Deploying the code on testnet using multiple clients to run live tests.
- Analyzing failure preparations to check how the Smart Contract performs in case of any bugs and vulnerabilities.
- Checking whether all the libraries used in the code are on the latest version.
- Analyzing the security of the on-chain data.



## Issue Categories:

Every issue in this report was assigned a severity level from the following:

### Critical Severity Issues

Issues of Critical Severity leaves smart contracts vulnerable to major exploits and can lead to asset loss and data loss. These can have significant impact on the functionality/performance of the smart contract.

We recommend these issues must be fixed before proceeding to MainNet..

### High Severity Issues

Issues of High Severity are not as easy to exploit but they might endanger the execution of the smart contract and potentially create crucial problems.

Fixing these issues is highly recommended before proceeding to MainNet.

### Medium Severity Issues

Issues on this level are not a major cause of vulnerability to the smart contract, they cannot lead to data-manipulations or asset loss but may affect functionality.

It is important to fix these issues before proceeding to MainNet.

### Low Severity Issues

Issues at this level are very low in their impact on the overall functionality and execution of the smart contract. These are mostly code-level violations or improper formatting.

These issues can be remain unfixed or can be fixed at a later date if the code is redeployed or forked.

### Informational Findings

These are finding that our team comes accross when manually reviewing a smart contract which are important to know for the owners as well as users of a contract.

These issues must be acknowledged by the owners before we publish our report.

### Ownership Privileges

Owner of a smart contract can include certain rights and Privileges while deploying a smart contract that might be hidden deep inside the codebase and may make the project vulnerable to rug-pulls or other types of scams.

We at BlockAudit believe in transparency and hence we showcase Ownership Privileges separately so the owner as well as the investors can get a better understanding about the project.

### Gas Optimization

Solidity gas optimization is the process of lowering the cost of operating your Solidity smart code. The term "gas" refers to the level of processing power required to perform specific tasks on the Ethereum network.

Each Ethereum transaction costs a fee since it requires the use of computer resources. It will deduct a fee anytime any function in the smart contract is invoked by the contract's owner or users.

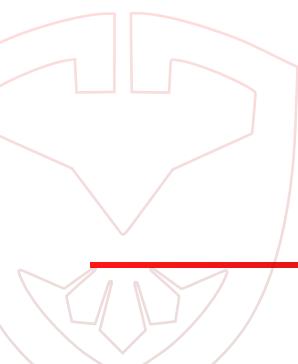


## DISCLAIMER

This is a limited report on our findings based on our analysis, in accordance with good industry practice as at the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report. In order to get a full view of our analysis, it is crucial for the client to read the full report. While we have done our best in conducting our analysis and producing this report, it is important to note that the client should not rely on this report and cannot claim against us on the basis of what it says or doesn't say, or how we produced it, and it is important for the client to conduct the client's own independent investigations before making any decisions. We go into more detail on this in the below disclaimer below – please make sure to read it in full.

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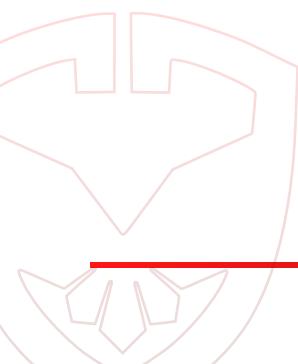


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The analysis of the security is purely based on the received smart contracts alone. No related/third-party smart contracts, applications or operations were reviewed for security. No product code has been reviewed.

Note: The statements made in this document should not be interpreted as investment or legal advice, nor should its authors be held accountable for decisions made based on them. Securing smart contracts is a multistep process. One audit cannot be considered enough. We recommend that the **SUPERHERODOGE** team put a bug bounty program in place to encourage further analysis of the smart contracts by other third parties





## About BlockAudit

BlockAudit is an industry leading security organisation that helps web3 blockchain based projects with their security and correctness of their smart-contracts. With years of experience we have a dedicated team that is capable of performing audits in a wide variety of languages including HTML, PHP, JS, Node, React, Native, Solidity, Rust and other Web3 frameworks for DApps, DeFi, GameFi and Metaverse platforms.

With a mission to make web3 a safe and secure place BlockAudit is committed to provide it's partners with a budget and investor friendly security Audit Report that will increase the value of their projects significantly.



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