Prod-E-G Hackathon Submission

# Problem Statement:

India's agriculture is among the least efficient users of water in the world. On average, it takes 5,600 liters of water to produce 1 kilogram of rice in India, compared to only 355 liters in China. This inefficiency leads to massive water wastage, which is unsustainable, particularly in regions where water scarcity is a growing problem. I have witnessed this first-hand in my own family, as my grandfather has faced significant water shortages on his farm. Traditional irrigation systems flood fields without considering factors like soil moisture or weather conditions, exacerbating the issue of water wastage.

# Proposed Solution: Smart Irrigation System Powered by IoT and AI

The proposed solution is a Smart Irrigation System that leverages Internet of Things (IoT) devices and Artificial Intelligence (AI) to optimize water usage based on real-time data from the environment.

## Key Features:

1. Soil Moisture Sensors: IoT-based sensors installed in fields will continuously monitor soil moisture levels. These sensors communicate data to a centralized AI system that determines when and how much irrigation is necessary based on the plant’s requirements.

2. Weather Forecast Integration: The system will pull weather forecast data to predict rainfall. If rain is expected, the system will adjust irrigation schedules, reducing water wastage by avoiding unnecessary watering.

3. Automated Water Control: The AI algorithm will analyze the soil moisture data, weather conditions, and crop type to automatically manage water release through drip or sprinkler irrigation systems. It can even prioritize specific areas of the farm that need water most, ensuring efficient distribution.

4. Mobile App Control: Farmers will have access to a user-friendly mobile application that provides real-time insights into water usage, soil moisture levels, and weather forecasts. They can also manually override the system or adjust settings as needed.

## Benefits of the Solution:

• Water Conservation: By using real-time data and predictive analytics, the system ensures that water is used only when necessary, potentially reducing water consumption by up to 30-40%. This could significantly close the efficiency gap between India and countries like China.

• Cost Savings: With less water being wasted, farmers can save on their water bills and reduce the need for expensive water infrastructure.

• Scalability: The system can be deployed on small family farms or scaled up for larger agricultural operations, making it a versatile solution for water management challenges across India.

# Conclusion:

As an undergraduate student of Electronics and Communication Engineering (specializing in AI & ML), I have gained the foundational knowledge required to develop and apply IoT and AI technologies effectively. This Smart Irrigation System leverages these technologies to address the water inefficiency issues plaguing Indian agriculture. Inspired by personal experiences and my academic background, I aim to create impactful, data-driven solutions that conserve resources while ensuring sustainability in agriculture.