Project Design Phase-I
Proposed Solution

Date	23 September 2023
Epic Project Group No.	216
Epic Project Name	Agriculture 4.0 - Integrated Smart Irrigation System

Proposed Solution Template:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Typical agricultural practises often involve the inefficient and inaccurate use of water, leading to over-irrigation, water waste, and suboptimal crop yields. the development and use of intelligent irrigation systems capable of anticipating climate change and managing agricultural water supplies sensibly. The irrigation methods used today are not able to adapt to changing environmental conditions or maximise water distribution based on real-time data. Many of the irrigation systems in use today are capable of making optimal use of water, but they also depend on healthy plants. Different amounts of water are required by plants at different stages of their lives. For a plant to develop strong and robust or to create a high-quality product, it may require a lot or little of it depending on the situation. Farmers are not very familiar with technology and their standards because of their illiteracy.
2.	Idea / Solution description	The project uses water resources effectively in accordance with plant requirements as determined by several field-deployed sensors that are coupled with machine learning models. The ML model aids in weather forecasting so that crops may be provided with water based on those conditions. Project irrigate the crop less during its early growth so that the roots become deeper. When the flowers and fruits appear, the crop will use less water and will be able to absorb more nutrients from the soil. Web and augmented reality are used in the design of user interfaces. AR technology can make system interaction simple for farmers. Internet of Things technology makes it possible to remotely access a water pump from any location, making it ubiquitous.

3.	Novelty / Uniqueness	Using AR technology, farmers can interface with the system more simply and overcome their lack of familiarity with technology. Water a crop or plant in varying amounts depending on its stage of life. For example, give it less water at the beginning to encourage deeper roots, which will allow it to absorb more water and nutrients from the soil when it is ready to bloom and produce fruit.
4.	Social Impact / Customer Satisfaction	The suggested smart irrigation system offers a comprehensive approach that makes use of cutting-edge technology to solve important agricultural issues. The technology adjusts irrigation schedules depending on current weather forecasts and optimises water resources in accordance with plant requirements by fusing machine learning models with field-deployed sensors. Reduced irrigation during the early stages of crop growth promotes deeper root formation, improving soil health and long-term sustainability. In addition to providing accessibility for farmers with differing levels of tech competence, the usage of online and augmented reality interfaces also makes for an interesting and instructive user experience. By utilising Internet of Things (IoT) technology, water pumps may be accessed remotely, which facilitates widespread system control and ease. The social effect is significant and includes things like agricultural yield gains, economic empowerment for farming communities, and water conservation. Resource savings, better crop quality, and the ability of farmers to confidently handle the challenges of contemporary agriculture are all expected to contribute to customer satisfaction. All things considered, the suggested method to agricultural water management is revolutionary and inclusive, with promising results for farmers and the larger society.
5.	Revenue for Project	
6.	Scalability of the Solution	The suggested smart irrigation system's scalability is supported by a multimodal strategy. The system can be easily implemented into a variety of agricultural settings, accommodating varied crop kinds and regional circumstances, thanks to its flexibility to different crops and habitats. Because of the system's modular nature, farmers can easily

		integrate it with their current infrastructure and expand it to meet their specific demands. Utilising IoT connection and cloud-based infrastructure guarantees that the system will scale with responsiveness, efficiency, and the ability to handle growing data volumes. By adapting the technology to particular agricultural practises and tastes, localised customisation increases its applicability to a wider range of populations. In order to promote a cooperative and inclusive approach to scaling, cooperation with agricultural extension agencies and cooperatives, who offer training, support, and community participation, makes widespread adoption easier. Furthermore, the inclusion of affordability and subsidy programmes removes financial obstacles, opening up the technology to a wider user base and encouraging its widespread application across various agricultural environments.