**Green Hydrogen Production and Transportation with Monitoring System**

**1. Overview**

The Green Hydrogen Production and Transportation System is an IoT prototype that harnesses solar panels to generate hydrogen fuel from water. Its primary focus is to tackle the issue of flashbacks that can occur during hydrogen production. To mitigate this problem, the system employs a machine learning model that predicts flashbacks and is connected to an actuator, which can promptly shut off the power supply to prevent any potential hazards.

Furthermore, the system incorporates a water pump to maintain a balanced level of water consumption and hydrogen fuel usage. This ensures that the system operates efficiently by providing a consistent supply of water for the electrolysis process while regulating the production of hydrogen fuel.

By addressing the challenge of flashbacks and optimizing water consumption, the Green Hydrogen Production and Transportation System aims to enhance the safety and efficiency of hydrogen production. With the integration of solar panels, the system also promotes the utilization of renewable energy sources, contributing to a more sustainable and environmentally friendly approach to fuel production.

**2. Features**

The Green Hydrogen Production and Transportation System includes the following features:

- Solar panels: The system uses solar panels to produce electricity to power the hydrogen production process.

- Electrolyzer: The system includes an electrolyzer that uses electricity from the solar panels to split water into hydrogen and oxygen.

- Hydrogen storage tank: The system includes a hydrogen storage tank to store the produced hydrogen fuel.

- Machine learning model: The system uses a machine learning model to predict flashbacks during hydrogen production.

- Actuator: The system includes an actuator that can shut off the power supply system in the event of a predicted flashback.

- Water pump: The system includes a water pump to balance the level of water consumption and used hydrogen fuel.

- Alarm: The system includes an alarm to alert users in case of any malfunctions or errors.

- Visualization: The system includes a visualization tool to display all measurements and data in real-time.

**3. Components**

**Solar tracker:**

Solar panel

2 LDR

2 Resistors

Servo motor

Holder

Wires

Arduino

12V Battery

Relay

**Electrolyzer:**

Stainless steel electrodes (cathode, anode)

Wires

Water tank

Gases tanks(collectors)

DHT

Ultrasonic

MQ-8

Raspberry pi

2 breadboards

Buzzer

LEDs

Gas pipes

**4. Process**

The Green Hydrogen Production and Transportation System operates as follows:

1. Solar panels generate electricity to power the hydrogen production process.

2. Water is pumped into the electrolyzer, where it is split into hydrogen and oxygen.

3. The produced hydrogen is stored in the hydrogen storage tank.

4. The machine learning model predicts any potential flashbacks during hydrogen production.

5. If a flashback is predicted, the actuator shuts off the power supply system.

6. The water pump balances the level of water consumption and used hydrogen fuel.

7. The alarm alerts users in case of any malfunctions or errors.

8. The visualization tool displays all measurements and data in real-time.

**5. Conclusion**

In conclusion, the Green Hydrogen Production and Transportation System is an advanced IoT prototype that utilizes solar energy to produce green hydrogen fuel from water. It incorporates a machine learning model, actuator, water pump, alarm system, and visualization tool to ensure safety, efficiency, and user-friendliness. With its sustainable energy source, intelligent optimization capabilities, automated control, reliable water supply, safety features, and user-friendly interface, the system represents a significant advancement in the field of renewable energy technologies.