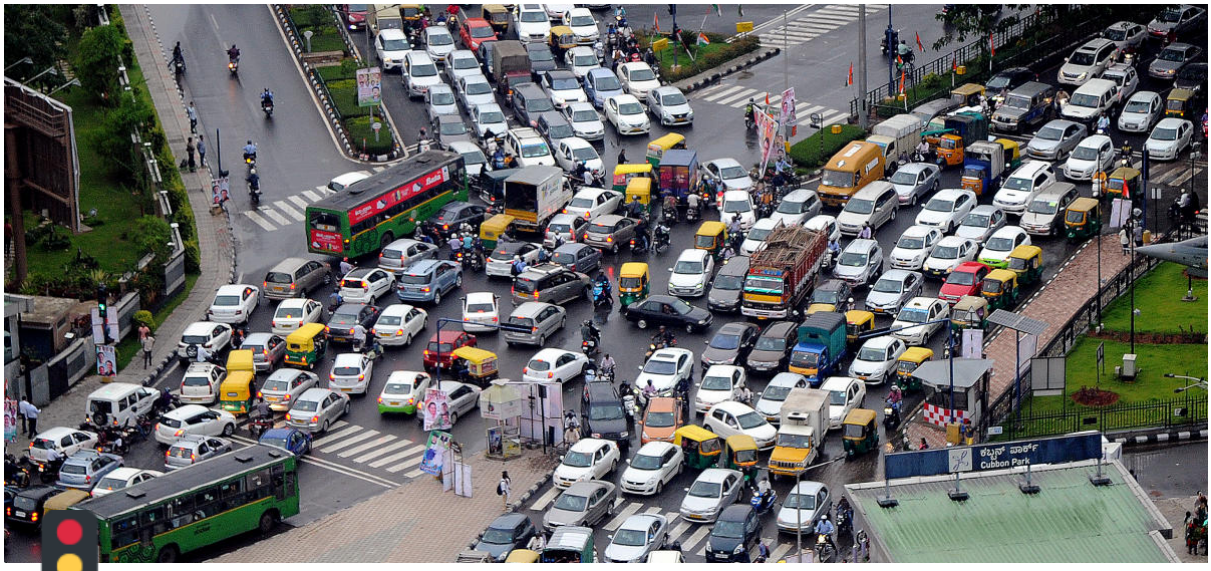

Prayanaka

> Everything a commuter needs to know to get around Bengaluru

Team Outliers

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🚂Introduction

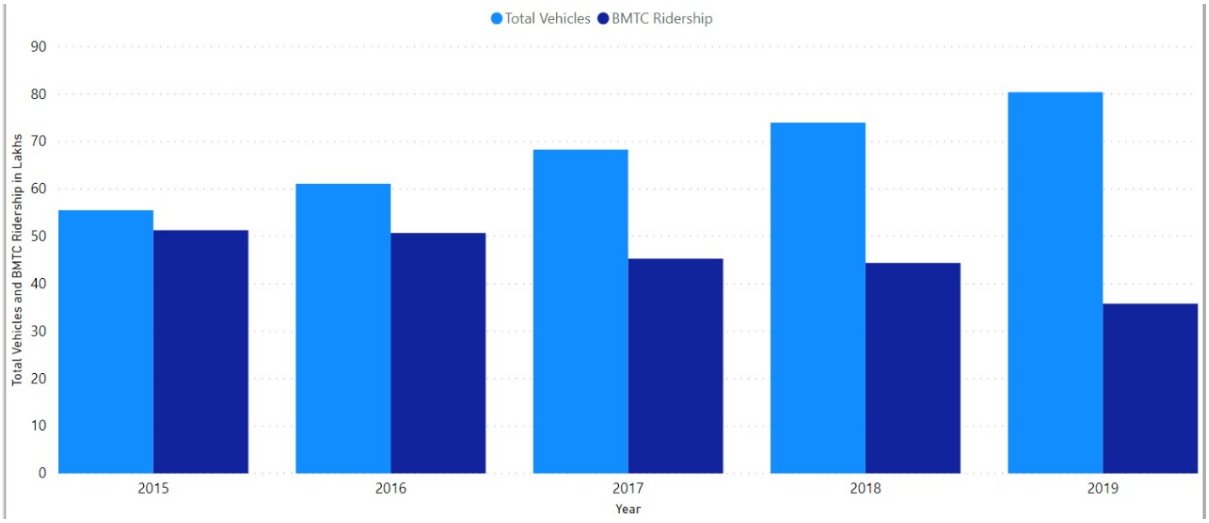


Fig1

As you can see in the Fig1, the number of vehicles in Bengaluru is constantly increasing due to the growing population and urbanisation. But contrary to this trend, the BMTC ridership is constantly decreasing. Both these trends together explain the atrocious congestion on Bengaluru roads.

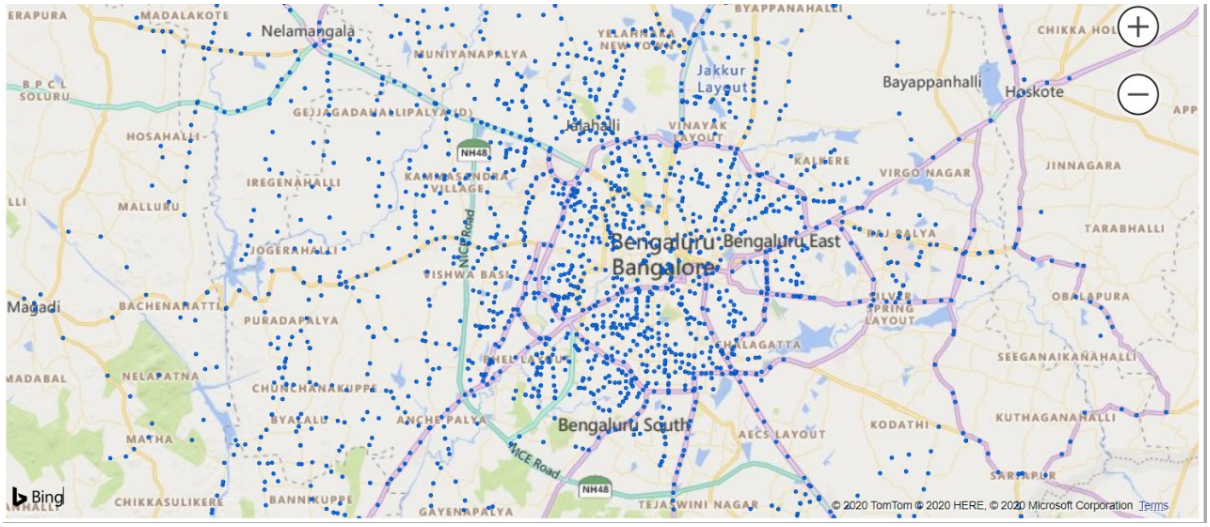


Fig2

As you can see in Fig2, Central Bengaluru is well connected by the BMTC bus system but the exterior parts hardly have any accessibility. The population of

Bengaluru is spread through the entire city but the bus system is not a perfect reflection of the same. The lack of accessibility and the convenience of last-mile connectivity through cabs with a marginal difference in fairs has caused commuters to choose other modes of transport. So the most efficient system would be to include last-mile connectivity with public transport.

Solution🚍

- To promote public transport while providing all options to get to the destination and encourage journey planning
- To include last mile connectivity with public transport to increase accessibility and ridership
- To create an application from user end and service provider end
- To inform the commuter of current traffic situation at the time of travel and in the path to the destination using real-time traffic and mobility data collection
- To identity areas with less accessibility, include bus frequency or introduce minibus services to areas with narrow roads

Options for commute provided🚐

- Public transport arrangement combined with last mile connectivity through bike taxi, mini van service or ola and uber services . Total cost of public transport ticket and last mile connectivity provided
- Ola, Uber availability, cost and ETA through APIs
- Parking arrangement at the destination for travel in their own vehicle. This would be in collaboration with the Smart Parking System to be implemented by BBMP. This might encourage individuals to avoid taking their cars and generate revenue.
- Yulu, Bounce and VOGO stations if within 5 min walk radius

Added features for commuter end of the app🛵

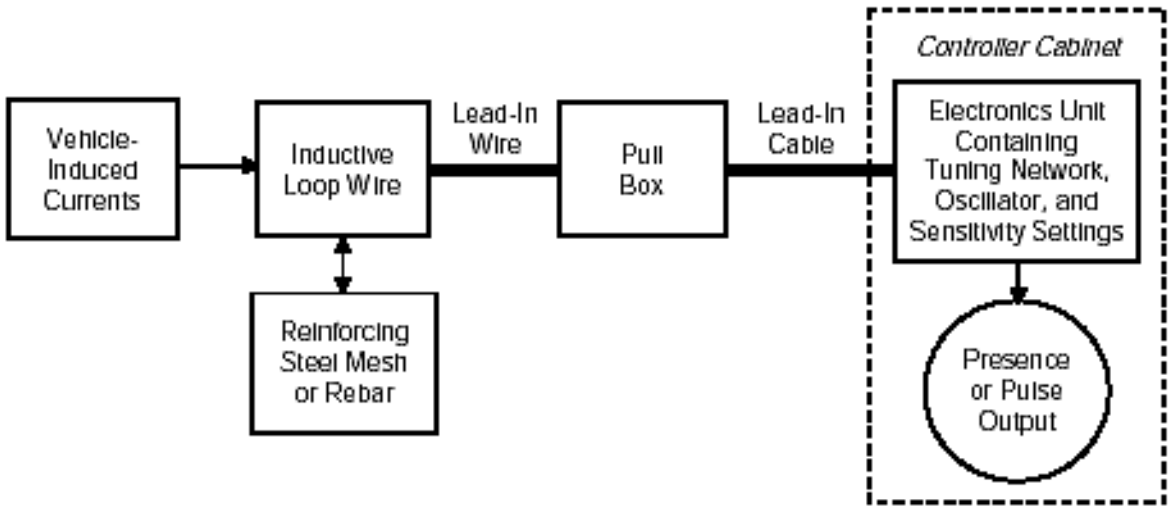
- Real time alerts on traffic in the path to destination

- Details on safety, illumination, shelter, accessibility from source and destination, seating facility and wheelchair accessibility at bus stop provided
- Display of statistics and statements to help the consumer make informed, responsible choice towards the planet and reduce negative impact
- Calculation of time difference between travel in car and bike
- Provision to request for accessibility for bus stop either by requesting for a bus stop or service for last-mile connectivity.

Features on Service provider side of App 📱

- Display of overcrowded routes to increase number of buses and frequency
- Provision to view underdeveloped bus stop (lighting, shelter, seating, wheelchair accessibility) to make required arrangements
- Provision to view areas not connected by public transport within 2km radius and width of roads to make last-mile connectivity arrangements. Suggestion to include minivans and small buses as big buses will find it inconvenient to pass through narrow roads

Data Collection Methods



1.Inductive loop

Vehicle detection loops, called inductive-loop traffic detectors, can detect vehicles passing or arriving at a certain point, for instance approaching a traffic light or in motorway traffic. An insulated, electrically conducting loop is installed in the pavement.

Advantages

- Capable of vehicle classification
- And speed classification
- Insensitive to inclement weather such as rain, fog, and snow.
- Provides best accuracy for count data as compared with other commonly used techniques.

Disadvantages

- Needs electricity
- Installed underground- roads have to be dug

Budget and installation

- 3-12m long loops
- Rs. 8000-9000 per loop
- 3 per 25 kms (acc to paper)

2. Piezoelectric sensors

Collect data by converting mechanical energy into electrical energy. The piezoelectric sensor is mounted in a groove cut into the road's surface.When a car drives over the piezoelectric sensor, it squeezes it and causes an electric potential - a voltage signal. The size of the signal is proportional to the degree of deformation. When the car moves off, the voltage reverses. This change in voltage can be used to detect and count vehicles.

Advantages

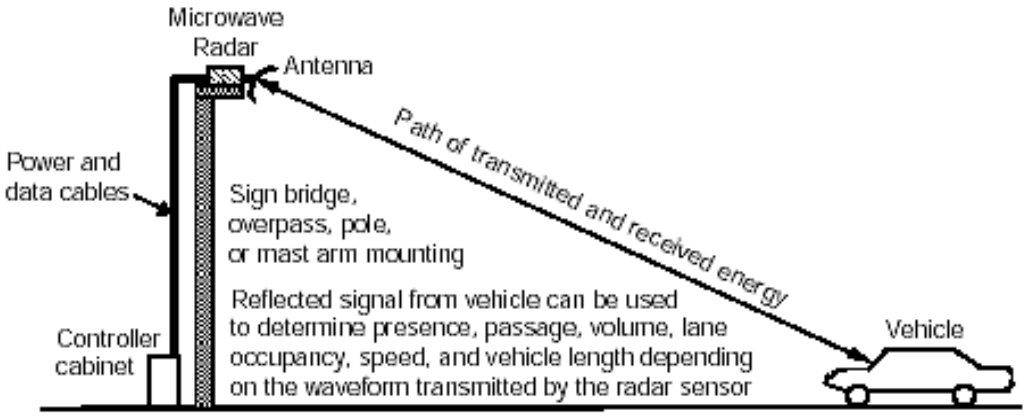
- Can be used to power street lights

- Simple to Install and Maintain
- Used to count and classify data.

Disadvantages

- Might Damage road
- Required high in number

3 .Microwave Radar



Microwave detection devices transmit a continuous signal of low-energy microwave radiation at a target area and then analyze the reflected signal. The detector registers a change in the frequency of waves occurring when the microwave source and the vehicle are in motion relative to one another. This allows the device to detect moving vehicles.

Advantage

- Radar is capable of detecting distant objects and determining their position and speed of movement.
- Typically insensitive to inclement weather at the relatively short ranges encountered in traffic management applications.
- Multiple lane operation available
- With vehicle detection, a device directs high-frequency radio waves at the roadway to determine the time delay of the return signal, thereby calculating the distance to the detected vehicle.

Disadvantage

- may not detect stopped vehicles
- Slightly expensive

4. Video Processing🎥

This vehicle counting method has several advantages over other automatic systems. It is cost-effective as it can count in many directions at once: only one camera is needed for several lanes or exits at a junction. It is easy to add or modify the zones through which vehicles are counted from an office PC.

Advantages

- Monitors multiple lanes and multiple detection zones/lane.
- Easy to add and modify detection zones.
- Rich array of data available.
- Provides wide-area detection when information gathered at one camera location can be linked to another.

Disadvantages

- Installation and maintenance, including periodic lens cleaning
- Performance affected by inclement weather such as fog, rain, and snow; vehicle shadows; vehicle projection into adjacent lanes; occlusion; day-to-night transition; vehicle / road contrast; and water, salt grime, icicles, and cobwebs on camera lens.
- Requires 50- to 70-ft (15- to 21-m) camera mounting height (in a side-mounting configuration) for optimum presence detection and speed measurement.
- Inaccuracy due to camera motion caused by strong winds or vibration
- Movement from other structures (i.e. span wires or overhead conductor) within the field of view can cause problems.
- Very Expensive

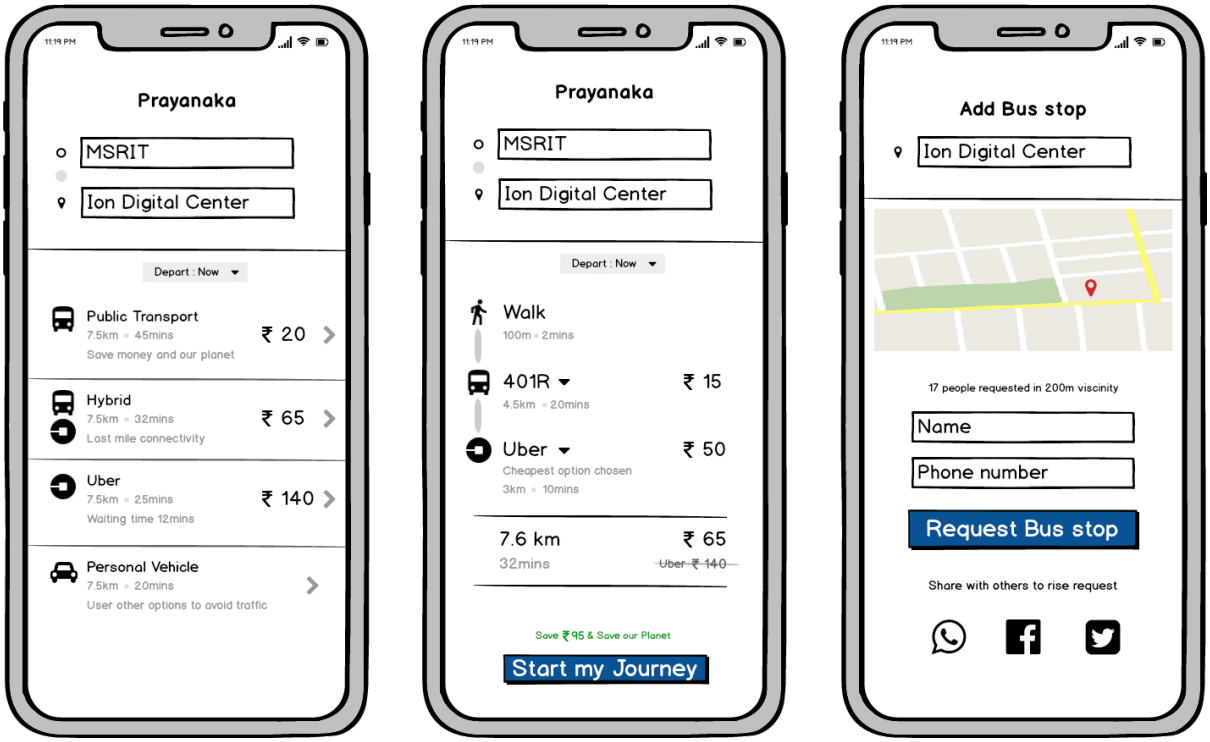
Budget💰

Currently the big project in the field of public transport is the Intelligent Traffic System. BMTC is shelling out Rs 79 crores over a period of five years for this state-of-the-art transport system, amounting to almost Rs 1.1 crore every month. This is also ineffective as most of the buses are not equipped with GPS system The effective solution in the long run would be to increase the accessibility in all areas, increase frequency and track traffic conditions. The primary areas where finances must be dedicated are acquiring buses and minivans, installation of real time data collection equipment or improve already existing ones, maintaining data centres and infrastructure. The current ridership is approximately 40 lakhs in a city of 1.2 crore people. So the fleet must be doubled if not tripled. Out of the newly acquired buses 70% must big buses and the remaining will be mini buses.

This calculation must be reviewed as appropriate data on road width has not been acquired. If these are numbers are to be considered the cost would be 700 crores which are not feasible. While BMTC can work on increasing the fleet with time, in the meantime accessibility can be improved by providing last-mile connectivity with the already available options. The element of uncertainty associated with waiting for buses can be avoided with real-time data collection and journey planning can be encouraged. The installation costs associated with each data collection installation has been mentioned.

Combining Google maps route calculation with real-time traffic data collection would be a cost-effective solution.

Wireframes of the consumer app



Conclusion

Bengaluru has a one of a kind traffic situation as the urbanization, overpopulation did not go hand in hand with the city development and planning. Issues like supplemental reduction in road density compared to other cities, narrower width of roads, rapid urbanization have made the traffic control and management a very tedious task. Not only has extensive research been done on existing systems in place but also case studies on other cities have been studied to gather inspiration. This project is the perfect amalgamation of technology and urban planning that enables Bengaluru to become a smart and sustainable city. With the help of the esteemed authorities involved in making the city the beautiful place that it is, this solution can make a big difference to the prevalent issues. The idea is only far

fetched without the help and support of all the authorities involved. The final solution is to be presented in the form of a mobile application with state of the art user experience and all the features required to make sure that "Everything a commuter needs to know to get around Bengaluru" is provided.