

# Proforma for Submitting Technical Proposal

## 1. General Information

S. No.	Particulars	Details to be Filled by Team
1	Hackathon Title	Smart Urban Virtual Interactive Digital Helpdesk Assistant (SUVIDHA) - 2026
2	Problem Statement ID / Theme	Smart City 2.0: Empowering Indian Industries with Smart Solutions
3	Team Name	TechTark
4	Institution / Organisation Name	National Institute of Technology Warangal
5	Team Leader Name	Arsh Ansari
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8	City / State	Warangal, Telangana

## 2. Team Composition

S. No.	Name of Team Member	Role in Team	Qualification / Specialization
1	Arsh Ansari	Team Lead	Integrated M.Sc. Mathematics
2	Harshal Kushwaha	Frontend Developer	Integrated M.Sc. Mathematics
3	Aman Shaikh	Full Stack Developer	Integrated M.Sc. Chemistry

## 3. Project Overview

### 3.1 Project Title:

#### **NAGAR-SETU : A Digital Bridge Between Citizens and Civic Services**

*NAGAR-SETU acts as a digital bridge between citizens and civic authorities, enabling secure authentication, instant bill payments, complaint management, and service tracking through a single interactive interface. It promotes efficient governance while delivering a faster, smarter citizen experience.*

### 3.2 Brief Project Description:

NAGAR-SETU is a touch-screen based uniform self-service KIOSK system that aims to simplify and modernize the manner in which citizens access civic utility services. As cities become increasingly metropolitan, citizens are required to visit various offices such as the electricity office, gas office, water office, and municipalities for a variety of services.

NAGAR-SETU takes care of this challenge by providing users access to various services using an integrated interface, through which users can access various services provided by the government. By using the KIOSK, users can authenticate, track their real-time account and consumption information, complete digital payments, and submit requests/complaints, as well as instantly generate receipts without human intervention.

The platform offers a multi-lingual, touch-optimized UI, which is accessible to all age groups. It is designed as a scalable microservices application, supporting real-time notifications, service advisories, and emergency alerts. It also offers a management dashboard for officials, which provides usage analytics, reporting, as well as service monitoring.

Designed to comply with various regulations set by the Government of India, including data protection and cybersecurity regulations, NAGAR-SETU will enable the Smart Cities vision by enhancing transparency, reducing operational costs for citizens, and providing a fast experience for citizens.

### 3.3 Key Features & Functionalities:

#### 1. Interactive Touch-Based User Interface

- Created by **React.js**, targeted for **big-size touchscreens** in KIOSK environments.
- Animations - transitions are smooth.
- Step-by-step guided flows, with icons and prompts to guide First-Time Users, Senior Citizens, and the Less Tech-Savvy.
- Fully responsive and accessibility-conscious design.

#### 2. Multilingual & Inclusive Experience

- Supports multiple Indian languages and allows the language to be changed at the beginning of a session.
- Clear typography, visual cues, and navigation should be inclusive.

#### 3. Secure Citizen Authentication and Profile Management

- Authentication should be secure, using systems such as **JWT or JSON Web Tokens** for both citizens and administrators.
- **Simulated Aadhaar Profile Creation Module:** A module that will enable creation by an individual of a virtual profile on Aadhaar with minimum information, namely name, mobile number, and unique ID.

- **OTP Authentication** to simulate real-world Identity verification performed by governments.
- Implement Role-Based Access Control for Citizens and Admin Users.

#### 4. Single Window to Civic Services

Single interface to access:

- **Electricity services**
- **Gas Services**
- **Water and waste management**
- **Municipal complaints and service requests**

The services provided allow the citizens to access bills, consumption history, complaints lodging, service requests, and tracking of applications.

#### 5. Digital Bill Payment System

- Digital payments securely facilitated by **BHIM UPI (developer sandbox)**.
- Supports payment of bills for different utilities.
- **Auto-generated digital receipts** include a transaction ID and time stamp.

#### 6. Document Upload, Download, Receipt Generation

- The user can upload the necessary documents for the service request/complaint.
- Receive payment receipts, summaries, and acknowledgments, as well as print them directly from the KIOSK.

#### 7. Real-Time Status Tracking & Notifications

- Live tracking of service requests, complaints, and payment status.
- Notifications about updates, notifications, outages, and/or emergencies on the KIOSK screen itself.

#### 8. Admin Dashboard & Control Panel

- Implementing Admin Login Using JWT Authentication.

Dashboard to:

- Monitor the use of KIOSK and its interaction with citizens.
- View and resolve complaints efficiently.
- Generate reports based on payments, fines, requests created, and resolution duration.
- Analytics-based insights that assist in reducing paperwork and ground-level work.

#### 9. Scalable Backend Architecture

- **Node.js-based microservices architecture** ensuring scalability and modularity.
- **MySQL database** for reliable, structured storage of user profiles, transactions, complaints, and logs.
- Easy integration with future government APIs when available.

## 10. Security, Compliance & Reliability

- Secure API communication with encrypted data transfer.
- Designed to comply with **DPDP Act**, IT Act guidelines, and cybersecurity best practices.
- Session timeouts and auto-logout to ensure public KIOSK safety.

## 4. Problem Understanding & Objective

### 4.1 Understanding of the Problem Statement

*Rapid strides taken towards urbanization in India have, in turn, resulted in the increased need for urban services like electricity, gas, water supply, waste management, and resolution of grievances related to civic utilities. However, most civic utilities are relying on traditional counter-based systems of delivering services to citizens, which often lead to wide queues, greater paperwork, reduced transparency, and thereby raised issues related to inefficiencies in these services.*

*The key focus area in the problem statement is related to the design and development of a touch-based interactive KIOSK graphical user interface wherein citizens are able to access essential civic services independently. Instead of visiting various offices and different counters, citizens are able to carry out various activities such as bill payment, requesting services, registering complaints, and document submission by interacting with different components of a unified interface.*

*As far as a major part of the problem is concerned, it is important that it addresses usability and accessibility for a diverse citizen base, considering first-time users, seniors, or citizens with differing levels of digital literacy. At the same time, it is important that it offers a safe mode of citizen authentication, digital transactions, and citizen data protection in line with Government of India regulations.*

*From the governance point of view, it should also help civic departments reduce counter work, improve service turn around time, and provide better visibility into citizen interactions through digital records and reports. Hence, it is extremely important that the solution is not only citizen-centric but also operationally efficient.*

*Overall, the problem statement is a reflection of the requirement for a smart, intelligent, integrated, and secure digital interface for improving citizen engagement, transparency, and ultimately, the larger Smart Cities mission through civic service modernization.*

### 4.2 Objectives of the Proposed Solution

*The major objective of the proposed solution is to ensure the design and development of citizen-centric and touch-based unified KIOSK interfaces to ease citizen access to civic utility services with enhanced transparency and efficiency in the delivery of the service by civic authorities. The solution is being developed with a specialized focus on usability, security, scalability, and Government of India standards.*

*To accomplish this, the system is implemented with a technology stack that is carefully selected to meet specific problem needs, literally tailored towards the issues at hand.*

### ***Interactive & Intuitive User Experience***

*The solution is intended to provide a highly intuitive and engaging user experience, enabled through a touch-optimized interface developed on top of React.js. The use of animations, workflows, and visual prompts ensures that users from different age groups with different levels of digital literacy can interact with the KIOSK easily, which makes it perfect for use in public spaces.*

### ***True Self-Service for Citizens***

*Citizens are also empowered to carry out regular civic activities like bill payments, making requests, complaint registration, document uploading, tracking, and receipt generation without any help from civic staff, thereby decongesting the counters.*

### ***Multilingual & Inclusive Access***

*Moreover, multilingual support with effortless language switching facilities promotes inclusivity and accessibility by allowing multiple users to comfortably interact with the system.*

### ***Secure Authentication & Digital Identity***

*Secure access for citizens as well as administrators is provided by implementing JWT-based authentication mechanisms. The simulated Aadhaar-like digital profile system enables users to verify their profiles using basic identity information and OTPs for proper authentication without accessing any actual government API, making it applicable for the hackathon challenge while being future-ready itself.*

### ***Scalable Backend & Real-Time Operations***

*The backend is created using Node.js, which enables micro services-based architecture. In this case, all the civic services will be allowed to operate independently. This will allow the API responses and statuses to be real-time and quick.*

### ***Secure Digital Payments***

*The bill payment system is integrated via BHIM UPI through the developer/sandbox mode, matching the digital payment system of India to simulate bill payment process safely.*

### ***Reliable Data Management and Analytics***

*A MySQL database manages user profiles, transactions, complaints, and interactions to maintain integrity, auditable history, and facilitate report generation.*

### **Admin Dashboard & Governance Support**

*The role-based Admin Dashboard will be equipped with the tools that allow the authorities to monitor KIOSK usage, prepare analytical reports, track fines, review complaints, and optimize service delivery. This reduces much of the ground-level administrative effort.*

*In summary, the solution fits very strongly into the Smart Cities Mission, ensuring security, scalability, and citizen-friendly digital governance, while being realistic, implementable, and hackathon-ready.*

## **5. Technical Design & Architecture**

### **5.1 Solution Description**

#### **1. Overall System Overview**

*NAGAR-SETU is a single integrated, touch-enabled self-service KIOSK concept planned for facilitating citizens to access a number of civic utility services seamlessly through a single interface. The system can eliminate the need for citizens to physically visit different government offices by integrating essential citizen services like electricity, gas supplies, water, waste management, and municipal grievance handling through a single interface. It is planned for use in public areas for independent use without human intervention.*

#### **2. Touch-Optimized Citizen Interaction Flow**

*This system starts off with a language selection window for inclusiveness. The user interface is developed using react JS and optimized for large touchscreen KIOSK screens. It also follows a guided approach wherein the user needs to follow a step-by-step workflow, which is accompanied by large buttons, icons, animations, and prompts to easily accommodate first-time users, elderly users, or people with low IT knowledge.*

#### **3. Secure Authentication and Session Handling**

*Citizen authentication will be achieved through a mock digital identity system similar to the Aadhaar system, which can be implemented under the constraints of a hackathon. User authentication occurs based on the minimum identity provided, followed by OTP-based authentication. Using JWT tokens ensures secure sessions, while implementing session timeouts and logouts helps prevent abuse in a public space like KIOSK.*

#### **4. Single Window Civic Service Access**

*Upon authentication, citizens are then able to view a central dashboard from which they can access various civic services. They are able to view their utility bills, make complaints, and submit requests among other activities. All these are then intelligently routed to the relevant department without any need for citizens to be aware of their departmental boundaries.*

## **5. Digital Payment and Receipt Generation**

*Integration with Digital Bill Payment using BHIM UPI Developer Sandbox APIs: The platform facilitates citizens with digital bill payments through integration with BHIM UPI Developer Sandbox APIs. Citizens can pay utility bills securely using QR-based payment systems or UPI-based payment systems. Upon successful payment, users will be presented with digital receipts, which can be downloaded directly from the KIOSK.*

## **6. Backend Architecture and Data Management**

*The use of a Node.js-based microservices architecture has enabled individual services like those related to civic services within the system to run independently. Secure REST API implementation helps services communicate between each other. MySQL is used as a database, storing data such as users, transactions, complaints, documents, and log files, which assist with data reliability, auditability, and scalability.*

## **7. Administration and Governance Support**

*An Admin Dashboard provision for authorized officials to enable roles such as monitoring KIOSK usage, complaint reports, service requests, and analytics is entirely feasible. Here, the dashboards would prove to be helpful to the civic authorities by providing information about service requests, usage, and other matters of interest using the displays.*

## **8. Security, Compliance, and Reliability**

*All data transfer takes place in an encrypted fashion so that secure communication occurs at all times. Government of India regulations like DPDP Act and IT Act, as well as cybersecurity standards, have been followed in the design of the system so that it operates reliably in secure fashion when used in public domain scenarios.*

## **5.2 System Architecture Diagram**

- Upload Architecture Diagram (Link):

<https://drive.google.com/drive/folders/1if35SVhU8BR0REBT0BQcW-FURytkBF9N>

## **5.3 Workflow & Data Flow**

### **A. Workflow of the NAGAR-SETU System**

#### **1. Citizen Workflow**

- The citizen workflow depicts the step-by-step interaction of a user with the NAGAR-SETU KIOSK system.
- Choosing the Language for the Session and Starting the Session
- The workflow starts as the citizen approaches the KIOSK. The process starts by asking the citizen to select their chosen language, which is important to ensure inclusivity.

### **Authentication Gateway (Login / Sign-Up)**

The citizen is redirected to the authentication gateway where he has the option to log in or sign up.



### **Login Flow:**

- Mobile/Id number to be registered by user.
- OTP is sent and verified.
- On a successful verification process, the token is generated.

### **Sign-Up Flow**

- The user is required to provide their mobile number and virtual Aadhaar ID.
- OTP verification is performed. User agrees to terms and conditions. A session token is created.

### **Home Dashboard Access**

Once the authentication is successful, the citizen is redirected to the Home dashboard, which acts as a single window for availing all civic services.

### **Service Selection**

From the home screen, the citizen can select:

- Electricity services
- Water Services
- Waste management
- Gas Services
- Municipal services
- Utility Services Workflow
- Citizens are able to view bills, view history, and make payment for bills.
  - The payment is done by BHIM UPI.
  - Once payment is successfully made, a digital receipt is produced.
  - In case of failure, the user is notified and can retry.

### **Complaint & Service Request Workflow**

- The citizens can lodge complaints regarding waste, gas, water, or services.
- Location services like Google Maps are utilized if needed.
- A unique complaint ID is created.
- The status of the complaint can be tracked by the citizen.

**Session Termination** After completing these services, the user can go back to the home screen to perform any other action or end the service. The system automatically logs out and terminates the session to guarantee KIOSK security.

## **2. Admin / Authority Workflow**

- Admin Authentication
- Authorised persons use their credentials to access the system via the Admin Dashboard.
- Complaint Monitoring



- Admins view complaints filed by citizens along with complaint IDs.
- Complaint Lifecycle Management
- Complaints have distinct stages which include:
  - Pending
  - Assigned
- In Progress Resolved Status Updates & Reporting Manages the status of complaints and develops reports for service usage, payment, and the response timeline.

## **B. Data Flow in the NAGAR-SETU System**

Data flow conveys the movement of information across system components concerning the workflow.

### **1. Authentication Data Flow**

- It sends a request to the Authentication Service through the KIOSK UI regarding the citizen's ID or mobile number.
- The Authentication Service requests OTP verification with the OTP Gateway.
- The status of OTP verification is returned to the backend.
- A JWT session token is issued and returned to the KIOSK UI if all goes well.

### **2. Service Access & Billing Data Flow**

- The KIOSK UI sends, along with the session token, service requests such as electricity bill request to the backend.
- The bill and history data is fetched from the MySQL by the respective service microservice.
- The bill details are returned to the UI to be confirmed by the user.

### **3. Flow of Payment Information**

- Payment request information is sent from KIOSK to the Payment Service.
- It interacts with the BHIM UPI sandbox API.
- Response for payment success/ failure is received.
- MySQL database is used to store all transaction details.
- The receipt data is sent back to the KIOSK, which displays and prints it.

### **4. Complaint & Location Data Flow**

- The details of the complaint and the location information are transmitted from the KIOSK to the Complaint Service.
- Google Maps API can be used for location validation.
- Information about complaints is held by the database.
- A complaint ID and status are also provided to the citizen.

### **5. Admin Data Flow**

- Requests data for complaint and service data from backend services.
- Admin checks the complaint status.

- Updated data is recorded in the database, which is also reflected in the citizen's tracking view.

## 6. Technical Details

### 6.1 Tools & Frameworks Used:

- **Frontend:** React.js
- **Backend:** Node.js (Express.js)
- **Database:** MySQL
- **APIs:** REST APIs, JWT Authentication APIs, BHIM UPI (Developer/Sandbox) APIs

### 6.2 Hardware Components (if applicable): **Touch-enabled KIOSK display, Receipt printer, QR code scanner**

## 7. Implementation Details

### 7.1 How does the solution work?

#### Step 1: KIOSK Initialization & Language Selection

When a citizen approaches the NAGAR-SETU KIOSK, a new session is started by displaying a language selection screen. The language selected by the citizen needs to be used throughout the user interface for easier accessibility by a citizen from different linguistic backgrounds.

#### Step 2: Secure Authentication Gateway

The citizen is redirected to the authentication gateway, in which he/she can choose to log in or sign up.

Existing users can enter their registered mobile number or ID.

New customers will have a digital profile based on their Aadhaar details.

In both instances, OTP-based verification is conducted to ensure the authenticity of the user.

#### Step 3: Session Creation & Access Control

Once the verification of the OTP is successful, the backend will generate a JWT-based token for the user's session. This token will be used to authenticate subsequent requests.

Session timeout and logout are set automatically to ensure safety in a public KIOSK system.

#### Step 4: Home Dashboard & Service Selection

The authenticated citizen is redirected to the Home dashboard, where it acts as a single window for accessing all the civic services the government provides. Here, users can select the services they want to avail, such as electricity, water, waste management, gas supply, etc.,

#### Step 5: Utility Services & Bill Management

For utility-based services, information regarding the bills is retrieved from the database. The citizen can view the pending bills and pay them online through the utility. The Bill payment through BHIM UPI (developer sandbox) is done securely. The system handles both successful and failed transactions.

#### **Step 6: Digital Payment & Receipt Generation**

Once the payment transaction is successfully made, the system saves the details in the database. A digital receipt for the transaction is also generated, bearing a transaction ID and a timestamp. This can be viewed, downloaded, or even printed from the KIOSK itself.

#### **Step 7: Complaint Registration & Service Requests**

This allows citizens to register complaints or service requests on waste management, gas services, water-related complaints, or general municipal services. In some cases, location functionality, through Google Maps API, is used in identifying service areas. Each complaint is given a unique complaint ID.

#### **Step 8: Real-Time Status Tracking & Notifications**

The system also enables citizens to access the current status of their complaints and service requests. The live status is displayed on the KIOSK interface in the citizen's account. For example, the status may show "pending," "in progress," or "resolved." Notifications also appear on the interface.

#### **Step 9: Admin Dashboard & Governance Operations**

Authorized officers can access the Admin Dashboard to keep tabs of KIOSK usage, view complaints, allocate jobs to departments, update statuses, and generate analysis reports.

#### **Step 10: Session Termination & Data Security**

On completion of rendering mandatory services, the citizen can go back to the Home dashboard or conclude the session, as the system would automatically logout the user and clear its session to avoid any unauthorized access, thereby securing public KIOSK.

## **8. Impact & Future Scope**

### **8.1 Innovation & Uniqueness**

NAGAR-SETU seeks to bring forward a new-generation concept of delivering citizen-centric public service through a state-of-the-art, intelligent, and unified kiosk system, differentiating itself from currently implemented kiosk options that only offer fragmented, limited, and separate citizen service delivery. Unlike existing options, NAGAR-SETU promises an innovative single window service delivery system through which citizens can access numerous citizen utilities such as electricity, water, gas, etc., on a single touch screen kiosk system.

One of the most important changes incorporated into the proposed solution is the implementation of the «public KIOSK-first» philosophy in the user interface design. That is to say, the user interface is specifically designed for touchscreen settings and includes features like guided navigation, multilingual support, and accessibility-based navigation for all sorts of users, including those who are not tech-savvy—something many other kiosks seem to lack.

From a technology perspective, NAGAR-SETU employs a microservices-based model for its backend, providing every civic service a high degree of independence with integrated security through APIs. The system has a strong ability to scale, isolate failures, and invite new government services, all without affecting existing infrastructures, characteristics not generally associated with kiosk-based deployments.

Another interesting feature is the secure and lightweight simulation of the digital identity concept. In this concept, the Aadhaar system is replicated by using OTP-based login system and JWT-based session management without interacting with the actual government system.

The platform also provides features such as real-time digital payments via BHIM UPI (sandbox) for seamless transactions, receipt generation for greater efficiency, tracking of complaints via unique ID allocation, and an analytics-based admin dashboard for better governance. Thus, the inclusion of features such as citizen self-service, transparency in operations, and analytics-based governance in a unified platform makes NAGAR-SETU a step ahead in the existing kiosk concept while strongly aligning with the “Smart Cities and Digital Governance” concept in India.

## **8.2 Future Improvements & Scalability:**

The NAGAR-SETU platform incorporates scalability and future extensibility, so it can advance with new digital governance initiatives. There are many options available to make the system even better.

### **Future Improvements**

One such significant enhancement that could be made is integration with live government APIs for authenticated services like Aadhaar authentication, DigiLocker for document verification, and others. Another enhancement that could be made to this platform is artificial intelligence-based complaint categorization for faster resolution by automatically directing complaints based on priority and history.

For instance, extensions of mobile applications or web portals may be developed to facilitate citizen engagement and enable people to access the services remotely while still keeping KIOSK-based accessibility available for the digitally underserved population. Additional features, such as voice assistance, chatbots, or biometric options, may be introduced.

### **Scalability and Expansion**

From a scalability standpoint, the API based backend allows for the integration of new departments such as health, transportation, property tax, and distribution systems without significant architectural modifications to the core structure. It also allows for the possibility of horizontal scaling where the application could be run on many servers/cloud environments to cater to different city and state needs.

The Admin Dashboard can be extended to advanced analytics and predictive reporting, thus helping the authorities to identify service bottlenecks, forecast demand, and efficiently allocate resources. Featuring unified monitoring, NAGAR-SETU can be deployed at multiple KIOSKs with centrally managed control.

Overall, NAGAR-SETU is not a single deployment or for a city; it is future-ready, can scale, and civic digital infrastructure that will eventually support emerging smart cities and the e-Governance ecosystem in India.

## 9. Scalability & Extensibility

### Modular Design

The platform, along with being modular in nature through the microservices approach, has individual civic services like electricity, water, gas, waste management, and civic services as distinct modules. This helps in fault isolation along with component maintenance, as an individual component can be updated or modified without affecting the rest of the platforms. This approach also helps in integrating new components into the platform.

### Multi-Department Integration

NAGAR-SETU has been developed as a single window system through which various departments of a government can function collectively on a platform of unity. Here, different departments have been interconnected with standardized REST API, providing a better sense of transparency as each department functions independently of the others.

### Future Service Expansion Support

A design for future services like healthcare appointments, transportation services, payments for property taxes, and public distribution services is possible with this architecture. These services can be integrated as independent modules without requiring changes to the existing architecture. This ensures the scalability and flexibility of the proposed system with regards to future needs under the Smart Cities and e-Governance initiatives.

## 10. Security & Compliance

Aspect	Description
User Authentication	The secure OTP-based login using JWT session tokens for citizens and administrators is used as a security measure. Role-based access control and session timeout guarantees the safe usage in the public KIOSK environments.
Data Privacy	The privacy by design concepts have been achieved by collecting minimal data, using user consent, and storing data in a secure manner using encryption techniques.
Compliance with Govt. IT / DPDP Act	The system uses privacy by design principles such as collecting minimal data, seeking users' consent, and storing data securely by using encrypted communication.
Secure Transactions	The payment aspect is completed via digital modes with the help of BHIM UPI (sandbox), guaranteeing bank-grade security without storing sensitive payment information. The process of communicating is encrypted.

## 11. Declaration

We hereby declare that the information provided in this technical proposal is true and correct to the best of our knowledge. The proposed solution is our original work and does not violate any intellectual property rights.

Signature: Arsh Ansari, Harshal Kushwaha, Aman Shaikh