**KATHFORD INTERNATIONAL COLLEGE OF**

**ENGINEERING AND MANAGEMENT**

Balkumari, Lalitpur

A

Major Project Proposal

On

**“FAKE PRODUCT IDENTIFICATION USING QR CODE BASED BLOCKCHAIN SYSTEM”**

[Subject Code: EX654]

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Abstract

A counterfeit product results in huge loss to company. In Nepal, a lot of counterfeit is found in market. As a result of counterfeit product, it not only makes a customer dissatisfaction but also a loss to retailer. A lot of solution to this problems has been addressed using various techniques. And most of solution is based on centralized system where information about products is stored in central server. In such centralized system, there are lot of problems such as a single point of failure, prone to attacks. Using the Blockchain, data is distributed over the peer-to-peer network instead of central server handling the all the data. In Blockchain, data is shared among the nodes in network. In our system, information about the product is stored in distributed ledger. So, any one on the network can watch the data. By scanning QR code attach to product, a customer can query about the product that he is buying and check whether the product is genuine or not. After deciding to buy the product, customer need to send a request to transfer the ownership of product to him/her. The main aim of this project to make decentralized application i.e. Dapps using the Ethereum framework using solidity programming language for writing the smart contract.

QR code that is to be attached to the product is generated using the serial no. of the products, time of manufacture, manufacturer name. After the product has been manufactured and ready for shipments, information about the product is added to distributed ledger. A customer can scan QR code and query the system whether the product is genuine or fake. If someone has attached QR code to product which is fake then it will be easily identify using our system.

**Keywords:** Blockchain, Ethereum, Smart contracts, anti-counterfeiting, decentralization

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List of Abbreviations

Dapps Decentralized Application

IPFS Inter Planetary File System

# Introduction

## Background

In context of Nepal, lots of fake product of renowned company is found in market. Because of this it causes a lots of renowned company a huge loss and also break trust about the product for a customer. Individual customer also get in loss because they get the fake product not the genuine one. Also, retailer who is selling a genuine product may have to compete with the retailer who is selling a Counterfeiting product. As a result, retailer who is selling a genuine product may goes his/her business to a loss. In order to resolve this problems, one popular technology that can be used is Blockchian. One of the renowned Blockchain application is Bitcoin cryptocurrency. Blockchain is simply a chain of blocks connected together with hash value. If any of data gets changed in one block, whole of the block following that blocks gets wrong. Any application built using Blockchain technology ensures that contents in data are tamper-proof.

The main goal of our project is to make a decentralized Blockchain system to keep the record of information of manufactured product such as ownership of the product, model number, Date of Manufacture and so on. At the customer side, we tends to use the QR code scanner to get the information about product using and check whether or not the product is genuine or not which indeed help the customer to buy the given product or not.

## Problem Statement

Many fake products has been generated in existing supply chain in Nepal. In order to resolve this problems, there must be a system for end user to check details about the product and determine whether to buy the product or not by checking whether the product is genuine or not. In past, the information about the products is stored in centralized manner. So, hacker can attack on the just a single system and cause the whole system to fail i.e cause single point of failure. Due to this single point of failure , we fail to track the information about the products. In some of case, QR code is being used but the information about the products is stored in centralized database which is not so good because bad people can attact such system easily than the decentralized system. So, our main aim is to build the decentralized blockchain system for sharing the information about the product for product anti-counterfeiting. In such a system, it is impossible for attacker to change information about the products and get their fake products in the market.

## Objectives

### Main Objective

* To design and develop a decentralized Blockchain system for fake product identification using QR code.

### Specific Objectives

1. To make a smart contracts using solidity programming language
2. Design and develop Dapps
3. To make a Blockchain with each block containing necessary data.
4. To generate QR code for a product

# Literature Review

Satoshi Nakamoto [1] explaind that a purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. He propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work.

A. Funde [2] described about how IPFS(Inter Planetary File System) which is Distributed Web can be used to manage the ownership of products.IPFS is more useful than http as it can distribute huge volume of data efficiently and IPFS doesn’t allow duplication. IPFS and the Blockchain are similar. You can address large amounts of data with IPFS, and place the immutable, permanent IPFS links into a blockchain transaction. This timestamps and secures your content, without having to put the data itself on the chain.

Product anti-counterfeiting solutions are developed and implemented with centralized system architecture relying on centralized authorities or any form of intermediaries. Vulnerabilities of centralized product anti-counterfeiting solutions could possibly lead to system failure or susceptibility of malicious modifications performed on product records or various potential attacks to the system components by dishonest participant nodes traversing along the supply chain [3].

J. Leng introduce about new decentralized blockchain-driven model, named Makerchain, is presented to handle the cyber-credit of social manufacturing among various makers. An anti-counterfeiting method composed of chemical signature is proposed to represent unique features of personalized products. Twinning unique signature data to blockchain and other functional databases is realized and anticipated to make manufacturing service transactions among makers more trustworthy. Based on an automated execution mechanism of smart contracts among makers, a decentralized manufacturing network can be enabled for automating transactions among makers, as well as third-party verification of product lifecycle through a trail of historic events [4].

Blockchain paradigm when coupled with cryptographically-secured transaction has demonstrated its utility through a number of projects with Bitcoin being one of the most notable ones. Ethereum implements this paradigm in generalised manner. Furthermore,it provides a plurality of such resources each with distinct state and operating code but able to interact through a message-passing framework with others [5].

Current anti-counterfeiting supply chains rely on a centralized authority to combat counterfeit products. This architecture results in issues such as single point processing, storage, and fail-ure. Blockchain technology has emerged to provide a promising solution for such issues. N. Alzahrani [6]proposed the block-supply chain, a new decentralized supply chain that detects counterfeiting attacks using blockchain and Near Field Communication (NFC) technologies. Block-supply chain replaces the centralized supply chain design and utilizes a new proposed consensus protocol that is, unlike existing protocols, fully decentralized and balances between efficiency and security.

Although there has been many related studies focusing on supply chain quality management, the technologies used still have difficulties in resolving problems arising from the lack of trust in supply chains. The root reason lies in three challenges brought to the traditional centralized trust mechanism: self-interests of supply chain members, information asymmetry in production processes, costs and limitations of quality inspections. Si Chen and his team [7] discussed how to improve the supply chain quality management by adopting the blockchain technology, and propose a framework for blockchain-based supply chain quality management.

QR i.e. “Quick Response” code is a 2D matrix code that is designed by keeping two points under consideration, i.e. it must store large amount of data as compared to 1D barcodes and it must be decoded at high speed using any handheld device like phones. QR code provides high data storage capacity, fast scanning, omnidirectional readability, and many other advantages including, error-correction (so that damaged code can also be read successfully) and different type of versions. Different varieties of QR code symbols like logo QR code, encrypted QR code, iQR Code are also available so that user can choose among them according to their need. QR code is applied in different application streams related to marketing, security, academics etc [8].

# Feasibility Study

## Technical Feasibility

All the technical resources required for the project including hardware and software are easily available in the market. Also, most of the equipment that is required for the project is there. And there must not be a problem for us to get those things that are required for the project. Evaluating the technical feasibility is the most intricate part of the feasibility study. Here, as we will be making an smart contract or decentralized application using solidity programming language on Ethereum. We will change their smart contract Solidity code into Ethereum bytecode, add the bytecode into a transaction and deploy the transaction into the network. When miners of Ethereum receive the transaction, they will record the transaction in a block and run the bytecode in the Ethereum virtual machine each time a transaction of this smart contract is called. Since our project require resources that are easily available, so our projects is technical feasible.

## Financial Feasibility

The project we are going to work on is economically feasible and is within the range of affordable expenditure as most of the equipment and electronic devices are already available. Once the system setup is done and it starts functioning as it is supposed to, then all the expenses that are made during the project would look worth it. A simple financial analysis which gives the actual comparison of costs and benefits are much more meaningful in every project. This gives the top management economic justification for the new system. Since we do have to use mobile with internet connection with camera able to scan QR code in our project so, the total cost for our project is very low which makes it financially feasible and easy to complete within deadline.

## Schedule Feasibility

The project is currently in the analysis and requirement gathering phase. So, in 9 months, the project is expected to be completed within the proposed schedule.

## Operational Feasibility

Our final project will need the computer and mobile with internet connection to utilize it.

# Project Methodology

## Block Diagram

User Interface

Block 1

Block 3

Block n

Smart contract

Manufactured Product

Details

Admin

User

**Figure 4.1 Block Diagram**

## Flow Chart

Scan QR code

Information about product

Transfer the ownership of Product

Real

Fake

Is information there in blockchain

**Figure 4.2 Flow Chart**

# Implementation Plan

## Schedule

**Table 5.1 Gantt Chart**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S.N.** | **ACTIVITY** | **JUL-SEPT** | **OCT-NOV** | **DEC-JAN** | **FEB-MAR** |
| 1 | Feasibility Study |  |  |  |  |
| 2 | System specification |  |  |  |  |
| 3 | Requirement Analysis |  |  |  |  |
| 5 | Designing and Building Prototype |  |  |  |  |
| 6 | Documentation |  |  |  |  |
| 7 | Testing |  |  |  |  |
| 8 | Implementation |  |  |  |  |

## Hardware and Software Requirements

### Hardware Requirements

* + A computer with internet connection
  + Mobile Device with Camera with internet connection

### 5.2.2 Software Requirement

* + Ethereum
  + solidity
  + Node.js
  + HTML
  + CSS
  + Ganache
  + GIT
  + Javascript
  + Android Studio

# Expected Outcomes

The following outcomes have been presumed for this project:

* + Get the information from QR code attach to product using QR code scanner
  + By providing the information of product to Dapps, Customers can verify that the product is genuine or not.

References

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