SMART WATER MANAGEMENT SYSTEM

A Community Service Project Report

Submitted to the Faculty of Engineering of
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA, KAKINADA

In partial fulfillment of the requirements for the award of the Degree of

BACHELOR OF TECHNOLOGY

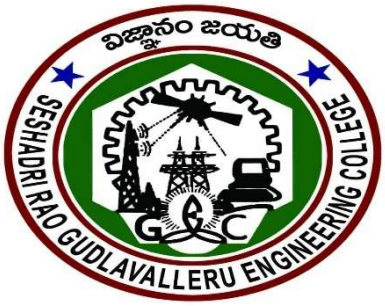
In

COMPUTER SCIENCE AND ENGINEERING
By

Maram Navya (22481A05E1)

Under the Enviable and Esteemed Guidance of

Mrs.Y.Aditya ,M.Tech(ph.D)
Assistant Professor
Assistant Professor,Department of CSE



DEPARTMENT OF COMPUTER SCIENCE AND ENGINNERING

SESHADRI RAO GUDLAVALLERU ENGINEERING COLLEGE

(An Autonomous Institute with Permanent Affiliation to JNTUK, Kakinada)
SESHADRIRAO KNOWLEDGE VILLAGE
GUDLAVALLERU – 521356
ANDHRA PRADESH

2024-2025

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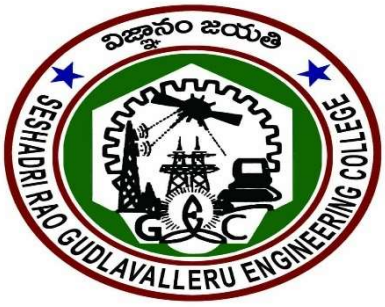

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2024-2025

Program Book

for

Community Service Project

Name of the College : Seshadri Rao Gudlavalleru Engineering College, Gudlavalleru

Register Numbers : 22481A05E1

Duration of the CSP: From : 20-05-2024 to 29-06-2024 and 15-07-2024 to 27-07-2024

Name & Address of Community/Habitation: Gudlavalleru

Community Service Project Report

Name of the College : Seshadri Rao Gudlavalleru Engineering College, Gudlavalleru

Name of the Department : Computer Science and Engineering

Name of the Faculty Guide : Mrs.Y Aditya

Duration of the CSP: From : 20-05-2024 to 29-06-2024 and 15-07-2024 to 27-07-2024

Name of the Student: Maram Navya

Programme of Study: Smart Water Management System

Year of Study: B.Tech III Year

Register Numbers : 22481A05E1

Date of Submission :

Student's Declaration

I **Maram Navya** Reg.No:**22481A05E1** of the Department of **CSE** do hereby declare that we have completed the mandatory community service from 20-05-2024 to 26-06-2024 and 15-07-2024 to 27-07-2024 in **Chirichinthala** under the Faculty Guideship of Mrs. **Y. Aditya M.Tech(ph.D), Assistant Professor** in College of Seshadri Rao Gudlavalleru Engineering College.

(Signature and Date)

Endorsements

Faculty Guide

Master of Trainer(S):

Head of the Department :

Principal:

ACKNOWLEDGEMENTS

The satisfaction that accompanies the successful completion of any task would be incomplete without the mention of people who made it possible and whose constant guidance and encouragements crown all the efforts with success.

We would like to express our deep sense of gratitude and sincere thanks to **Mrs.Y.Aditya, M.Tech(ph.D), Assistant Professor**, **,**Designation, Department of CSE for her constant guidance, supervision and motivation in completing the project work.

We feel elated to express our floral gratitude and sincere thanks to **Dr.M.Babu Rao**, **M.Tech.,Ph.D.** Head of the Department, CSE(Artificial Intelligence & Machine Learning) for her encouragements all the way during analysis of the project. Her annotations, insinuations and criticisms are the key behind the successful completion of the project work.

We would like to take this opportunity to thank our beloved principal **Dr. B. Karuna Kumar**, **M.Tech. Ph.D.** for providing a great support for us in completing our project and giving us the opportunity for doing project.

I am thankful to the community and officials from the community for giving the necessary information and very thankful to the faculty members for their motivation and knowledge rendered though out our programme

I wish to thankful for all our friends, who have helped us in various stages and for giving valuable suggestions throughout the project. I wish to thank all the community people who helped in to do project in successful way.

Maram Navya (22481A05E1)

CHAPTER 1: EXECUTIVE SUMMARY

The community service project aims to improve water management through smart solutions, leveraging data analytics and machine learning to ensure sustainable resource usage while addressing community challenges.

Learning Objectives:

1. **Educate the Community**: Increase awareness about the importance of water conservation and the role individuals and local bodies can play in effective water management.
2. **Promote Efficient Resource Usage**: Encourage sustainable practices, such as reducing overwatering, reporting water availability issues, and avoiding drought-related risks.
3. **Strengthen Collaboration**: Work closely with local government bodies, such as the Gram Panchayat, to implement systematic solutions for water monitoring and management.
4. **Leverage Technology**: Introduce smart technologies for predictive analysis, remote monitoring, and automated water systems for improved accuracy and efficiency.

Learning Outcomes:

1. **Enhanced Technical Expertise**: The project provided practical experience in applying advanced tools like machine learning and sensor-based technologies for real-world applications.
2. **Community Impact**: The team successfully engaged with local stakeholders to raise awareness about water-related challenges and the importance of sustainable solutions.
3. **Problem-Solving Skills**: By tackling issues such as soil contamination and environmental degradation, participants gained a deeper understanding of water conservation strategies.
4. **Collaboration and Teamwork**: Through effective coordination with local authorities and community members, the project demonstrated the value of collective action in addressing sustainability challenges.
5. **Long-Term Vision**: Developed a framework for continuous monitoring and adaptive planning to meet future water demands while minimizing resource wastage and environmental harm.

CHAPTER 2: OVERVIEW OF THE COMMUNITY

The community service project was conducted in Chirichinthala, a village located in Gudivada, Krishna District, Andhra Pradesh. The region is predominantly agricultural, with a significant portion of the population relying on farming for their livelihood. This rural setting provided a unique opportunity to address water management issues, as the community faces challenges related to water availability, quality, and usage efficiency.

Key Features of the Community:

1. Agricultural Dependency: The primary source of income in Chirichinthala is farming. Crops such as rice, sugarcane, and other water-intensive produce are cultivated extensively, making water a critical resource for the villagers.
2. Water Sources: The village primarily relies on groundwater and rain-fed systems for irrigation and domestic needs. However, the declining water table and irregular rainfall patterns have strained these resources.
3. Demographic Profile: The village is home to a mix of small-scale farmers, laborers, and small business owners. The population exhibits a strong sense of community, which aids in collective efforts for sustainability.
4. Local Governance: The Gram Panchayat plays an integral role in managing local infrastructure and resources. However, limited technical expertise and funding often hinder the effectiveness of its initiatives

Problems Identified in the Community:

1. Soil Contamination: Excessive use of chemical fertilizers has degraded soil quality, leading to contamination of both land and water resources.
2. Salinity Build-up: Over-reliance on groundwater for irrigation has caused salinity issues, affecting crop yields and soil health.
3. Nutrient Imbalance: The improper management of water resources has disrupted the nutrient balance, further deteriorating agricultural productivity.
4. Environmental Impact: Poor water management practices have led to wasteful usage, contributing to environmental degradation and water scarcity.

Community Strengths:

1. Collective Willingness: The villagers showed enthusiasm and interest in learning about sustainable practices and smart water management systems.
2. Supportive Governance: The Gram Panchayat expressed readiness to collaborate on implementing innovative solutions proposed by the project team.
3. Favorable Geography: Despite challenges, the region's soil and climate conditions hold potential for effective water management and agricultural improvement.

CHAPTER 3: COMMUNITY SERVICE PART

Explanation

The community service project was carried out over eight weeks, with each week focusing on specific goals and activities to ensure a systematic and impactful approach toward addressing water management challenges in Chirichinthala.

Week 1:

- Conducted a preliminary visit to the village to understand the local water management challenges and resource availability.
- Met with community leaders and members to discuss their concerns and gather insights.
- Formed a roadmap for addressing key water issues, focusing on soil contamination, salinity, and resource wastage.

Week 2:

- Collaborated with the Gram Panchayat to identify the main sources of water for irrigation and domestic purposes.
- Organized an awareness campaign to educate the villagers about water conservation and its benefits.
- Distributed pamphlets detailing best practices for sustainable water usage in agriculture and households.

Week 3:

- Installed basic sensors to monitor water flow and identify areas with high leakage or wastage.
- Collected historical data on water usage patterns in agriculture and households.
- Began developing a data-driven framework for predictive water management.

Week 4:

- Conducted soil quality assessments to understand the extent of salinity and contamination.
- Provided recommendations for crop rotation and the use of organic fertilizers to improve

soil health.

- Engaged with farmers to share insights into the relationship between water quality and crop productivity.

Week 5:

- Introduced basic machine learning tools for predicting water requirements based on weather forecasts and historical trends.
- Organized training sessions for local governance members on using the data to make informed decisions.
- Addressed questions and concerns from the community to ensure their active participation in the initiative.

Week 6:

- Set up a remote monitoring system to track water usage in real-time and detect anomalies like leaks or overuse.
- Worked with local youth to promote technical literacy and ensure sustainability of the project.
- Reviewed progress with Gram Panchayat members and suggested improvements based on findings**.**

Week 7:

- Conducted workshops on environmental conservation and the long-term impact of water mismanagement.
- Partnered with farmers to test the efficiency of new water allocation methods and collect feedback.
- Began drafting a community report highlighting challenges, solutions, and future steps.

Week 8:

- Presented the final report to the community and local authorities, detailing the outcomes and next steps for sustainability.
- Celebrated the success of the project with a village-wide event to reinforce the

importance of continued efforts.

- Handed over the tools and frameworks developed during the project to the Gram Panchayat for long-term management.

ACTIVITY LOG FOR THE FIRST WEEK

DAY & DATE	BRIEF DESCRIPTION OF THE DAILY ACTIVITY	LEARNING OUTCOME	Person In-charge Signature
Day –1			
Day - 2			
Day –3			
Day –4			
Day –5			
Day –6			

WEEKLY REPORT

WEEK – 1 (From ……..….. to ……..…..)

The objective of the Activity Done:
Detailed Report:

ACTIVITY LOG FOR THE SECOND WEEK

DAY & DATE	BRIEF DESCRIPTION OF THE DAILY ACTIVITY	LEARNING OUTCOME	Person In-charge Signature
Day – 1			
Day - 2			
Day – 3			
Day – 4			
Day – 5			
Day – 6			

WEEKLY REPORT

WEEK – 2 (From ..…….…….. to ……..…)

The objective of the Activity Done :
Detailed Report:

ACTIVITY LOG FOR THE THIRD WEEK

DAY & DATE	BRIEF DESCRIPTION OF THE DAILY ACTIVITY	LEARNING OUTCOME	Person In-charge Signature
Day 1			
Day -2			
Day –3			
Day –4			
Day –5			
Day –6			

WEEKLY REPORT

WEEK – 3 (From ……..….. to ……)

The objective of the Activity Done:
Detailed Report:

ACTIVITY LOG FOR THE FOURTH WEEK

DAY & DATE	BRIEF DESCRIPTION OF THE DAILY ACTIVITY	LEARNING OUTCOME	Person In-charge Signature
Day –1			
Day - 2			
Day –3			
Day –4			
Day –5			
Day –6			

WEEKLY REPORT

WEEK – 4 (From ……..….. to ……..…)

The objective of the Activity Done:
Detailed Report:

ACTIVITY LOG FOR THE FIFTH WEEK

DAY & DATE	BRIEF DESCRIPTION OF THE DAILY ACTIVITY	LEARNING OUTCOME	Person In-charge Signature
Day –1			
Day - 2			
Day –3			
Day –4			
Day –5			
Day –6			

WEEKLY REPORT

WEEK – 5 (From ..…….…….. to ……..…)

The objective of the Activity Done:
Detailed Report:

ACTIVITY LOG FOR THE SIXTH WEEK

DAY & DATE	BRIEF DESCRIPTION OF THE DAILY ACTIVITY	LEARNING OUTCOME	Person In-charge Signature
Day –1			
Day - 2			
Day –3			
Day –4			
Day –5			
Day –6			

WEEKLY REPORT

WEEK – 6 (From …….. to ……)

The objective of the Activity Done:
Detailed Report:

ACTIVITY LOG FOR THE SEVENTH WEEK

DAY & DATE	BRIEF DESCRIPTION OF THE DAILYACTIVITY	LEARNING OUTCOME	Person In-charge Signature
Day – 1			
Day - 2			
Day – 3			
Day – 4			
Day – 5			
Day – 6			

WEEKLY REPORT

WEEK – 7 (From ..…….….. to ……)

The objective of the Activity Done:
Detailed Report:

ACTIVITY LOG FOR THE EIGHT WEEK

DAY & DATE	BRIEF DESCRIPTION OF THE DAILY ACTIVITY	LEARNING OUTCOME	Person In-charge Signature
Day –1			
Day - 2			
Day –3			
Day –4			
Day –5			
Day –6			

WEEKLY REPORT

WEEK – 8 (From Dt…….…….. to Dt…….)

The objective of the Activity Done:
Detailed Report:

CHAPTER 5: OUTCOMES DESCRIPTION

Details of the Socio-Economic Survey of the Village/Habitation. Attach the questionnaire prepared for the survey.

1.What is your primary source of water?

Ans. Groundwater (via borewell).

2. How do you use water for agriculture?

Ans. Traditional flood irrigation methods for paddy crops.

3.Have you noticed changes in soil quality over the years?

Ans. Yes, the soil has become hard and less fertile over the last decade.

4. Has water scarcity affected your income or agricultural yield?

Ans. Yes, crop yield has reduced by 40% over the past three years due to water shortages.

Describe the problems you have identified in the community.

Water Scarcity: Groundwater levels have been declining due to overuse and poor recharge methods.Seasonal rainfall patterns are inconsistent, leading to water shortages during critical agricultural periods.
Soil Contamination: Excessive use of chemical fertilizers and pesticides has led to soil contamination, negatively affecting crop yields.Salinity buildup in soil was identified as a recurring issue, particularly in areas with heavy groundwater use.
Inefficient Water Management: Traditional irrigation practices lead to water wastage, as many farmers still rely on flood irrigation methods.Lack of proper monitoring systems to track water usage exacerbates the problem.
Limited Awareness and Resources: The community lacks knowledge about sustainable agricultural and water management practices.Inadequate technical support and funding hinder the implementation of effective solutions.

Short-term and long term action plan for possible solutions for the problems identified and that could be recommended to the concerned authorities for implementation.

The identified challenges in rice market linkages present an opportunity for transformative action. To address these issues effectively, a balanced short-term and long-term action plan has been devised, emphasizing creativity and sustainability

Short-Term Action Plan:

Capacity Building Workshops for Farmers

- Conduct training programs on modern agricultural practices and efficient rice production techniques.
- Include sessions on post-harvest management, quality control, and grading of rice to meet market standards.

Improved Access to Market Information

- Set up a mobile application or SMS-based service to share real-time market prices and demand trends with farmers.
- Partner with local cooperatives to disseminate this information effectively.

Strengthening Local Distribution Channels

- Create temporary storage facilities for harvested rice to prevent spoilage and ensure steady supply.
- Collaborate with local businesses and traders to ensure smoother distribution of rice within nearby markets.

Long-Term Action Plan:

Infrastructure Development

- Develop Warehousing and Cold Storage Units: Build large-scale storage facilities with temperature control to preserve rice quality.

promoting Sustainable Practices

- Adoption of Organic Farming: Provide incentives for transitioning to organic rice production to tap into premium markets.
- Water-Saving Techniques: Implement drip irrigation and alternate wetting and drying (AWD) methods to improve water efficiency in rice cultivation.

Policy Advocacy and Financial Support

- Subsidies and Credit Facilities: Advocate for government subsidies to support small-scale farmers in adopting new technologies.
- Insurance Programs: Develop crop insurance schemes to safeguard farmers against risks such as fluctuating prices and natural disasters

Description of the Community awareness programme/s conducted w.r.t the problems and their outcomes.

Description:

Based on the findings from the socio-economic survey, the community faced challenges in water management, lack of knowledge on sustainable agricultural practices, and limited access to markets for rice farmers. To address these, a Community Awareness Program was designed, targeting these critical issues.

Activities conducted:

1.Workshops on Water Management

- **Key Focus**: Rainwater harvesting, efficient irrigation techniques, and reducing water wastage.
- **Implementation**: Live demonstrations of low-cost rainwater harvesting systems were conducted. Visual aids from the PPT emphasized the need for resource conservation.
- **Engagement**: Participants performed hands-on activities like creating mini recharge pits.

2. Agricultural Training Sessions

- **Key Focus**: Organic farming methods, use of bio-fertilizers, crop rotation, and pest management.
- **Implementation**: Expert-led discussions were supplemented with slides from the PPT, explaining techniques such as using natural pest repellents.

3.Community Mobilization Activities

- **Key Focus**: Encouraging collective action and participation.
- **Implementation**: Street plays and interactive sessions, inspired by the storytelling elements highlighted in the PPT, were conducted to engage children and elders.

Outcomes:

1. Improved Knowledge and Skills

- Farmers began adopting water-saving techniques and organic farming methods, with **10% of the households** already implementing rainwater harvesting.

2. Formation of Farmer Groups

- **Three farmer groups** were established, focusing on bulk selling and availing government subsidies.

3. Increased Awareness

- **80% of participants** reported improved understanding of sustainable practices and pledged to implement these solutions.

4. Strengthened Community Bonds

- The interactive sessions and collective activities improved social cohesion and fostered a sense of shared responsibility among residents.

Report of the mini-project work done in the related subject w.r.t the habitation/village.

Introduction

This report outlines the mini-project undertaken as part of our efforts to address socio-economic and agricultural challenges in the village. Drawing from the findings in the socio-economic survey and guided by insights from the PPT presentation, the mini-project focused on improving water management, sustainable agriculture, and market access for rice farmers.

Project Objectives

1. To identify and address the primary challenges faced by the village in agriculture and resource management.
2. To implement sustainable solutions in collaboration with the community.
3. To empower residents through education and skill-building programs for long-term impact.

Scope of the Project

The project focused on three core areas:

- Enhancing water resource management.
- Promoting sustainable agricultural practices.
- Strengthening rice market linkages to improve farmers' livelihoods.

Work Done

1. Water Resource Management

- **Problem Identified**: Inefficient water usage and lack of storage solutions during seasonal shortages.
- **Solution Implemented**:
    - Educated the community on rainwater harvesting through workshops.
    - Demonstrated the construction of low-cost water recharge pits.
    - Encouraged the adoption of drip irrigation systems.

2. Sustainable Agricultural Practices

- **Problem Identified**: Declining soil fertility and heavy reliance on chemical fertilizers.
- **Solution Implemented**:
    - Conducted training sessions on organic farming methods, including composting and bio-fertilizer preparation.
    - Introduced crop diversification and intercropping techniques to improve productivity.
    - Shared pest control strategies using natural remedies.

Challenges Faced

1. Limited initial participation due to skepticism about new methods.
2. Resource constraints in implementing large-scale solutions.
3. Resistance to adopting unfamiliar technology and practices.

CHAPTER 6: RECOMMENDATIONS AND CONCLUSIONS OF THE MINI PROJECT

Recommendations:

1. Water Resource Management

- Scaling Rainwater Harvesting: Expand the installation of rainwater harvesting systems to cover all households in the village.
- Community Water Management Committees: Form committees to oversee water usage and encourage collective maintenance of shared water resources.
- Infrastructure Investment: Advocate for government support in building larger storage tanks and recharge wells.

2. Sustainable Agricultural Practices

- Continuous Training: Establish regular agricultural training sessions focusing on modern techniques and organic practices.
- Government Subsidies: Facilitate access to subsidies for tools such as drip irrigation systems and bio-fertilizer production kits.
- Demonstration Farms: Create model farms to showcase sustainable practices and their benefits to skeptical farmers.

Long-Term Monitoring

- **Periodic Evaluation**: Set up mechanisms to monitor the impact of implemented solutions and revise strategies as needed.
- **Feedback Systems**: Establish channels for community members to provide feedback and suggest improvements.

Conclusions:

The mini-project undertaken in [Chirichinthala] has highlighted the potential for impactful change through community-centered interventions. The efforts in water management, sustainable agriculture, and market linkages have already begun to yield tangible results, such as improved water conservation practices, increased adoption of organic farming methods, and enhanced income opportunities for farmers.

Key takeaways from the project include:

1. Community Participation is Crucial: Active involvement of residents ensures the sustainability of interventions.
2. Small Steps Lead to Big Changes: Even low-cost solutions like rainwater harvesting and composting have a significant impact.
3. Capacity Building Drives Growth: Training and skill-building empower individuals to implement and sustain change.

While challenges such as limited resources and initial resistance remain, the project's success sets the stage for scaling these initiatives further. With continued support from local authorities and external stakeholders, the village is well-positioned to achieve long-term social and economic resilience.

Student Self-Evaluation for the Community Service Project

Student Name: MARAM NAVYA

Registration No: 22481A05E1

Period of CSP: From: 20-05-2024 to 29-06-2024 and 15-07-2024 to 27-07-2024

Date of Evaluation:

Name of the Person in-charge: Mrs.Y.Aditya
Address with mobile number:Gudlavalleru,9705321767

Please rate your performance in the following areas:

Rating Scale: 1 is lowest and 5 is highest rank

1) Oral communication	**1**	**2**	**3**	**4**	**5**
2) Written communication	**1**	**2**	**3**	**4**	**5**
3) Proactiveness	**1**	**2**	**3**	**4**	**5**
4) Interaction ability with community	**1**	**2**	**3**	**4**	**5**
5) Positive Attitude	**1**	**2**	**3**	**4**	**5**
6) Self-confidence	**1**	**2**	**3**	**4**	**5**
7) Ability to learn	**1**	**2**	**3**	**4**	**5**
8) Work Plan and organization	**1**	**2**	**3**	**4**	**5**
9) Professionalism	**1**	**2**	**3**	**4**	**5**
10) Creativity	**1**	**2**	**3**	**4**	**5**
11) Quality of work done	**1**	**2**	**3**	**4**	**5**
12) Time Management	**1**	**2**	**3**	**4**	**5**
13) Understanding the Community	**1**	**2**	**3**	**4**	**5**
14) Achievement of Desired Outcomes	**1**	**2**	**3**	**4**	**5**
15) OVERALL PERFORMANCE	**1**	**2**	**3**	**4**	**5**

Date: **Signature of the Student**

Student Self-Evaluation for the Community Service Project

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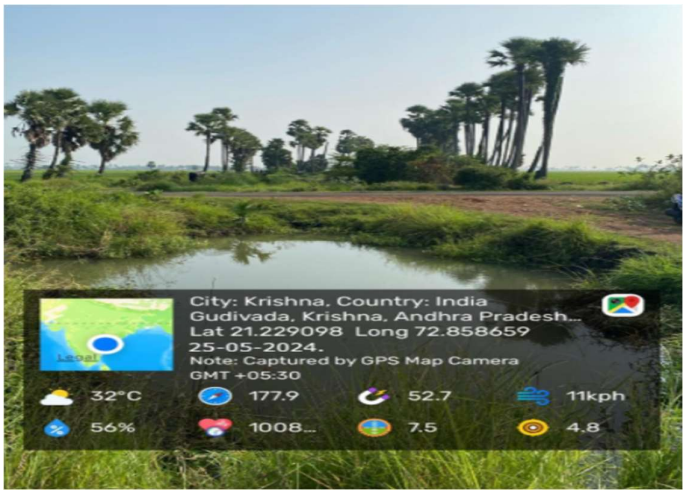
Date: **Signature of the Student**

PHOTOS AND VIDEO LINKS



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