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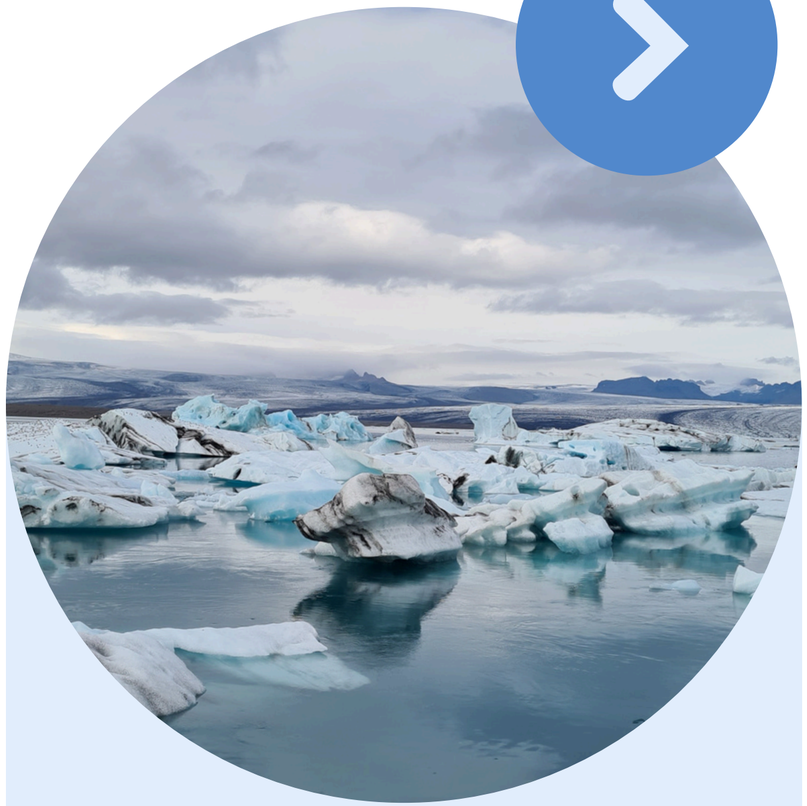
ISOOKO

Project



Background

"Isooko" (inspired by Rwanda's rivers) is a mobile and web-based Smart Water Management System tailored to Rwanda's needs. The platform integrates IoT, AI, and community-driven data to address challenges in water access, conservation, and quality monitoring.

PROBLEM STATEMENT

In Rwanda, many communities struggle to find safe and reliable water sources. People often don’t have clear information about where to find water, whether it is available, or if it is safe to use. This can lead to people using contaminated water, which causes health problems. Additionally, there is a lack of awareness about how to save water or manage water resources in a sustainable way. These challenges make it harder for families to access clean water and can lead to wastage, especially in areas where water is already scarce.

FEATURES

Community water mapping

A mobile app crowdsources the location of water sources (wells, boreholes, and rivers). Maps real-time water availability and quality, using sensors and manual input. Provides directions to the nearest reliable water source.

Quality Monitoring

IoT -enabled water testing devices monitor pH, turbidity, and microbial contamination. Results are uploaded to a centralized database, and displayed on the app with alerts for unsafe water.

Education and Gamification

Includes a gamified section to educate users about water conservation. Rewards individuals and communities for actions like reporting leaks or reducing water usage

Overview of the embedded system

Water quality monitoring

Sensors will measure key water quality parameters such as:

- **pH levels**
- **Turbidity (clarity)**
- **Dissolved oxygen**
- **Electrical conductivity (indicating salinity)**
- **Temperature**
- **Presence of contaminants (e.g., nitrates or heavy metals).**

The embedded system will collect sensor data and transmit it to the cloud or local servers via:

- **IoT Connectivity:** Using technologies like Wi-Fi, or GSM
- **Alerts and Notifications:** Anomalies in water quality will trigger immediate alerts. Notifications will be sent to relevant stakeholders via: SMS or app notifications.

Data Logging and Analytics

- **Onboard storage for local data backup in case of network interruptions.**
- **Data will be periodically uploaded to a central database for AI-driven analysis and historical tracking.**

Technological stack

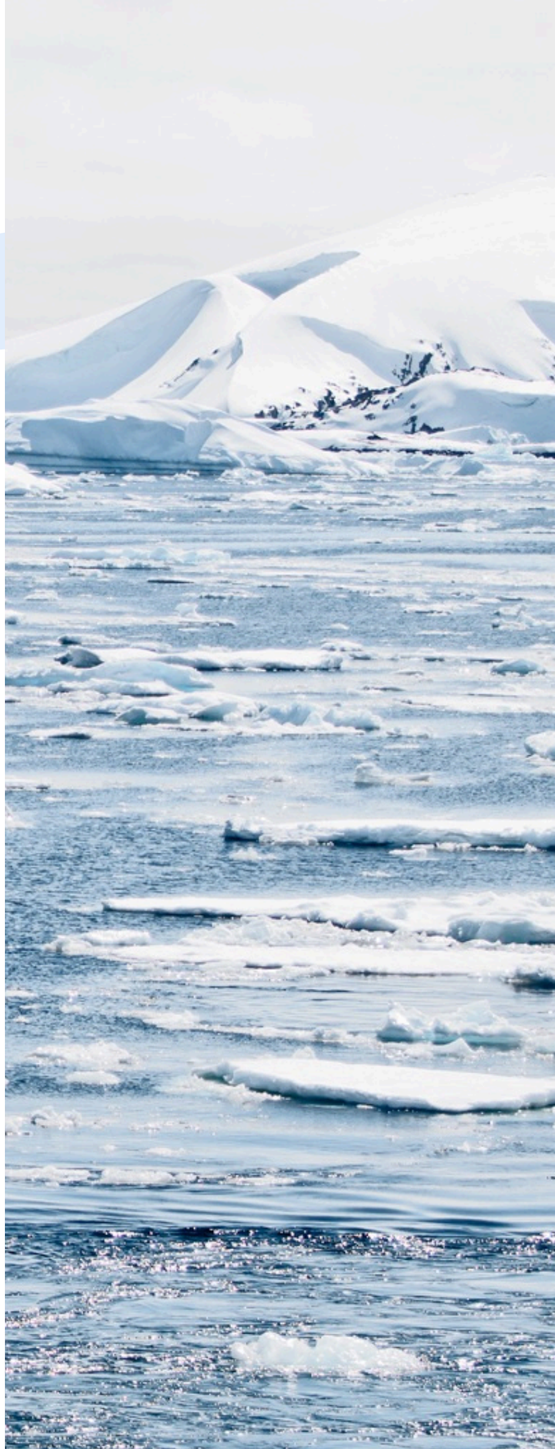
Frontend (Web and Mobile)

Web Development

- **Framework:** React.js (for building dynamic, responsive web interfaces)
- **Styling:** Tailwind CSS / Material-UI (for modern, scalable UI design)
- **Charts and Visualizations:** Chart.js or D3.js (for data visualizations like water usage, quality trends, etc.)
- **Map Integration:** Leaflet.js or Google Maps API (to show water distribution and monitoring)

Mobile Development

- **Framework:** React Native (cross-platform mobile app development for Android and iOS)
- **Native Features:** Expo (for IoT device notifications and geolocation services)



Technological stack

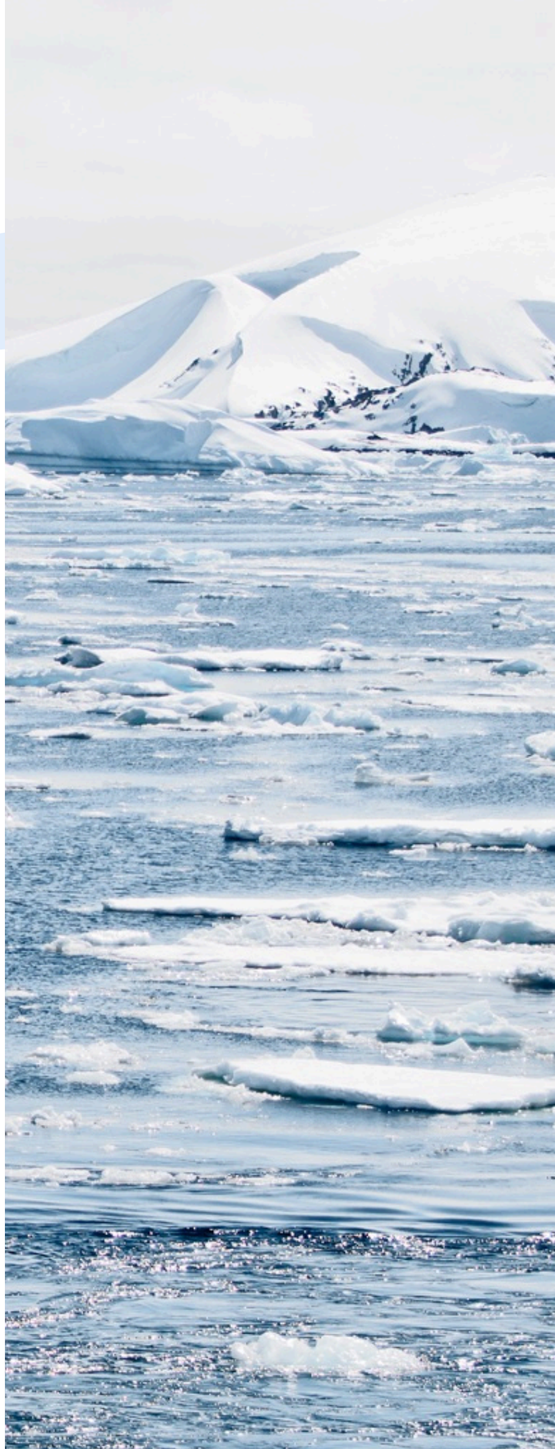
Backend

Server-side

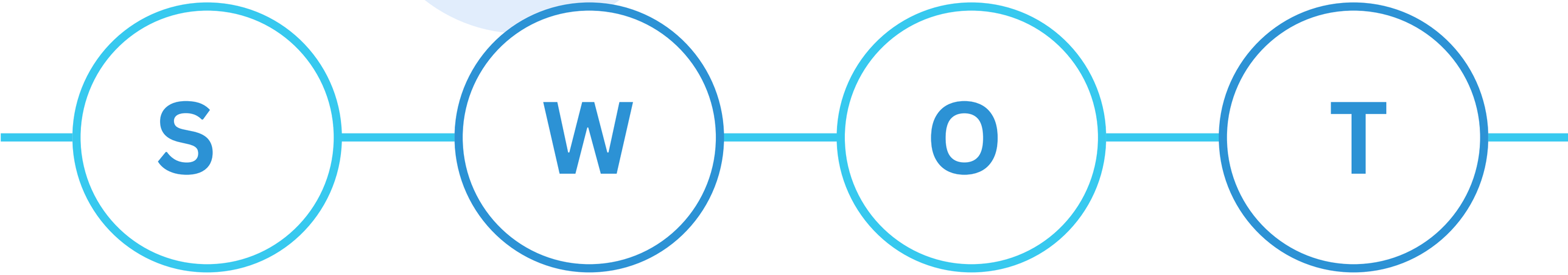
- **Framework:** Node.js with Express.js (lightweight and scalable)
- **API:** RESTful API or GraphQL (to handle data interactions between frontend, IoT devices, and the database)
- **IoT Data Handling:** MQTT protocol with libraries like Mosquitto (for real-time IoT communication)

AI and Data Analysis:

- **Language:** Python (for AI/ML modules)
- **Frameworks: TensorFlow or PyTorch (to build and deploy AI models for water quality predictions, conservation suggestions, etc.)**



SWOT Analysis



STRENGTHS

- Relevance to Rwanda’s needs
- Community engagement
- Integration of advanced technology
- Scalable and flexible

WEAKNESSES

- Dependency on technology
- Maintanance and support
- Limited technical knowledge
- initial cost

OPPORTUNITIES

- Government support
- Global interest in water sustainability
- Employment creation

THREATS

- Adoption barriers
- Environmental risks
- competition
- sustainability challenge

Timeline

1

Research and Design
Nov 01.2024 - Nov.25,2024

2

Prototype Development
Nov.27,2024 - Feb.24,2025

3

System Development
Mar.6,2024 - 20.May,2025

4

Testing Phase

5

Final Development
May.21,2025 - Sept,2025

6

Testing

7

Launch

OUR TEAM

NISHIMWE Ndindabahizi Hope

Backend Developer

ISHIMWE Jolie Princesse

Backend Developer

IRANZI Dianah

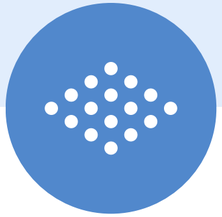
Projector Manager

IHIMBAZWE Niyikora Kevine

Frontend Developer

UMUTONI U wase Sandra

UI/UX Designer



THANK YOU!