Mushroom Environment Monitoring System

Purpose:

The purpose of our project is to develop an IoT-based solution for monitoring and optimizing the environmental conditions in mushroom cultivation. By integrating sensors, data analytics, and automation, we could enhance mushroom growth, quality, and resource efficiency. Through real-time monitoring and control, our system will empower cultivators to achieve higher yields and improved cultivation outcomes while reducing manual intervention and environmental impact.

STAGE 1

DISCOVERING STAGE

TARGET AUDIENCE: Mushroom Cultivators

EXECUTIVE INTENT:

The intent of our project is to provide a comprehensive and automated solution for monitoring and managing mushroom cultivation.

The system consistently tracks essential factors, including temperature, humidity, CO2 levels, light intensity, and substrate moisture within the environment where mushrooms are cultivated.

Utilizing the gathered data, the system has the capability to autonomously manage environmental variables by making adjustments, such as modifying temperature and humidity levels.

If the system identifies any deviations from the target parameters or potential concerns, it has the capacity to promptly transmit real-time alerts and notifications to growers. This facilitates prompt corrective measures and aids in mitigating the risk of crop loss.

SUCCESS FACTORS:

- Optimized growing conditions
- Automation and labour savings
- Data-driven insights
- Guaranteed profits
- Remote monitoring and control

TECHNOLOGY CONSTRAINTS:

- Internet and smartphone is required
- Network issues in rural areas.

PRIMARY RESEARCH

In our primary research, we conducted interviews with five mushroom cultivators to gain insights into user behaviors and requirements.

1. What are the main challenges you face in traditional mushroom cultivation in terms of environmental monitoring and control?
2. How do you currently monitor and control temperature, humidity, and other environmental factors in your mushroom cultivation process?
3. What are the common issues or obstacles you encounter when trying to maintain optimal environmental conditions for mushroom growth?
4. Are there specific stages in the mushroom cultivation process where maintaining precise environmental conditions is particularly critical?
5. How do you handle environmental adjustments during different growth stages of mushrooms?
6. Have you explored or implemented any technology solutions, such as IoT-based systems, for automating and enhancing mushroom cultivation?
7. What features or functionalities would you find most valuable in an IoT-based mushroom cultivation environmental monitoring system?
8. How do you envision such a system improving your cultivation process, yield, and overall outcomes?
9. Are there any concerns or limitations you foresee with adopting an IoT-based solution for mushroom cultivation?
10. Can precision farming be employed to cultivate exotic mushrooms?

Responses:

1.**Srinivasan Farm,** Redhills(Mushroom Cultivation)

Contact no: 94447 54559

Major problems: Production site contamination,Seed bag contamination,Inconsistent seed output

Inconvenience in maintaining proper temperature and humidity.

Temperature alteration for different climates and sand related problems.

Produced yield does not match labour costs.

Even with good produced yield, no proper marketing.

Even if marketed well, issues related to decrease in quality or change in colour before reaching the destination.

People with high investments go for button mushrooms;less investments-oyster mushrooms.

Lack of general awareness and good networking in the initial stages.

2.Shanjeev, House of mushrooms,Guduvanchery

Contact no:+91 96298 95988

The primary worry for numerous farmers will be the aspect of affordability.

The most common issue is contamination due to the lack of temperature control and humidity.

Lacking sufficient scientific expertise in the cultivation of mushrooms.

With the help of precision farming targeted exotic mushrooms can be cultivated.

With adequate infrastructure and diligent care, it is possible to cultivate any variety of mushrooms.

3.Faizal Satheesh,mushroom cultivator,Thallapalli.

Contact no:+91 81369 67544

Strict and accurate whether controlling is required which only hi-tech farms could spend money on.

Precision farming is expensive and ordinary cultivators might resort using natural methods which has a lot of drawbacks.

In a high-tech farm, we can achieve maximum crop yield regardless of external weather conditions.

Even a slight change of 2 or 3 degrees can impact the crops, yet it has been disregarded by people.

Pasteurization is equally crucial. Since we're dealing with fungi, eliminating all bacteria and molds becomes imperative before the spawning process.

4.Ravi,Engineer,Coimbatore

Contact no:+91 93449 96000

Experiencing discomfort in the fingers and hand joints while manually filling the bag.

Contamination by airborne fungi and micro organism

People quit when they don't make quick profits.

COMPETITIVE ANALYSIS:

1.SMALLHOLD

DESCRIPTION: Smallhold is a company that focuses on creating small-scale, automated mushroom farms for businesses. Their primary objective is to revolutionize and democratize fresh food production by providing innovative solutions for growing mushrooms in urban and controlled environments.

FOUNDING DATE: 2017

PLATFORM: Web Application

BUSINESS MODEL: BUSINESS TO CONSUMER(B2C)

REVENUE MODEL: Smallhold generates revenue by offering businesses access to compact, automated mushroom farms complemented by continuous assistance and services.

USER INTERFACE:

- Our mushrooms
- Our farms
- Shops
- Careers
- Blogs
- Recipes

STAGE 2

DEFINING PHASE

USER BACKGROUND:

- Mushroom cultivators lack general awareness and good networking in the initial stages.
- Mushroom growers are hesitant about cultivating exotic mushroom varieties.
- They are concerned about whether their investment will yield a profitable return.
- Some retail cultivators lack sufficient understanding of the required environmental conditions and hence they face loss.
- Due to a lack of knowledge, they have refrained from attempting new varieties.

CHALLENGES AND PAINS:

- Limited understanding of the scientific principles underlying mushrooms.
- Strict and accurate whether controlling is required which only hi-tech farms could spend money on.
- In a technologically advanced farm, it is possible to achieve optimal crop yield independent of external weather conditions, a challenge that smaller cultivators often struggle to address.
- Contamination due to the lack of temperature control and humidity.

USER INTEREST:

- Client interested in how to make huge returns.

- Cutting costs whenever and wherever possible.
- The user is keen on cultivating mushrooms that are established and not considered experimental.

EMPATHY MAPPING

USER PERSONA: Mushroom cultivator

SAYS:

- I aim to guarantee that my mushrooms thrive in ideal environments.
- I find it annoying when I lack the ability to remotely monitor temperature and humidity.
- I have concerns about the potential impact of contamination and pests on my mushroom cultivation.
- I require a method to promptly receive alerts if any issues arise.

THINKS:

- I wish this system gives me good returns.
- If i can trust the accuracy of this system.

DOES:

- Manually observes and tracks temperature, humidity, and additional environmental variables.
- Regularly assesses the advancement of mushroom growth.
- Takes proactive measures to modify conditions as needed.
- Conducts online research to discover optimal methods for cultivating mushrooms.

SEES:

- Tranquility achieved via remote monitoring and instant alerts.
- Efficiency gained by eliminating manual monitoring and adjustments.
- Enhanced yield and success rate.
- Assurance in the cultivation process.

Component Specifications:

Microcontroller: ESP-32 Wi-Fi Module

Sensors:

· Temperature and Humidity Sensor: DHT22

· Light Intensity Sensor

· Soil Moisture Sensor

. NDIR CO2 Sensor

Actuators:

- Humidifier/Dehumidifier
- Cooling/Heating Element

Breadboard

LED

Resistor

Button

Buzzer

Power Source

Jumper Cables

Enclosure and Mounting