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| **Stage Activity** | **Tools** | **Outcome** | **Metrics/Rubrics** |
| PHASE - I |  |  |  |
| Stage-1:Brainstroming | GD:  Challenges – Unoptimized water usage, manual irrigation dependency, over- or under-watering risks  Opportunities – Efficient water management using IoT and ML for smart decision-making  Ideas – Develop an automated irrigation system using real-time data and predictive analytics for optimal performance in greenhouses  FLASH CARD:  Type - Tech-Driven Agri Project  Domain - Precision Agriculture / IoT System  Stakeholders - Farmers, Greenhouse Operators, Agri-tech Startups, Water Boards  Technologies – Sensors are Soil Moisture, DS18B20 (Temperature), optional DHT11 (Humidity) Processing with ESP32 + Cloud Software: ML models for scheduling, cloud dashboard, trend analysis tools Connectivity through Wi-Fi or LoRa to sync sensor data with cloud | Refined PS (Key Points): A Smart Irrigation System that can: 1. Monitor real-time soil and climate conditions 2. Use ML to analyze moisture trends 3.Forecast water needs 4.Automate irrigation scheduling 5. Improve water use efficiency and crop yield through intelligent decisions | (4) The problem is restated well with insights and outputs presented in detail (3) The problem is restated well with vague insights (2) The problem is clearly stated but lacks output detail (1) Vague problem and unclear outputs |
| Stage - 2:Idea Posting | Mind Map: | Document: |  |
| PHASE - II |  |  |  |
| Stage - 3:Customer Mapping | Questionnaire:  1.) For greenhouse farmers  2.) For agri-business operators  3.) For farm equipment suppliers  4.) Agricultural extension officers | Requirement Specification from Customer Mapping:  \* Real-time alerts for soil moisture levels, reduce labor in irrigation.  \* Cloud dashboards for multi-greenhouse monitoring, data export support.  \* Modular hardware with easy replacement, battery backup support.  \* Visualization for training farmers, ability to monitor remotely | Rubrics/Metrics:  (4) Questionnaire is exhaustive and the inferences are established well as resource requirements  (3) The questionnaire is exhaustive but the inferences are not well established as resource requirements  (2) The questionnaire is not exhaustive but the inference mapping is good  (1) The questionnaire is not defined properly and the inferences out of them are also not good |
| Stage - 4:Idea Layout | Sticky Notes: | Overview: |  |
| PHASE - III |  |  |  |
| Stage - 5: Reflection | Checklist:  Soil Moisture & DS18B20 sensors integrated.  Cloud platform (e.g., AWS IoT, ThingSpeak).  ML model trained for irrigation scheduling.  Dashboard (e.g., Power BI) for visualization. | Potential Gaps:  Sensor accuracy in varied soil types.  Dependency on stable internet for cloud analytics.  Scalability for large greenhouse networks. |  |