GREY WATER QUALITY MONITORING AND RECYCLING KIT

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Greywater, Water Recycling, Water Treatment, pH Sensor, TDS Sensor, Turbidity Sensor, Sediment Filtration, Carbon Filter, Reverse Osmosis (RO), Water Purification, Sustainable Water Management, Water Conservation, IoT Monitoring, Wastewater Reuse.

Introduction:

1. Greywater, which is the wastewater generated from sinks, showers, and washing machines (excluding toilet waste), represents a significant opportunity for enhancing water availability.
2. This water constitutes about 50-70% of total residential water usage but contains only a small fraction of organic material making it a viable resource.
3. Greywater recycling offers a sustainable solution to water scarcity by providing an alternative source for non- potable uses.
4. Common applications of treated greywater include toilet flushing, outdoor irrigation, car washing, and air conditioning.
5. Greywater recycling is gaining acceptance due to its potential to improve water management.

Objectives:

1. Develop a functional prototype kit that monitors key water quality parameter (pH, Turbidity, TDS, Temperature value) in real time.
2. Ensures treated greywater meets safety standards for non- potable reuse.
3. To design an automated filtration and treated module the processes unsafe greywater before reuse.
4. Enable seamless integration with IoT platforms for data collection, analysis, and visualization, facilitating remote monitoring.

Methodology:

The greywater treatment system begins with a pre-chamber where water is collected, stabilized, and analyzed using sensors like TDS, pH, and turbidity. These sensors help determine the quality and contamination level of the incoming water. The water then flows into the treatment unit, which includes a sediment filter to remove larger particles such as dirt, hair, and debris. Next, a carbon filter absorbs finer impurities, odors, and chemical residues. The reverse osmosis filter further purifies the water by removing dissolved salts,

bacteria, and harmful substances. After treatment, the water moves to the post-chamber for final inspection and validation. A pH sensor ensures that the treated water is safe and balanced. The purified greywater can then be reused for non-drinking purposes like gardening, flushing, and cleaning. This system helps conserve water and promotes sustainable usage.

Result and Conclusion:

1. The Grey Water Quality Monitoring and Recycling Kit was developed to measure pH, turbidity, TDS, and temperature in real time, along with a filtration unit using sediment, carbon, and RO stages. The system effectively improved grey water quality, making it suitable for non-potable reuse. Testing over three cycles showed decreasing water recovery: 500 ml in the first, 150 ml in the second, and 30 ml in the third cycle. Overall, the system achieved 680 ml recovery from 1000 ml, demonstrating efficient initial filtration with reduced output in later stages due to increased impurities.
2. In conclusion, the grey water quality monitoring and recycling kit uses IoT technology to manage and reuse greywater efficiently. Sensors for pH, turbidity, and TDS in the pre-chamber assess initial contamination levels. The water then passes through sand and carbon filters to remove particles, organic compounds, and odor. Post-chamber sensors recheck turbidity and pH to ensure treatment effectiveness. Overall, the system enables smart, real-time monitoring and safe reuse of treated greywater for non-potable applications.

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Future Scope:

The future scope of this project includes:

1. The project can be expanded for use in big buildings and apartments.
2. Can be used in houses for reusing bathroom and irrigation systems.
3. Used in industries for recycling process water.