**Final Year Project Report**

**“NFT Marketplace”**



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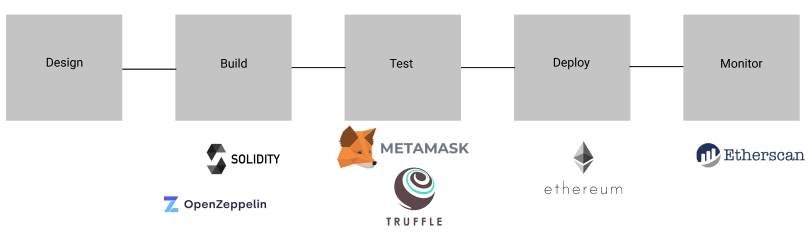
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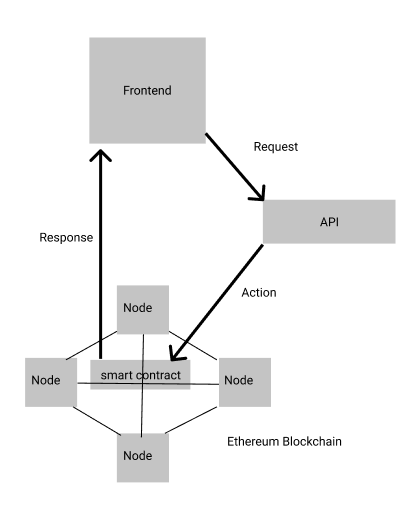
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# **C e r t i f i c a t e**

The work in the document “NFT Marketplace” is written by Fraz Naveed as a confirmation to the required standard for the partial fulfillment of the degree of Bachelor of Science in Computer Science.

\*\* EDIT before submission

Approved by:

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9th Nov, 2021

# 

# **Abstract**

With the boom of blockchain development many use cases arised with it. One of the most innovative concept it brought with it is Non-Fungible Tokens. The blockchain is a distributed ledger that is immutable and provides the certificate of authenticity of anything that is stored on it. NFTs are the assets that can be particularly associated with anything digital or physical. These NFTs are also a currency but are not interchangeable like fungible tokens which can be traded with each other. Every NFT is a unique asset, has unique features and holds its own value. The making of an NFT marketplace will provide an opportunity to buy and sell off those unique assets. This project is unique in the sense that it will allow gaming content creators to showcase their best gaming moments as an NFT and sell its rights to their fans. When a thing is unique it holds significant value, applying that concept the NFTs then could be sold further offering more capital to both buyer and the seller.

# 

# **Acknowledgments**

I first of all thank Almighty ALLAH (SWT) for giving us knowledge, power and strength to accomplish this project. I owe a great many thanks to my friends, and the people who helped and supported my idea and worked with me on this project. My sincere gratitude to Mr.Ali Irfan (Assistant Professor in Department of Computer Science, Bahria University) for having faith on me and thus allowing me to carry out a project. He helped immensely by guiding me throughout the project, inspiring me to take up new challenges along the road, and at the same time providing valuable suggestions and constructive criticisms. Without him this project might not have been completed.

Fraz Naveed

Islamabad, Pakistan

November 9, 2021

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# **Table of figures**

# **Acronyms and abbreviations:**

UC USE CASE

NFT NON FUNGIBLE TOKEN

DAPP DECENTRALIZED APPLICATION

ABI APPLICATION BINARY INTERFACE

API APPLICATION PROGRAMMING INTERFACE

IDE INTEGRATED DEVELOPMENT ENVIROMENT

JS JAVA SCRIPT

RPC REMOTE PROCEDURE CALL

DAO DECENTRALIZED AUTONOMOUS ORGANIZATION]

DEFI DECENTRALIZED FINANCE

**Chapter # 1**

# **Introduction**

\*\* Do all the editing according to the IEEE standard before submission

## Introduction:

An NFT marketplace will be developed that will be connected with the Ethereum blockchain, on which creators can post their gaming moments as NFT and buyers can buy and bid on those NFTs. NFTs are non-fungible tokens, with each token having unique properties. There will be a native token for the platform that will be listed on a DEX (Decentralized Exchange) which users will use for transactions on the platform. The NFTs will be supported by the ERC721 standard with the additional auction smart contract for the auctioning and bidding of the NFTs.

\*\* Proof Read Chap1 before submission

### Creator Perspective:

The content creator will use this platform to mint the NFTs. These are the things he can do:

#### **Minting:**

This feature is the core feature of the platform. With the minting functionality the creator will craft the asset and it will be sent to be stored on the Ethereum blockchain.

#### **Auctioning:**

Although all the NFTs will get minted with their price but this auction feature will allow the creators to put limited edition pieces of NFTs on sale for a limited time.

### Buyer Perspective:

* + - The buyer will be able to see the NFTs posted on the platform
    - He can bid on those NFTs.
    - He can search and sort the NFTs on the platform
    - He can follow his favorite creator.

## Objective:

The objective is “*To design an NFT marketplace for unique gaming moments that will live on Ethereum blockchain with buy, sell and auction mechanics*”.

## Problem Description:

An NFT marketplace is a place for buying and selling of digital assets. These marketplaces are used to create, display and trading of digital assets using tokens of the native platform or of blockchain. Before the concept of NFTs the creators would create their physical artworks and place them in galleries for sale. But that was the case only for picture arts, for the displaying and selling of video artworks these digital markets can be used where any type of art can be sold and the ownership of the respective artwork could be preserved. On our marketplace the content creators can post their gaming moments as NFT. Because gaming moments are themselves unique and those moments are unlikely to happen again so they are perfect for the scenario of non-fungible tokens. The marketplace can be combined with blockchain, the art that will be created by user will get stored on the blockchain, from there it will be displayed on the platform. The origin of the artwork on these platforms are public and anyone is able to verify it.

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## Methodology:

For the making of this project, agile methodology will be used. Agile methodology is an iterative process in which changes are released with improvements. Right now the plan for the project is limited and new features could be added later on. But the contracts that are already deployed will not be subject to change. For integration of new features new smart contracts will be developed in which addresses of the previous deployed contracts will be used for interaction purposes. For the development of contracts, the standard approach will be followed that is provided by OpenZeppelin library.

Frontend website will be made on React.js and Web3.js library will be used for the interaction with the blockchain. Pinata SDK will be used for the dumping of the digital assets, that will be done with the help of multer and the critical data will be stored on blockchain. For the storage of data of users a database like MongoDB will be used.

#### Lifecycle**:**

A system will be created that will consist of a web application and code will reside on Ethereum blockchain. The system will be designed and build with solidity language, will be tested on metamask wallet and truffle, will be deployed on Ethereum blockchain and monitoring will be done from Etherscan.

## 

### Architecture:

* Presentation Layer
* Business Layer
* Blockchain Layer

##### Presentation Layer:

The Presentation Layer will provide the following functionalities:

* Wallet connection
* Signup form
* Minting the NFTs
* Viewing other NFTs
* Bidding on NFTs
* Following other creators

##### Business Layer:

The Business Layer will do the following:

* Handle requests from frontend
* Forward requests to blockchain
* Handle MongoDB logic
* Handle dumping of NFTs to IPFS

##### Blockchain Layer:

The Blockchain Layer will do the following:

* Hold our smart contracts
* Save relevant data coming from the Business Layer
* Transfer of asset’s logic

## 

## Project Scope:

### Justification:

A platform is needed where content creators could post their unique gaming moments as NFT and that could be sold online along with the ownership protection.

### Deliverables:

In this project and NFT marketplace will be developed. The creators will be able to signup on the platform, the data of whom will be stored on a separate centralized database. The user will buy the platform’s native tokens that will be developed (which will be given some name in future) and with the help of it he will be able to mint their artwork. He will specify the price of the particular asset and that asset will get stored on the blockchain. From blockchain that asset will be showed to other users on the frontend. The creator will have additional functionality of putting that asset on auction. Other users will be able to bid on those assets if they are on auction. If the original creators liked the bid he will stop the auction and the NFT will get transferred to the highest bidder and creator will get that particular amount of tokens. An additional fund could be allocated for the maintenance of the platform i.e. whenever there is some sale a portion of it goes to developers for the maintenance purposes.

For the token, NFT and auction mechanics smart contracts will be made and for testing they will be deployed on the Ropsten Testnet of Ethereum.

### Exclusion:

Upgradability feature of smart contracts that could override the existing smart contracts. We cannot change the smart contracts once they are deployed on the blockchain. In case a bug arises in future it could cause trouble. So this approach is used such cases. This approach is complexed yet very powerful in terms of management of smart contracts. This feature won’t be included right now.

## Feasibility Study:

### Risks Involved:

#### **For project:**

Scope Creep:The project might seem small at the start and adding more and more functionality to it can make it out of scope.

Scheduling:Time management issues could arise if scope gets larger and larger.

Integration Risk:Due to complexity of project while integrating, some high severity bug could make their way in platform as a single individual is looking after all processes.

Legal Risk: Full scale launch of such project could invite trouble from LEAs as crypto isn’t regulated yet.

#### **For platform:**

Asset ownership risks: Risk of theft or loss of digital assets where someone puts asset claiming to be theirs.

Smart Contract security risk: If smart contracts are not tested and audited before deployment they could pose serious issue for the theft of assets or tokens.

### Resource Requirement:

Human Resource for testing: Because the project is complex and critical, as real money is involved, so auditing of smart contracts should be done from certified organization.

Capital Resource: If the project is launch fully, then cost resource would be required to cover the expenses for the hosting of platform and deployment of smart contracts on main ethereum network.

## Solution Application Areas:

The project has value in the Art markets present in digital space. The NFT marketplaces takes the concept of ownership of art to another level where the ownership of the respective item is preserved on the temper proof blockchain.

By putting it on marketplace combined with blockchain, everyone agrees upon the fact that the particular item was created by the specific creator and he is the owner of that item.

## Tools/Technology:

* Solidity
* Vanilla JavaScript
* Web3.js
* Metamask
* ERC20, ERC721 tokens
* Pinata SDK
* Infura
* Multer
* React.js
* MongoDB
* Express.js
* Node.js

## Expertise of the Team Members:

The team have deep understanding of how Ethereum blockchain protocol works. Along with that team is fluent in Solidity Programming language, libraries of blockchain, designing of frontends and connecting them.

## Milestones:

|  |  |
| --- | --- |
| **Milestones** | **Expected Completion** |
| Project Proposal submission | Oct 20, 2021 |
| Proposal Defense | Oct 29, 2021 |
| Frontend Design | Nov 15, 2021 |
| Documentation Phase-1 | Jan 10, 2022 |
| Implementation Phase-1 | Jan 10, 2022 |
| Documentation Phase-2 | Mar 15, 2022 |
| Implementation Phase-2 | Mar 15, 2022 |
| Final Review & Submission | Apr 25, 2022 |

**Chapter # 2**

# **Literature Review**

## 2.1. Literature Review:

## 

NFT marketplace will provide the opportunity to creators to post their gaming content as Non-Fungible Tokens on a web based application. Posting their rare moments as an NFT not only prevents it from being stolen but also preserves the ownership of their content. This content can help the creators earn money by selling them to other users.

I have done research on other marketplaces and have developed understanding how a better one can be made by covering their shortcomings. On the basis of those shortcoming new changes has been proposed to cater them. Much of these applications has been built on Ethereum Blockchain that targets mostly JPEG/PNG based NFTs. Some of the points are discussed in which those shortcomings are explained that led to the creation of this project.

### 2.1.1. Other Related Applications:

The concepts of DeFi and Non-Fungible Tokens are among those new concepts in blockchain that has been recently introduced to the market. With the power of the blockchain behind it, everyday there are new ideas and use cases popping up. The bu

“NFT Marketplace” is a project that is similar to online shopping stores. But the difference is that this marketplace intends to sell digital items.

tokenized video clips

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Much of these applications has been built on Ethereum Blockchain that targets mostly JPEG/PNG based NFTs.

Following are some points in which those shortcomings are explained that led to the creation of this project.

Royalities distributed back to the users

using our own coin so it will help expand further projects

- Support stable coin

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