International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 04 | April - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

Blooms & Bytes Nurturing Garden with Smart Irrigation – Planning

Ms. Siddhi Sanjay Borade[1]
Ms. Pallavi Rajendra Chavan[2]
Ms. Nivedita Vijay More [3]
Ms. Prachi Sanjay Varale[4]
Mr. Vinod Yadav[5]
Department of Electronics, Premlila Vithaldas Polytechnic (SNDT Women's University)

Abstract:
Blooms and Bytes: Nurturing Garden with Smart Irrigation proposes a cutting-edge solution to address the challenges of water scarcity and inefficient irrigation practices in gardens. The project integrates advanced technology to automate and optimize watering processes, ensuring sustainable plant growth while conserving water resources. Through the implementation of hardware components such as solenoid valves, water filters, and pressure pumps, coupled with automation facilitated by microcontrollers and real-time clock modules, the system offers precise control over irrigation schedules. Additionally, a cloud monitoring system enables remote management and monitoring of the garden layout. The project outlines a comprehensive implementation plan, market research insights, and budget considerations, emphasizing the benefits of

water conservation, environmental sustainability, and time efficiency. Collaboration with NGOs and
funding agencies is sought to support the project's implementation. Overall, the proposed smart irrigation system presents a promising solution to promote eco-friendly gardening practices and contribute to sustainable development goals.

Keywords:

Water conservation, Automation, Sustainable Technology, Smart irrigation

1 Introduction

As we navigate the challenges of water scarcity and environmental consciousness, this cutting-edge technology not only preserves our planet's most precious resource but also ensures that every drop counts in fostering bountiful harvests.

Project is a fusion of nature and technology. In this era of heightened connectivity and innovation, this project seeks to elevate traditional gardening practices by introducing a sophisticated irrigation system driven by intelligence.

2 Theme

Sustainable Technology Solution

The theme for the Smart Irrigation System revolves around harnessing advanced technology to optimize water usage in gardens. This innovative approach integrates automation to intelligently manage irrigation, ensuring efficient plant growth while

conserving water resources. The theme emphasizes sustainability, precision, and environmental consciousness, reflecting a commitment to address the

[1] siddhi.borade21@pvp.sndt.ac.in
[2] pallavi.chavan21@pvp.sndt.ac.in
[3] nivedita.more21@pvp.sndt.ac.in
[4] prachi.varale21@pvp.sndt.ac.in
[5] Vinod.Yadav@pvp.sndt.ac.in

challenges of water scarcity and promote smarter, more eco-friendly gardening practices.

Achieved goals of sustainability after implementation of this system:

1. Good health
2. Clean water & sanitation
3. Sustainable cities & communities
4. Responsible consumption & production
5. Life below water
6. Life on land

3 Problem Statement

1. The current manual watering practice in gardens is time-consuming, labour-intensive and often results in inefficient water usage. Gardeners face challenges in watering plants in the whole garden using a single pipe.
2. In the garden, a pipe is being laid to supply water. So, the pipe breaks down.
3. Gardeners block the campus premises to water plants, because of that cars are unable to enter college premises.

4 Scope Statement

- **Objectives:**

a. Design and develop a smart irrigation system integrating hardware and software components for efficient water management.
b. Implement automation features to enable scheduled watering, monitoring, and control of irrigation processes.
c. Assess the system's effectiveness in conserving water, promoting plant health, and enhancing garden aesthetics.
d. Conduct market research to identify suitable components and suppliers, considering factors such as cost, compatibility, and durability.
e. Explore opportunities for collaboration with NGOs and funding agencies to support project expenses.

- **Deliverables:**

a. Hardware components including water pumps, solenoid valves, filters, and irrigation pipes.
b. Software modules for controlling irrigation schedules, monitoring system performance, and visualizing garden layouts.
c. Installation plan detailing the placement and configuration of irrigation equipment within the college garden.
d. Implementation report documenting the steps taken to deploy the smart irrigation system and any adjustments made during the process.
e. Assessment report evaluating the system's impact on water conservation, plant growth, and overall garden management.

- **Out of Scope:**

a. The project does not involve landscaping or structural modifications to the college garden beyond the installation of irrigation equipment.
b. Training of maintenance personnel or long-term support services are not included in the project scope.
c. Marketing activities to promote the smart irrigation system to external stakeholders are beyond the scope of this project.
d. Any additional features or functionalities beyond those specified in the project objectives are considered out of scope.

- **Constraints:**

a. Budgetary constraints may limit the selection of components and suppliers for the smart irrigation system.
b. Time constraints necessitate efficient project management to ensure timely completion within the allocated schedule.
c. Technical constraints may arise during the integration of hardware and software components, requiring troubleshooting and adjustments.
d. Dependency on external collaborators, such as NGOs and funding agencies, may impact project funding and resource availability.

- **Assumptions:**

a. The college garden provides sufficient space and infrastructure to accommodate the installation of the smart irrigation system.
b. Access to water sources and electrical outlets is available within the vicinity of the garden for powering and supplying the irrigation equipment.
c. Stakeholder engagement and support from college administration are assumed to facilitate project implementation and funding acquisition.

5 Solution Description

The solution is divided in three major parts

1 Hardware

Installation of water pumps and valves to allow automate the watering process for plants.

Solenoid valve	Role of Solenoid Valve is to control the flow of water. This valve is operated by the controller at specific times.
Water filter	A water filter in an irrigation system plays a crucial role in removing impurities and debris from the water, preventing clogs in pipes
Water pressure pump	A water pressure pump in an irrigation system is crucial for ensuring adequate water flow and pressure to effectively distribute water across the irrigation network.
Thin-walled dripline	This pipe plays a crucial role in irrigation systems by providing a reliable conduit for the transportation of water to crops.

2 Automation

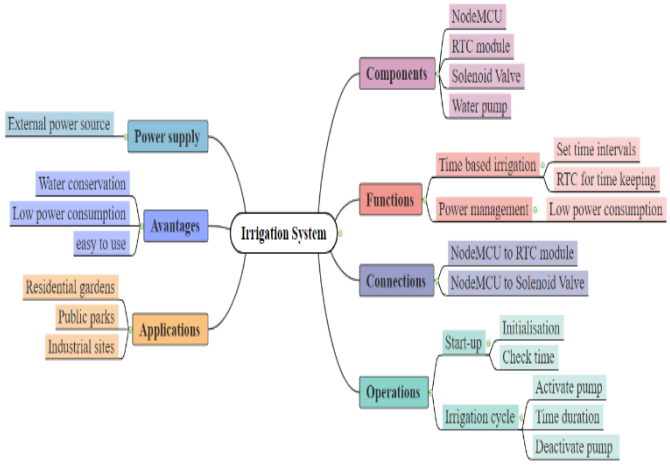
Controller integrates a timer with the ability to schedule watering times.

Microcontroller	Microcontroller will be scheduled at specific times to water plants. It will be interfaced with the RTC module to work in real time.
RTC module	Use of Real Time Clock (RTC) module is to monitor specific time that is already set in code and operate solenoid at that specific time through Microcontroller to the water plant.

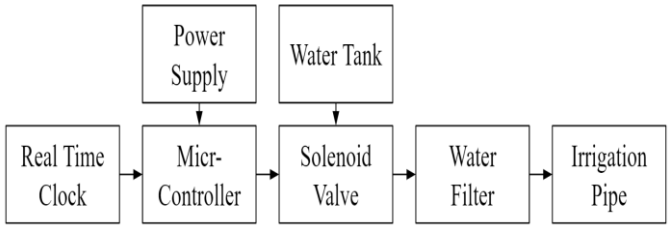
3 Software

Cloud monitoring system
Cloud subscription

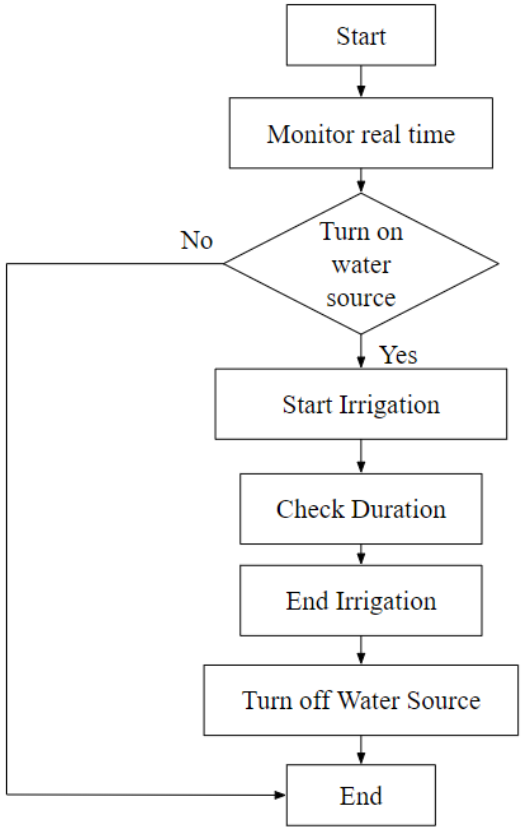
5.1 Mind Map



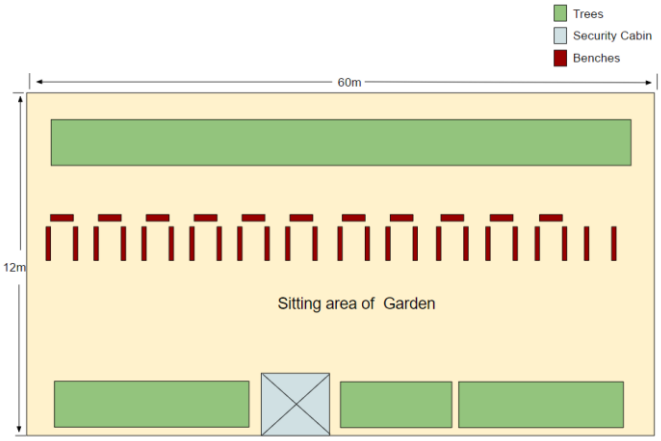
5.2 Block Diagram



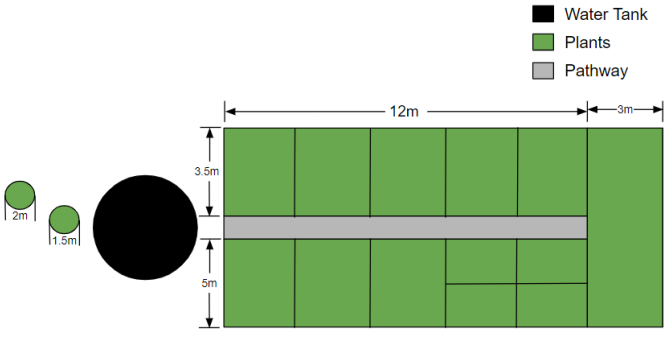
5.3 Flow Chart



5.4 Layout of Sitting Area of Garden



5.5 Layout of Kitchen Garden



5.6 Implementation plan

1. **Project Initiation and Requirements Gathering**
- Study existing systems
- Conduct surveys
- Collect required documents

2. **Conceptual Design**
- Acquire measurements of the garden
- Compare available solutions of components for the system

3. **System Design**
- Select components according to necessity
- Program and interface microcontroller with other accessories

4. **System Implementation and Testing**
- Get components from the market
- Make necessary adjustments to hardware and firmware during implementation

5. **Continuous Improvement**
- Release periodic feature updates
- Conduct user satisfaction surveys

6. **Market Research**
- Identify types of pipes used for irrigation
- Identify types of valves used for water flow
- Explore trends in sustainable and eco-friendly gardening practices
- Consider factors such as cost, ease of installation, compatibility with existing systems, and customer reviews

7. **Hardware Installation**
- Install water pumps and valves
- Install solenoid valve for controlling water flow
- Install water filter to remove impurities
- Install water pressure pump to ensure adequate water flow
- Lay thin-walled irrigation pipe for water distribution
- Install connectors and accessories as needed

8. **Automation Setup**
- Integrate controller with timer for scheduled watering
- Interface microcontroller with RTC module for real-time operation
- Program microcontroller to operate solenoid valve at specific times
- Test automation features for accuracy and reliability

9. **Software Development**
- Develop software modules for controlling irrigation schedules
- Develop software for monitoring system performance
- Develop visualization tools for garden layouts
- Implement cloud monitoring system
- Subscribe to cloud services for data storage and analysis

10. **Layout Planning**
- Design layout of sitting area of the garden
- Design layout of kitchen garden
- Plan installation of irrigation equipment within the garden layout

11. **Documentation**
- Prepare installation plan detailing placement and configuration of irrigation equipment
- Prepare implementation report documenting steps taken during deployment
- Prepare assessment report evaluating system's impact on water conservation and plant growth
- Format final project documentation for submission

12. **Budgeting and Procurement**
- Identify required components and quantities
- Estimate costs for each component
- Procure components from suppliers
- Manage budget constraints to ensure efficient spending

13. **Stakeholder Engagement**
- Engage with college administration for support and funding
- Collaborate with NGOs and funding agencies for additional support
- Communicate project progress and outcomes to stakeholders

14. **Training and Support**
- Provide training to maintenance personnel for system operation
- Offer support services for troubleshooting and maintenance post-implementation

15. **Quality Assurance**
- Conduct quality checks during hardware installation and software development
- Test system functionality and performance before final deployment

16. **Project Management**
- Create project schedules and timelines
- Assign tasks to team members
- Monitor progress and adjust plans as needed
- Ensure timely completion of project milestones

5.7 Work Breakdown Structure

1 Project Initiation and Requirements Gathering

Study of existing systems. Conducting surveys. Collection of required documents.
- Duration: 1 ½ months

2 Conceptual Design

Acquiring measurements of garden. Comparison of available solutions of components for the system.
- Duration: 1 months

3 System Design

Selection of components according to necessity. Programming and interfacing of microcontroller with other accessories.
- Duration: 2 months

4 System Implementation and Testing

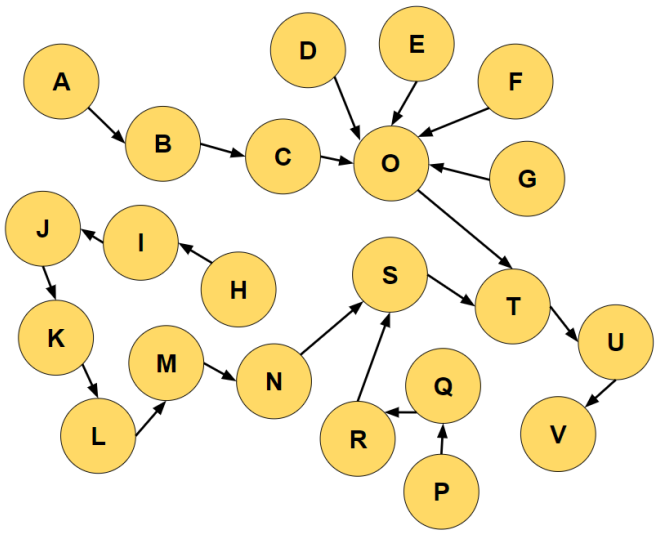
Getting components from the market. Making necessary adjustments to hardware and firmware during implementation.
- Duration: 2 months

5 Continuous improvement

Periodic feature updates released. User satisfaction surveys conducted.

5.8 Network Diagram

Random	Process	Before	After	Days
A	Select Idea Of Project	-	B	7
B	Prepare Mind Map	A	C	2
C	Scope Statement	B	O	2
D	Block Diagram	C	O	1
E	Work Breakdown Structure	B	O	1
F	Network Diagram	B	O	1
G	Gantt Chart	F	O	1
H	Circuit Diagram	A	I	2
I	Identify Components, Sponsors	H	J	15
J	Purchase Components	H	K	7
K	Designing & Circuit Preparation	J	L	1
L	Software Design	H	M	2
M	Connect & Prepare Modules	L	N	10
N	Test Circuit & Troubleshoot	M	S	5
O	Prepare Report	L	T	7
P	Identify Use	M	Q	1
Q	Prepare Question	N	R	1
R	Conduct Survey	Q	S	1
S	Modify If Suggested	N	T	6
T	Format Final Document	S	U	2
U	Bind Report	T	V	1
V	Submit Project	U	-	1



6 Market research

The market offers various options from established brands to newer startups. Factors to consider in market research include cost, ease of installation, compatibility with existing irrigation systems, and customer reviews. Additionally, exploring trends in sustainable and eco-friendly gardening practices can provide insights into potential demand for smart irrigation solutions.

Starting a business in the smart irrigation system for gardens presents a promising opportunity. With a growing interest in sustainable practices and home gardening, offering innovative solutions that conserve water and enhance plant care can attract environmentally conscious consumers. Leveraging technology to create user-friendly, efficient systems can position your business well in this emerging market.

1. Types of pipes used for irrigation:

SR. NO.	Type of Pipe	Parameters to Compare	
		Price (Rupees)	Lifespan (Years)
1	PVC Pipe	141/ Meter	100
2	PE Irrigation Pipe	140/Kg	50
3	Polyethylene	62/Kg	50
4	Micro spray belt	120/Meter	20
5	Thin wall drip line	5/Meter	10

2. Types of valves used for water flow:

SR. NO	Type of Valve	Parameter to Compare	
		Price (Rupees)	Lifespan (Years)
1	Ball Valve	4000	10
2	Gate Valve	5000	25
3	Butterfly Valve	2000	20
4	Solenoid Valve	4500	5

7 Final outcome and benefits

The smart irrigation system for the college garden significantly reduced water consumption, optimized plant health, and enhanced overall garden aesthetics. The integration of sensor technology allowed for precise moisture control, minimizing water wastage and promoting sustainable resource use. Additionally, the automated scheduling and monitoring features streamlined maintenance efforts, contributing to a flourishing and environmentally conscious campus garden.

- **Benefits of the system:**

i) Water Conservation: Smart irrigation systems optimize water usage by adjusting irrigation schedules.

ii) Environmental Sustainability: The reduction in water usage and minimized environmental impact make smart irrigation systems environmentally friendly, aligning with sustainable agriculture practices.

iii) Time Efficiency: Automated features of smart irrigation systems save gardener time.

8 Budget

Sr. No.	Components	Approximate Quantity (in Nos.)	Price (in Rs.)
1	Electronics Components	1	1,000
2	T connector	8	1,200
3	Plus connector	3	150
4	Solenoid Valve	3	4,500
5	Liver valve	10	500
6	PVC pipe (25-30 meters)	1	2,500
7	Thin-walled irrigation pipe (250-300 meters)	1	1,000
8	Elbow connector	10	450
9	Water filter	2	5,000
10	Water pressure pump (1kg)	1	5,000
11	Teflon tape	10	350
Total			21,650

9 Conclusion

"Blooms and Bytes: Nurturing Gardens with Smart Irrigation" offers a cutting-edge solution to tackle water scarcity and inefficiency in garden irrigation practices. By integrating advanced technology, including automation and cloud monitoring, the project promotes eco-friendly gardening while conserving water resources. Future trends suggest even more sophisticated systems leveraging IoT, AI, predictive analytics, and water-saving technologies. Ultimately, smart irrigation systems represent a significant step towards sustainable development and environmental conservation.