CHAPTER 1

INTRODUCTION

1.1 AIM

Rainwater harvesting aims to collect, store, and utilize rainwater for various purposes, enhancing water availability and sustainability. It addresses water scarcity by capturing rainwater from surfaces like rooftops and directing it into storage systems for later use. This practice not only reduces dependence on conventional water sources but also mitigates flooding and soil erosion. By promoting efficient water management, rainwater harvesting contributes to groundwater recharge, environmental conservation, and the resilience of communities against climate change impacts. Its implementation supports sustainable development by ensuring a reliable and eco-friendly water supply for domestic, agricultural, and industrial needs

1.2 PROBLEM STATEMENT

The problem with rainwater harvesting is that it often encounters challenges such as insufficient infrastructure for efficient collection and storage, variability in rainfall affecting water reliability, potential contamination of harvested water, and inadequate maintenance practices. These issues hinder the effectiveness of rainwater harvesting systems and limit their ability to provide a consistent and safe water supply.

1.3 OBJECTIVES

1. **Maximizing Water Use Efficiency**: Capture and store rainwater to reduce reliance on traditional water sources and optimize water usage.
2. **Enhancing Water Quality:** Implement filtration and purification methods to ensure the harvested water is safe for consumption and use.
3. **Mitigating Environmental Impact:** Reduce runoff and soil erosion, and decrease the strain on local water supplies and infrastructure.

1.4 PROPOSED SOLUTIONS

The proposed solution for rainwater harvesting involves a multi-faceted approach to address existing challenges and maximize its benefits. Key components of the solution include:

1. **Infrastructure Development:** Implementing well-designed and efficient systems for the collection, filtration, and storage of rainwater, tailored to various scales from individual homes to large communities.
2. **Public Awareness and Education**: Conducting comprehensive awareness campaigns to educate communities about the benefits of rainwater harvesting and best practices for its implementation and maintenance.
3. **Regulation and Policy Support:** Establishing supportive policies and regulations that incentivize rainwater harvesting, such as subsidies, tax benefits, and mandatory installation in new buildings.
4. **Water Quality Management:** Ensuring proper filtration and treatment of collected rainwater to prevent contamination and guarantee its safety for various uses.

CHAPTER 2

SYSTEM DESIGN

2.1 FLOWCHART

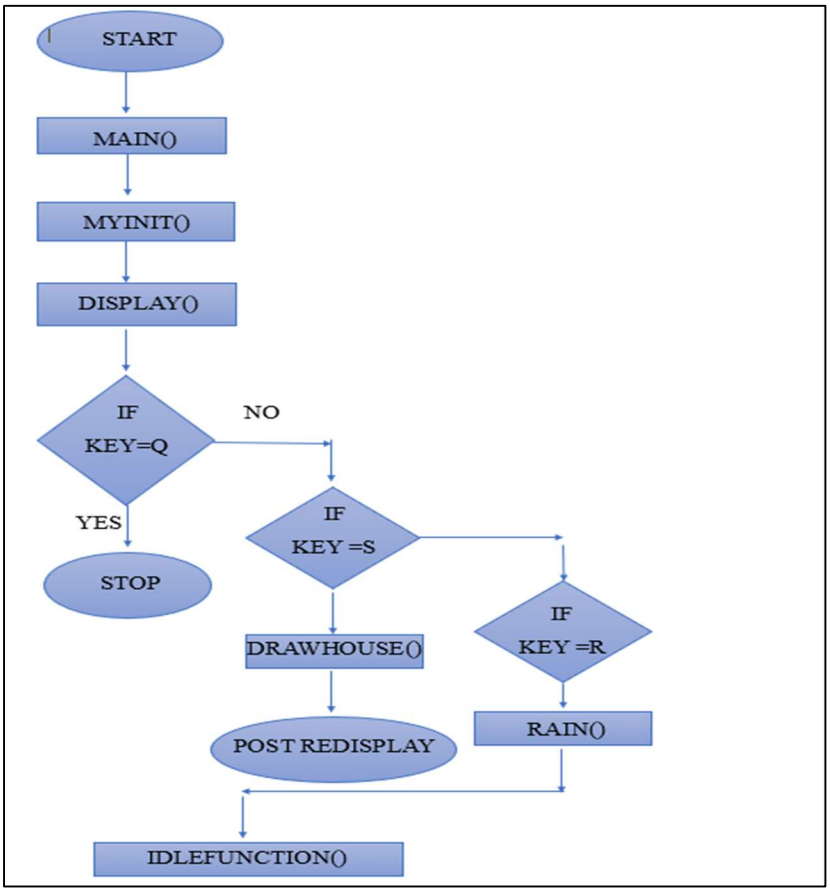

Fig 2.1.1:Flowchart

2.2 INITIALIZATION

- Initialize to interact with windows.
- Initialize to display mode that is double buffer and RGB colour system.
- Initialize window position and window size.
- Initialize and create window to display the output.

2.3 DISPLAY

- Rainwater Harvesting window will be displayed.
- Menus are created depending on the values returned by the menu.
- The operations performed are:
  i. Create home.
  ii. Rain.
  iii. Exit

CHAPTER 3

IMPLEMENTATION

3.1 OVERVIEW

This project is a demonstration of animation on “Rain water harvesting”. We have taken the help of built in functions present in the header file. To provide functionality to our project we have written sub functions. These functions provide us the efficient way to design the project. In this chapter we are describing the functionality of our project using these functions.

3.2 USER INTERFACE

The project which we have done uses the OpenGL function and implemented using C. Our project is to demonstrate RAIN WATER HARVESTING. User can perform operation using keyboard.

Keyboard interaction

1. Firstly, after compiling and running the program we get the display of animation.
2. Then if we press the key s the animation of house is created.
3. If the key “ r” is pressed it starts raining.
4. If the key ”q” is pressed then the process will quit.

3.3 STRUCTURE

int main(int argc,char** argv)

void myinit()

void mykey(unsigned char key,int x,int y)

void display()

void rain1()

void drawhouse()

void drawpump()

void drawtank()

3.4 LANGUAGES USED FOR IMPLEMENTATION

1. HTML (Hypertext Markup Language): Structures the web pages and defines the content of the user interface elements such as buttons, sliders, and information panels.

2. CSS (Cascading Style Sheets): Styles the visual appearance of the web pages, including layout, colours, fonts, and responsiveness to ensure a polished and user friendly interface.

3. JavaScript: Manages dynamic interactions on the web page, including user input, manipulation, and real-time updates. Facilitates the integration with WebGL and jQuery for advanced functionality and interactivity.

4. jQuery: Simplifies DOM manipulation, event handling, and AJAX interactions. Provides a streamlined way to implement features such as toggling UI elements and updating content dynamically

5. WebGL: Provides the capability for rendering interactive 3D graphics directly within the web browser. Handles the rendering of the solar system model, including planets, orbits, and visual effects.

6. OpenGL: Enhances the graphical capabilities for rendering complex scenes and effects. May be used in conjunction with WebGL to improve visual quality and performance.

3.5 PLATFORM USED FOR IMPLEMENTATION

1. Web Browsers:

• The application is designed to run on modern web browsers such as Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge.

• WebGL and JavaScript ensure compatibility with major browsers that support HTML5 and WebGL standards.

2. Operating Systems:

• The application is platform-independent and can be accessed from various operating systems, including Windows, macOS, and Linux.

• Responsive design ensures usability across different operating systems and devices.

3. Development Environments:

• Code editors or Integrated Development Environments (IDEs) such as Visual Studio Code, Sublime Text, or Atom are used for development.

• Browser developer tools are employed for debugging and testing the application.

4. Web Hosting:

• The application can be hosted on web servers or cloud platforms such as AWS, Azure, or Google Cloud Platform, allowing for online access and sharing.

CHAPTER 4

RESULT

4.1 SNAPSHOTS

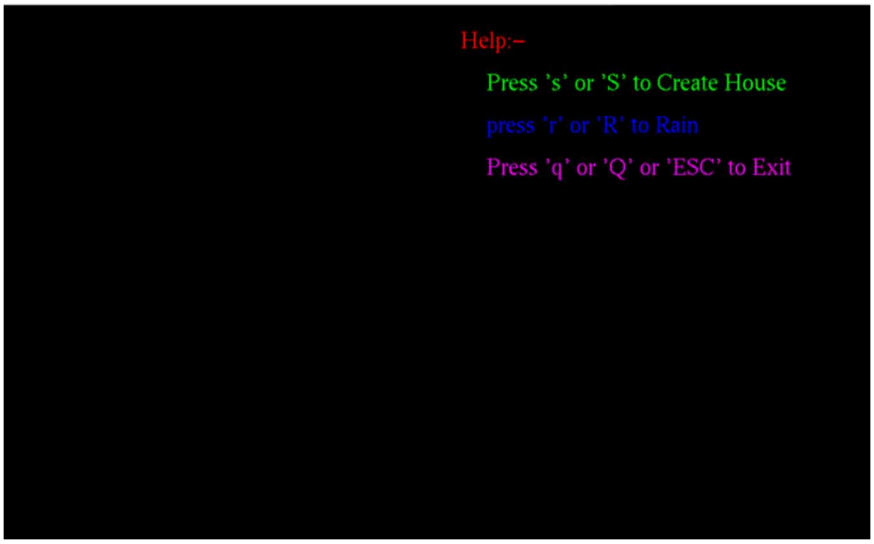

Fig 4.1.1 : Display window

Fig 4.1.2 : Setup of house and tank

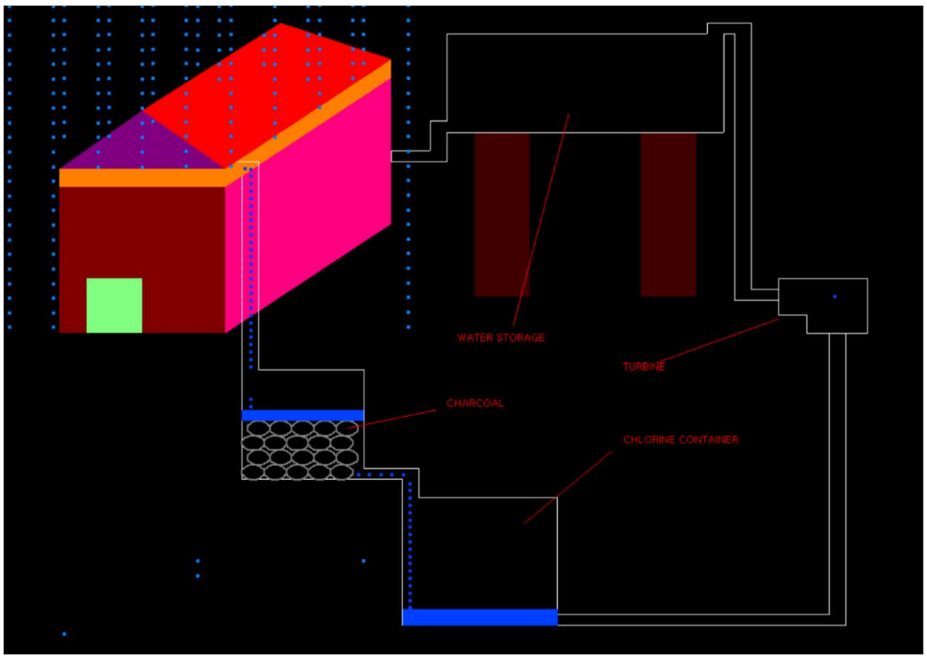

Fig 4.1.3: Setup while raining

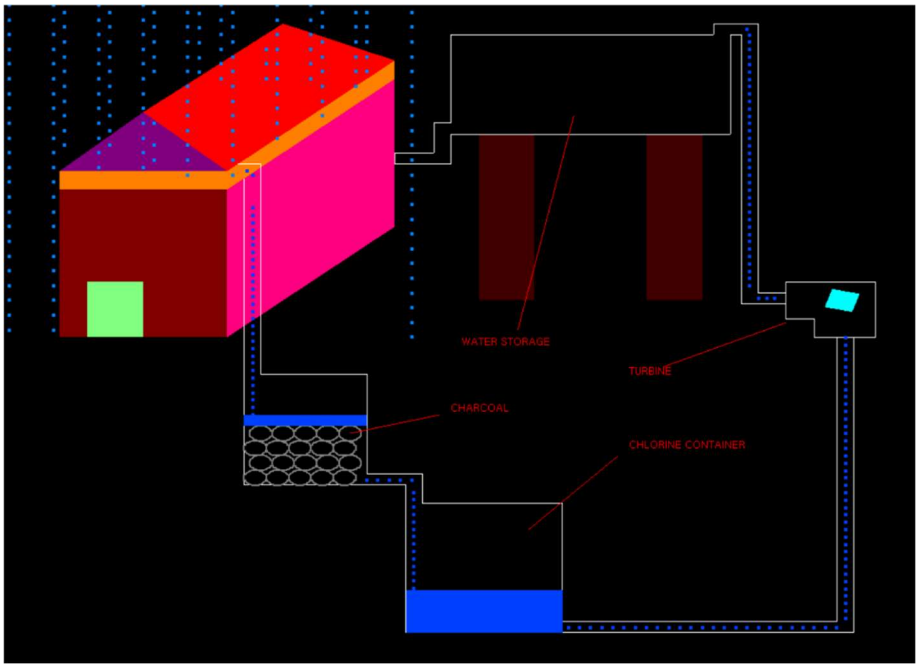

Fig 4.1.4: Setup while tank is filling

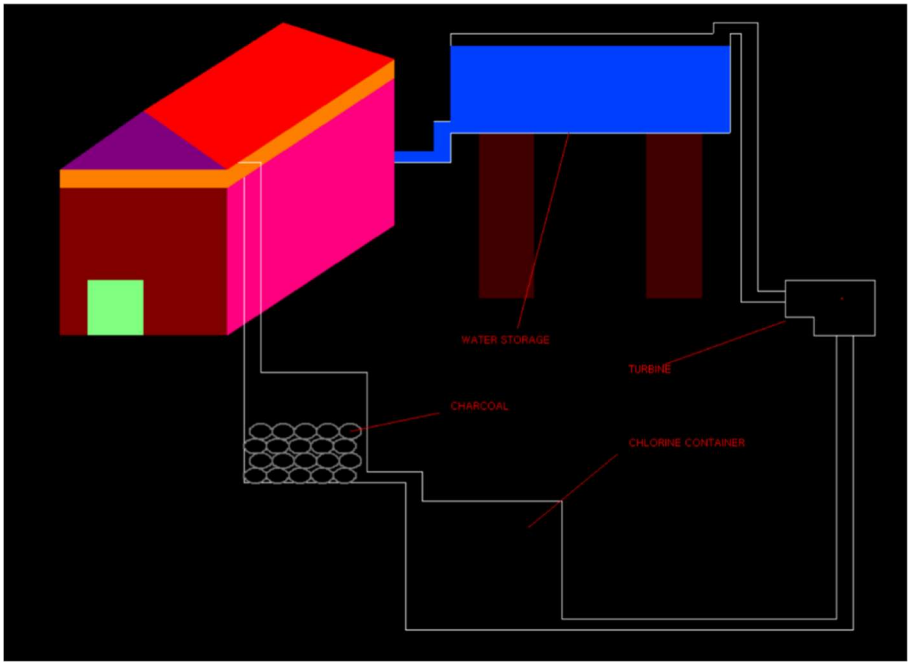

Fig 4.1.5 : Setup after tank is filled

CHAPTER 5

CONCLUSION AND FUTURE ENHANCEMENT

5.1 CONCLUSION

Rainwater harvesting is a sustainable and essential practice that addresses water scarcity and promotes efficient water management. By collecting, storing, and utilizing rainwater, communities can reduce dependence on traditional water sources, lower water bills, and mitigate the impacts of droughts. This practice also helps in reducing runoff, preventing soil erosion, and decreasing the burden on stormwater systems. Implementing rainwater harvesting systems, whether through simple setups for individual households or large-scale systems for urban areas, contributes to environmental conservation and resilience against climate change. Educating the public, advancing technology, and encouraging policy support are crucial for maximizing the benefits of rainwater harvesting and ensuring its widespread adoption.

5.2 FUTURE ENHANCEMENT

Smart Systems: Utilizing Internet of Things (IoT) devices and sensors to monitor water levels, quality, and usage in real-time. These systems can automate the collection, filtration, and distribution processes, ensuring optimal operation and maintenance.

Advanced Filtration and Purification: Developing more efficient and sustainable filtration technologies to improve water quality, including membrane filtration, UV purification, and biofiltration systems that are cost-effective and eco-friendly.

AI and Data Analytics: Leveraging artificial intelligence and data analytics to predict rainfall patterns, optimize water storage, and manage demand. AI can also be used to detect and diagnose issues within the system, enhancing reliability and performance.

Integration with Renewable Energy: Powering rainwater harvesting systems with renewable energy sources such as solar or wind power, reducing the carbon footprint and operational costs.

REFERENCES

- Coombes PJ(2007).Energy and economic impact of rain water tanks on the operation of regional system.
- OpenGL Programming Guide (Addison-Wesley Publishing Company).
- The OpenGL Utility Toolkit (GLUT)Programming Interface .
- -API Version 3 BY MARK J. KILGARD.
- Interactive computer graphics.
- -A top down approach by using Open GL by EDWARD ANGEL.