HempCheck Project Descriptions

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Technical Audience

1. The HempCheck Capstone project is a proof of concept prototype for blockchain enabled hemp seed tracking. Specifically we are exploring high level design aspects for a centralized, trustless network for tracking hemp seed. Hemp seed is a high value, highly distinguished product. Due to regulatory requirements and the specificity required for useful seed stock, hemp seed is an ideal candidate for blockchain backed asset. The scope of the HempCheck Capstone project is to create a proof of concept prototype which demonstrates the key principles and provides stakeholders with insight into how blockchain can be applied in this area. Our demo system consists of three primary components: Blockchain backend, proxy API, and frontend interface. We have chosen this simple approach to distill any semantic complications and focus on the functional components of a final system. The Blockchain backend is written using Hyperledger Sawtooth which implements a couple of simple smart contracts to handle our data. Sawtooth automatically exposes an API which we abstract to a proxy API which can handle authentication and data validation. A functional react frontend is finally used to allow browsing hemp seed crop data and to demonstrate data upload capabilities.

2. HempCheck is a Hyperledger Sawtooth based blockchain application designed to track hemp and hemp seeds through the growth and distribution process. We have developed a NodeJS based Proxy API with a number of useful features to make interfacing with the blockchain simple. We have also developed a web interface to allow an easily accessible, cross-platform interface with the blockchain. The web interface allows users a quick and easy way to upload government regulation test results, or make quick updates about the status of a field. Due to the implementation of a Proxy API, users can increase the granularity of tracking through the use of IOT style applications to truly track every aspect of the process. HempCheck is necessary because it provides an immutable public record of a crop's entire lifecycle. This public record provides proof that the hemp grown from their seed will fall within the government regulations, provided the farm follows the proper procedures. Farmers looking to buy hemp seed can also use this record of the crop to determine the germination rate of the seed to know how many seeds they need to buy for a given area of farmland. Currently in the hemp industry, millions of dollars are going to waste due to inaccurate tracking of seed genetics, THC levels, or even malicious modification of test results. HempCheck hopes to solve these issues by providing the complete history of every hemp seed grown by a HempCheck tracked farm.

3. HempCheck is a blockchain backed solution intended to mitigate existing issues in the hemp seed supply chain. It consists of two main components: a HyperLedger Sawtooth blockchain network running on an AWS EC2 instance and a frontend written in React.

Blockchain technology provides an indelible recording of transaction histories which is essentially 100% trustworthy if architected correctly. This project is importantly just a proof of concept; we show that blockchain technology can be successfully applied to the agricultural domain--specifically hemp. We have implemented the essential functionality of writing data to the blockchain and being able to serve that data in an accessible manner to the end user.

General Audience

1. HempCheck is a blockchain based application designed to track hemp and hemp seeds through the growth and distribution process. HempCheck application allows farmers an easy method of tracking every step of the hemp seed from planting the seeds to selling a freshly grown batch. Our website allows users to easily upload test results from government regulators. Seeds tracked with HempCheck are reliable because the blockchain acts as an immutable public record of the crop. Currently in the hemp industry, millions of dollars are going to waste due to inaccurate tracking of seed genetics, THC levels, or even malicious modification of test results. HempCheck hopes to solve these issues by providing the complete history of every hemp seed grown by a HempCheck tracked farm.

2. Farmers of hemp often have a difficult time finding quality seed to grow. It is easy to falsify a seed's pedigree and the cost to the farmer can be extreme when planting bad seed. If the resultant hemp has a THC (Tetrahydrocannabinol, or the main active ingredient in marijuana) percentage over the legal limit (0.3%), then the entire crop of seed could be ruined. HempCheck uses blockchain technology--the same technology utilized by bitcoin--to create a trustworthy record for hemp seeds that cannot be changed. This allows farmers to purchase hemp seeds from HempCheck with the confidence they are getting exactly what they are paying for. The main portal to HempCheck is a simple website that exposes the crop information to the farmers. They can browse different crops and view detailed information such as test results.

3. The HempCheck Capstone project is a proof of concept prototype for tracking hemp seed. Hemp seed is especially valuable, running about $1 per seed and with lots of government restrictions. Because of this, tracking and testing the seeds is especially important. Right now, hemp growers face issues with dependability of their seed quality because there is no widely available centralized entity for seed purchasers to see what they are buying. Blockchain is a promising technology for improving the reliability of this data because it allows many people to confirm information about the hemp seed.Our prototype includes three major components. First, we have the blockchain component

which stores and verifies data between everyone who is adding data to the network. We are using an existing framework called Hyperledger Sawtooth which provides the core blockchain code to build the project. There is also a frontend component which is how users can actually interact with the blockchain by viewing different hemp crops and farms. There is one final layer called the Proxy API, which helps move information between the frontend website and the blockchain in a way they can both understand.

Novice Audience

1. HempCheck is a program that helps hemp farmers keep track of important information about their crops. The information the farmers enter into the program gets shared with everyone else who uses it so they can't change it later in secret. Hemp can grow into an illegal crop if the farmer does not follow certain rules. By using HempCheck, the farmer can prove that their crops are legal and that the seeds produced by them will also be legal. HempCheck can also allow farmers to track their crops well enough to show how likely their seeds are to grow when they are selling them. This information helps the farmers who are buying seeds know how many seeds to buy for their farm.

2. Back in the time of the founding fathers like Benjamin Franklin, Americans used to grow a wonderful plant called hemp. Hemp had so many uses such as making paper, rope, and clothes to wear. Unfortunately, the government decided to stop letting farmers grow hemp back in 1937--even though it was so useful and an important part of American history. Then, starting in 2018, the government let farmers start growing hemp again. Our product, HempCheck, lets those farmers look at different seeds for the hemp plants they want to grow. The thing that makes our project special is it lets farmers know that everything they are reading about the seeds is true. Other people that sell seeds might lie about exactly how the seeds will grow up and that could cost the farmers lots of money.

3. Hemp is a plant of growing importance to Oregon agriculture. Our project focuses on tracking hemp seeds using a new technology called Blockchain. Tracking these seeds is very important because they are expensive compared to other seeds and won't grow unless they are thoroughly checked. Blockchain technology is a shared computer program that helps everybody to agree about their information with each other and confirm that it is correct. Our project's goal is to create a demonstration product so that everyone who is interested in using it can think about how to make it more useful. We used an existing system called HyperLedger Sawtooth to create a blockchain for tracking these hemp seeds. Sawtooth makes it a lot easier to create things like a blockchain because other people have made a blockchain with sawtooth before and we can ask them for help. The blockchain is only part of our project. It is useful for storing

information, but there are two other parts. One, which we call the API, is good at transferring information into and out of the blockchain. The last part of our project is a website. This website allows everyone who is interested to look at the information which is on the blockchain and add information to it.