NEXT जन Transport System

A COURSE PROJECT OF CS-684 EMBEDDED SYSTEM

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Problem Statement

1. *To Effectively convey LOCATION OF EACH AND EVERY BUS TO THEIR Respective stops.*
2. *To Extract location of relevant Buses at the bus-stops.*
3. *To Calculate Estimate Time of Arrival(ETA) for each bus at Their Respective bus-stops.*
4. *To Display the location and their estimated Time of arrival at the bus-stops.*

Requirements

1. *GPS module to provide Real-time location (NEO 6m-gps module).*
2. *Hardware module that can communicate over Radio frequency and internet (esp-lora-32).*
3. *Computational module (raspberry-pi).*
4. *Database to store chunks of data (aws iot framework).*

Project plan

{Plan followed to execute the task}

- *Initially we interfaced Neo-6m gps module with Esp-lora-32 module to fetch real time location.*
- *This information is then communicated over rf (433 mhz) with the help of ESP-lora-32 module.*
- *the received data is then store in an online database of Aws Dynamodb.*
- *Ras-pi is used to compute the Eta and current location.*
- *Real-time location display on google maps.*

Block Diagram

433 MHz
LoRa

Bus Module 2

433 MHz
LoRa

433 MHz
LoRa

Gateway

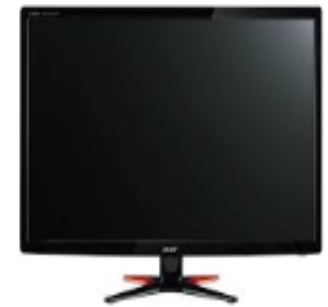
WiFi LoRa 32

WiFi Router

Battery and Battery
Management System

Cloud
(AWS IOT + DynamoDB)

Raspberry Pi + Display
{for Bus Stops under surveilance}



WiFi Router

433 MHz
LoRa

Bus Module 1

GPS (Neo6M)

WiFi LoRa 32

Battery and Battery
Management System

Android App User

Android App User

Innovation

1. *Currently there is no such deployed system.*
2. *Free of cost from users perspective.*
3. *Cost effective solution for bus-service providers.*
4. *can be used in rural areas where broad-band services are not prevalent.*
5. *No hardware at bus-stops except displays.*

challenges

1. *Getting familiar with esp-lora-32 architecture.*
2. *Rf communication between 2 modules.*
3. *Accessing AWS Dynamodb database .*
4. *Publish/ subscribe data on mqtt broker.*
5. *Getting data from google api's.*
6. *App development.*

Task completed

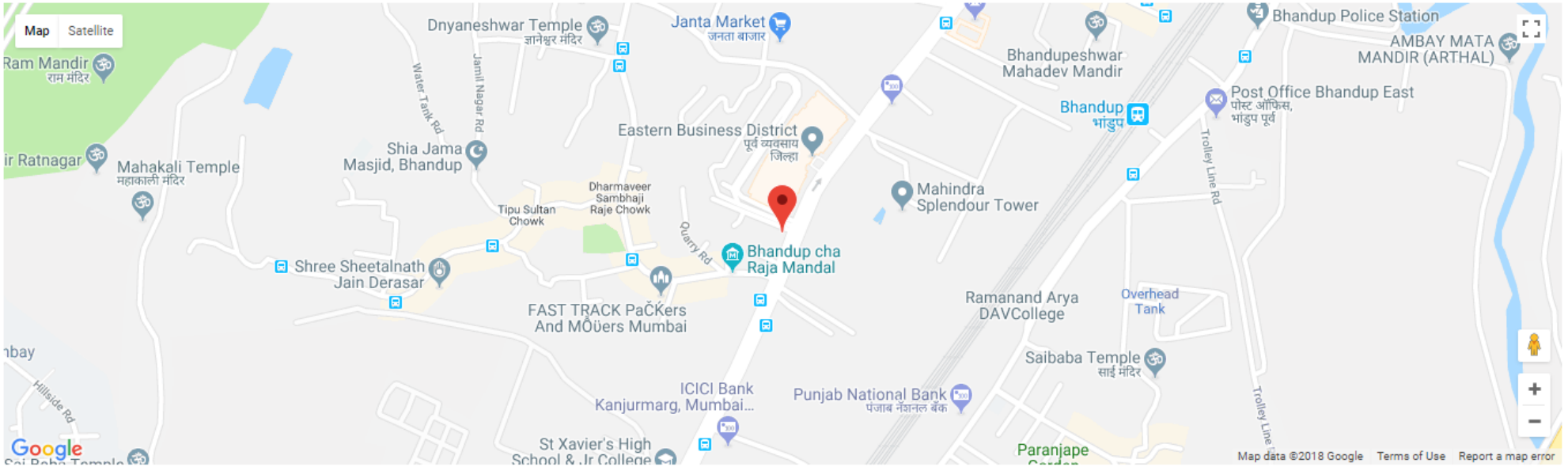
- *Successful communication over the rf was achieved using sdk and datasheet.*
- *A non-line of sight distance of about 1 kilometre was observed.*
- *CRUD (create, read, update, delete) of AWS database using aws tutorials.*
- *Google api's for eta and reverse geo-coding using google documentation.*
- *Proof of concept for the proposed solution.*
- *Prototype of the overall system.*

Test cases & Final output

NextJan Transport System

Bus Stop: Sakinaka Bus Stop, Andheri East

Bus ID	Location	Estimated Time of Arrival
602	45, Lal Bahadur Shastri Rd, Ganesh Nagar, Bhandup West, Mumbai, Maharashtra 400078, India	30 mins
881	Jaltarang Apartments, Rambaug, Chandivali, Powai, Mumbai, Maharashtra 400072, India	14 mins
882	B-7, Main Gate Rd, Central Area, IIT Area, Powai, Mumbai, Maharashtra 400076, India	24 mins
883	45-4, Jogeshwari - Vikhroli Link Rd, Chandan Nagar, Vikhroli West, Mumbai, Maharashtra 400083, India	24 mins



reusability

- *Extra nodes (transmitter and gateway) can be added without any prior request.*
- *Any addition of a new bus-stops does not require any extra setup except display.*
- *Long distance communication can be also be done using power amplifier.*
- *Can also be used as a sensor network for some other applications.*

Future enhancements

- *Android app development.*
- *Power amplifier for long range.*
- *Expansion of this network for real-time scenario.*

THANK YOU.