# SMART CONTRACT CODE REVIEW AND SECURITY ANALYSIS REPORT

**Customer**: eu21.football
**Date**: June 6th, 2021

## Document

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|---|---|
| **Name** | Smart Contract Code Review and Security Analysis Report for eu21.football. |
| **Approved by** | Andrew Matiukhin \| CTO Hacken OU |
| **Type** | Token |
| **Platform** | Ethereum / Solidity |
| **Methods** | Architecture Review, Functional Testing, Computer-Aided Verification, Manual Review |
| **Address** | https://etherscan.io/address/0x87ea1f06d7293161b9ff080662c1b0df775122d3#code |
| **Timeline** | 5TH JUN 2021 - 6TH JUN 2021 |
| **Changelog** | 6TH JUN - Initial Audit |

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## Introduction

Hacken OÜ (Consultant) was contracted by eu21.football (Customer) to conduct a Smart Contract Code Review and Security Analysis. This report presents the findings of the security assessment of the Customer's smart contract and its code review conducted between June 5th, 2021 - June 6th, 2021.

## Scope

The scope of the project is smart contract in the mainnet:

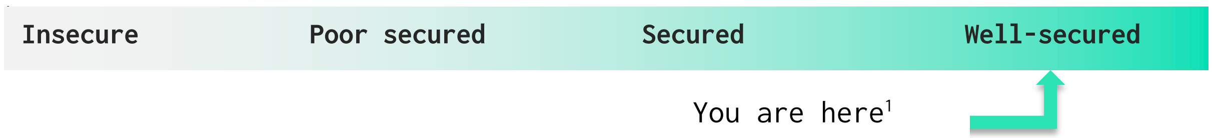
```
Address:
https://etherscan.io/address/0x87ea1f06d7293161b9ff080662c1b0df775122d3#code
```

We have scanned this smart contract for commonly known and more specific vulnerabilities. Here are some of the commonly known vulnerabilities that are considered:

| Category | Check Item |
|---|---|
| Code review | ▪ Reentrancy<br>▪ Ownership Takeover<br>▪ Timestamp Dependence<br>▪ Gas Limit and Loops<br>▪ DoS with (Unexpected) Throw<br>▪ DoS with Block Gas Limit<br>▪ Transaction-Ordering Dependence<br>▪ Style guide violation<br>▪ Costly Loop<br>▪ ERC20 API violation<br>▪ Unchecked external call<br>▪ Unchecked math<br>▪ Unsafe type inference<br>▪ Implicit visibility level<br>▪ Deployment Consistency<br>▪ Repository Consistency<br>▪ Data Consistency |
| Functional review | ▪ Business Logics Review<br>▪ Functionality Checks<br>▪ Access Control & Authorization<br>▪ Escrow manipulation<br>▪ Token Supply manipulation<br>▪ Assets integrity<br>▪ User Balances manipulation<br>▪ Data Consistency manipulation<br>▪ Kill-Switch Mechanism<br>▪ Operation Trails & Event Generation |

## Executive Summary

According to the assessment, the Customer's smart contract has not critical vulnerabilities and can be considered secure.



Our team performed an analysis of code functionality, manual audit, and automated checks with Mythril and Slither. All issues found during automated analysis were manually reviewed, and important vulnerabilities are presented in the Audit overview section. A general overview is presented in AS-IS section, and all found issues can be found in the Audit overview section.

Security engineers found no severity issues during the audit.

[1] Look for details and justification in conclusion section

## Severity Definitions

| Risk Level | Description |
|---|---|
| **Critical** | Critical vulnerabilities are usually straightforward to exploit and can lead to assets loss or data manipulations. |
| **High** | High-level vulnerabilities are difficult to exploit; however, they also have a significant impact on smart contract execution, e.g., public access to crucial functions |
| **Medium** | Medium-level vulnerabilities are essential to fix; however, they can't lead to assets loss or data manipulations. |
| **Low** | Low-level vulnerabilities are mostly related to outdated, unused, etc. code snippets that can't have a significant impact on execution |
| **Lowest / Code Style / Best Practice** | Lowest-level vulnerabilities, code style violations, and info statements can't affect smart contract execution and can be ignored. |

## AS-IS overview

### Description

*EU21* is an ERC20 token contract based on the *OpenZeppelin* source code. This contract cannot accept ETH because the receive function is always reverted. The *constructor* function mints 165,000 EU21 tokens. After the contract is deployed, new tokens cannot be minted.

### Imports

*EU21* contract has 3 imports:

- *Ownable* – from *OpenZeppelin*
- *IERC20* – from *OpenZeppelin*. Comments have been stripped and the interface has been renamed *ERC*.
- *SafeMath* – from *OpenZeppelin*. Unused functions have been removed.

### Inheritance

*EU21* contract inherits *ERC20* and *Ownable*.

### Usings

*EU21* contract use *SafeMath* for *uint256*.

### Fields

*EU21* contract has 6 fields:

- *string _name* – a name;
- *string _symbol* – a symbol;
- *uint256 _totalSupply* – the total supply;
- *uint256 _decimal* – a decimal;
- *mapping(address => uint256) _balances* – a mapping of balances;
- *mapping(address => mapping (address => uint256)) _allowances* – a mapping of allowances;

### Functions

*EU21* contract has 13 functions:

- *constructor*

**Description**

Initializes the contract. Mints 165,000 EU21 tokens.

**Visibility**

public

**Input parameters**

None

**Constraints**

None

**Events emit**

None

**Output**

None

- *name*

**Description**

Used to get the name.

**Visibility**

public view

**Input parameters**

None

**Constraints**

None

**Events emit**

None

**Output**

Returns the name.

- *symbol*

**Description**

Used to get the symbol.

**Visibility**

public view

**Input parameters**

None

**Constraints**

None

**Events emit**

None

**Output**

Returns the symbol.

- *decimals*

**Description**

Used to get decimals.

**Visibility**

public view

**Input parameters**

None

**Constraints**

None

**Events emit**

None

**Output**

Returns decimals.

- *totalSupply*

**Description**

Used to get the total supply.

**Visibility**

external view

**Input parameters**

None

**Constraints**

None

**Events emit**

None

**Output**

Returns the total supply.

- *balanceOf*

**Description**

Used to get the balance of the address.

**Visibility**

external view

**Input parameters**

- *address _tokenOwner* – an address;

**Constraints**

None

**Events emit**

None

**Output**

Returns the balance.

- *transfer*

**Description**

Used to transfer tokens.

**Visibility**

external

**Input parameters**

  - *address _to* – an address of recipient;
  - *uint256 _tokens* – an amount of tokens;

**Constraints**

None

**Events emit**

None

**Output**

None

- *_transfer*

**Description**

Used to transfer tokens.

**Visibility**

internal

**Input parameters**

  - *address _sender* – an address of sender;
  - *address _recipient* – an address of recipient;
  - *uint256 _amount* – an amount of tokens;

**Constraints**

  - The sender should not be a zero address.
  - The recipient should not be a zero address.

**Events emit**

  - *emit Transfer(_sender, _recipient, _amount);*

**Output**

None

- *allowance*

**Description**

Used to get allowance.

**Visibility**

external view

**Input parameters**

  - *address _tokenOwner* – an address of owner;
  - *address _spender* – an address of spender;

**Constraints**

None

**Events emit**

None

**Output**

Returns allowance.

- *approve*

**Description**

Used to approve transfer.

**Visibility**

external

**Input parameters**

- *address _spender* – an address of spender;
- *uint256 _tokens* – an amount of tokens;

**Constraints**

None

**Events emit**

None

**Output**

None

- *_approve*

**Description**

Used to approve transfer.

**Visibility**

internal

**Input parameters**

- *address _owner* – an address of owner;
- *address _spender* – an address of spender;
- *uint256 _value* – an amount of tokens;

**Constraints**

- The owner should not be a zero address.
- The spender should not be a zero address.

**Events emit**

- *emit Approval(_owner, _spender, _value);*

**Output**

None

- *transferFrom*

**Description**

Used to transfer tokens.

**Visibility**

external

**Input parameters**

  - *address _from* – an address of sender;
  - *address _to* – an address of recipient;
  - *uint256 _tokens* – an amount of tokens;

**Constraints**

None

**Events emit**

None

**Output**

None

- *receive*

**Description**

Reverts ETH payments.

**Visibility**

external payable

**Input parameters**

None

**Constraints**

None

## Events emit

None

## Output

None

## Audit overview

### 🟥 🟥 🟥 🟥 Critical

No critical issues were found.

### 🟨 🟨 🟨 High

No high issues were found.

### 🟩 🟩 Medium

No medium issues were found.

### 🟦 Low

No low severity issues were found.

### 🟦 Lowest / Code style / Best Practice

No lowest severity issues were found.

## Conclusion

Smart contracts within the scope were manually reviewed and analyzed with static analysis tools. For the contract, high-level description of functionality was presented in As-is overview section of the report.

Security engineers found no severity issues during the audit.

# Disclaimers

## Hacken Disclaimer

The smart contracts given for audit have been analyzed in accordance with the best industry practices at the date of this report, in relation to cybersecurity vulnerabilities and issues in smart contract source code, the details of which are disclosed in this report (Source Code); the Source Code compilation, deployment, and functionality (performing the intended functions).

The audit makes no statements or warranties on the security of the code. It also cannot be considered as a sufficient assessment regarding the utility and safety of the code, bugfree status, or any other statements of the contract. While we have done our best in conducting the analysis and producing this report, it is important to note that you should not rely on this report only - we recommend proceeding with several independent audits and a public bug bounty program to ensure the security of smart contracts.

## Technical Disclaimer

Smart contracts are deployed and executed on blockchain platform. The platform, its programming language, and other software related to the smart contract can have its own vulnerabilities that can lead to hacks. Thus, the audit can't guarantee explicit security of the audited smart contracts.