DAYANANDA SAGAR UNIVERSITY

LEAN STARTUP METHODOLOGY
(COURSE CODE: 21CT3604)

The Journey to Innovation:

Networking based Traffic Optimization

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE & TECHNOLOGY

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OUR JOURNEY

In the bustling city of Bengaluru, our team of four, comprising Gaurang Goyal, Jaice S Joseph, Shashank Hegde, and Swaroop K R, embarked on a journey driven by the principles of the Lean Startup Methodology. We took the idea To revolutionize and optimize the traffic management in the city of Bangalore to make our city safer and more efficient for its residents.

Our journey began with the Karnataka State Police Hackathon, where we honed in on Accident Data Analysis as our chosen domain. With meticulous planning and unwavering determination, we delved deep into the complexities of road safety, exploring innovative solutions to mitigate accidents and enhance overall traffic management. Despite pouring our hearts and souls into the project, the elusive victory slipped through our fingers, teaching us invaluable lessons in resilience and perseverance.

Undeterred by the setback, we pivoted our focus to the Manthan Business Idea Hackathon, presented with the tantalizing prospect of either continuing with an existing idea or venturing into uncharted territory. Fuelled by our passion for innovation, we chose the latter path, eager to explore new avenues in traffic management.

Our brainstorming sessions were filled with boundless creativity and spirited debates as we contemplated various business models. Eventually, we settled on a B2G approach, aiming to collaborate directly with government agencies to implement our solutions. From radar technology to sophisticated traffic optimization chips, our ideas knew no bounds as we envisioned a future where traffic flow was seamless and accidents were minimized.

Drawing inspiration from our interactions with network administrator, working in DSU campus 3 Kudlu Gate, we had insightful discussions about networking field, we then fine-tuned our ideas to align with the our idea's needs. Each conversation offered fresh insights and perspectives, guiding us towards solutions that made us do multiple iterations towards our BMC(business model canvas).

As our journey unfolded, we encountered challenges and setbacks, but each obstacle became an opportunity for growth and learning. Through perseverance, collaboration,

and a relentless pursuit of excellence, we remained steadfast in our mission to transform traffic management in Bengaluru.

However, our path took an unexpected turn when we sought guidance from network engineers and the Madiwala Traffic Police Station. While the network engineer provided valuable insights and feasible solutions, the Madiwala Traffic Police Station recommended us to visit the main Traffic Control Room in Bengaluru. There, we met police inspector Dr. Anilkumar who listened to our idea and advised against focusing solely on traffic management. He informed us that the city traffic police is on the most advanced stage of managing traffic, and there is no need to include another potential system to optimize the traffic congestion in the city, sir mentioned about systems like ASTRAM and said that live data collection of the traffic is done by several cameras and that there is no drawbacks to the current system. Instead, he urged us to consider road safety as a priority and suggested addressing issues in that domain.

Throughout our journey, our mentor Prof. Bhaskar Venugopalan provided invaluable guidance and support, helping us navigate the complexities of entrepreneurship and providing valuable insights that shaped our project.

As we continue on our entrepreneurial journey, the road ahead may be uncertain, but one thing is clear: our team is united in our vision to create a safer, more efficient city for all. With innovation as our compass and determination as our driving force, we are poised to leave a lasting impact on the future of traffic management and road safety in Bengaluru.

HYPOTHESIS

Change: Implementing a traffic light optimization system using radar, RFID, or microchips for real-time vehicle data collection at traffic signals.

Aspect that will change: Replacing the existing traffic light control system that utilizes IR sensors and cameras with a completely new system based on the chosen technology (radar, RFID, or microchips).

Success or fail metric:

Primary metric: No statistically significant reduction in average wait time per vehicle across all traffic signals in the test area compared to the existing system using IR sensors and cameras.

Success or Fail scenario: Our project aimed to completely overhaul the existing traffic light control system at specific intersections in Bengaluru. We proposed replacing the existing infrastructure utilizing IR sensors and cameras for queue length detection with a novel system based on either radar, RFID, or microchips. These technologies promised real-time, high-fidelity vehicle data collection, which we believed would enable more dynamic and efficient traffic light timing allocation based on the actual number of vehicles present in each lane.

Expected Benefits (not achieved):

Dynamic Traffic Light Timing: With real-time data on queue lengths, the system would adjust traffic light timings more frequently to prioritize the lane with the most waiting vehicles, theoretically reducing overall wait times.

Improved Traffic Flow: By efficiently managing traffic light cycles based on actual traffic conditions, we anticipated a smoother flow of vehicles, potentially increasing overall traffic throughput at the intersections.

Reduced Congestion: By minimizing wait times and optimizing traffic flow, we expected a noticeable reduction in traffic congestion in the test area.

Reasons for Potential Failure:

Integration Challenges: Integrating a completely new system with existing traffic light infrastructure could be complex and time-consuming. Compatibility issues and unforeseen technical hurdles might arise during implementation.

Cost-Effectiveness: Compared to the existing IR sensor and camera system, the proposed technologies (radar, RFID, or microchips) might be significantly more expensive to install and maintain, raising concerns about cost-justification.

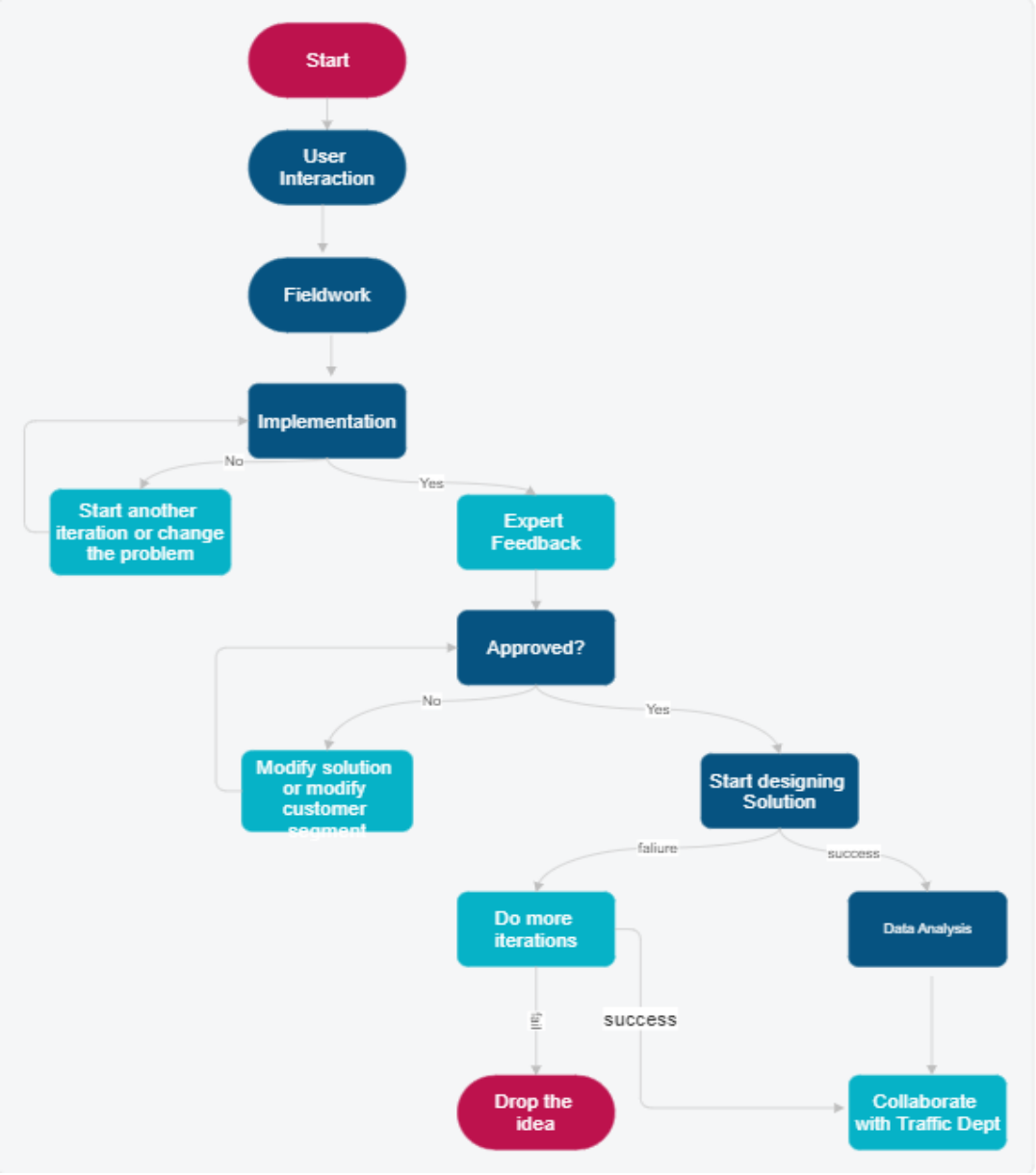
Data Security and Privacy: Depending on the chosen technology, real-time vehicle data collection might raise privacy concerns that would require careful consideration and implementation of robust data security measures.

Unforeseen Technical Issues: The chosen technology (radar, RFID, or microchips) might encounter unforeseen technical challenges in real-world traffic scenarios, potentially hindering performance or causing malfunctions.

Conclusion:

Although the project envisioned significant improvements in traffic flow through real-time data collection, the complexities of replacing existing infrastructure, potential cost issues, and data privacy concerns could lead to a situation where the new system offers no significant advantage over the existing IR sensor and camera system. This scenario would constitute a complete fail based on the primary success metric (no reduction in wait time).

FLOWCHART


Start
User Interaction
Fieldwork
Implementation
No
Yes
Start another iteration or change the problem
Expert Feedback
Approved?
No
Yes
Modify solution or modify customer
Start designing Solution
faliure
success
Do more iterations
Data Analysis
success
Drop the idea
Collaborate with Traffic Dept

BUSINESS MODEL CANVAS

BMC for the idea-1 iteration-1: traffic optimization

With

<table>
<tr>
<td rowspan="2">KEY PARTNERS/CUSTOMERS:

Bangalore traffic police:
The Task of traffic management in the city is managed by Bangalore traffic police. Their collaboration will be proved essential for us

BBMP officials
The traffic lights installation and resource management of this city is managed by BBMP. Partnership is essential with the city administrators
Network providers:</td>
<td>KEY ACTIVITIES:

Providing Continuous and live data on the number of Vehicles on a particular road, with high accuracy.

Analysis of live traffic data, to mitigate/reduce traffic, by creating a priority system Automate the traffic signalling and management.</td>
<td rowspan="2">VALUE PROPOSITIONS:

Traffic optimization:
Improving traffic flow and reducing congestion by adjusting signal timings based on real-time traffic data from the nodes and analyzing the data to provide priority-based signal timings.
Automation:
Automate the traffic monitoring and traffic signaling system..
Accident prevention and management: Minimalize any accidents that may occur. And provide fast information on accidents occurred in the network

Priority vehicles:
Ambulances, fire trucks, VIP and police vehicles get immediate priority to pass through the traffic junction</td>
<td>CUSTOMER RELATIONSHIPS:

Application based support where the Feedback will be used to reiterations to the product

Self-service: The company enables customers to access the network service without any direct interaction with the company.</td>
<td rowspan="2">CUSTOMER SEGMENTS:

• Metropolitan citizens who travel using their private vehicles in cities like BLR

• City Traffic police will be able to efficiently manage the traffic in the city with the help of our product</td>
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<td>KEY RESOURCES:
Local area network Infrastructure for each traffic junctions in the city.

Vehicular ad hoc networks.

microcontroller development board such as NodeMCU

RFID based technology to act as nodes in the network</td>
<td>CHANNELS:

Business to business model.
Wherein we will be partnering up with the administrative body of Bangalore metropolitan area (BBMP) and the Bangalore city traffic police.</td>
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<td colspan="3">COST STRUCTURE:

• Development of network Technology with node chips
• Priority system development to automate traffic management
• Customer Support</td>
<td colspan="2">REVENUE STREAMS:

• Subscription Fees
• One time payment for the entire product
• System maintenance fee</td>
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Iteration 2

These are the Iterations done after the fieldwork we did for the traffic optimization pitch, where we were advised to pivot our idea.

In this we kept the base idea then changed the customer segment and application of our idea.

Here the business model channel changed into the Business to customer model(b2c) where we are providing services to the

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KEY PARTNERS/CUSTOMERS:

BMTC:
We will be partnering up with BMTC because it is more concerned about the development of Bengaluru and it provides economic benefits to bmtc

(Ctrl)

KEY ACTIVITIES:

Connecting the fleet of buses to the LAN at the bus stands and then transmit live data from the bus to the network, from which the data will be provided to a database and that data can be
Provided to the customers waiting in the bus stand

KEY RESOURCES:
Local area network Infrastructure for each Bus stand in the city.
Ticket management system in each fleet buses so that we can provide

microcontroller development board such as **NodeMCU**

database management system which will have cache data

VALUE PROPOSITIONS:

Traffic optimization: many a times the customer doesn't know if there is a bus that will come to their particular stand that will go to the customer's desired destination, and whether there is space for the customer to board the bus.
So if the fleet of buses is connected to a network, which is provided in the junctions then we can send data to the mobile application to the customers.
Then they will be able to get information on the number of passengers on board of a bmtc bus.
They will also get to know which bus is on route to their bus stand.
By this data our customers can make an informed decision on which bus they should board or not.

CUSTOMER RELATIONSHIPS:

Self-service: The company enables customers to access the service with the help of mobile applications.

CHANNELS:

(B2C) Business to customer channel by sending the information of the bus and number of passengers onboard the bus

CUSTOMER SEGMENTS:

- Metropolitan citizens who travel using the services provided by public transport co-operations like BMTC
- The

COST STRUCTURE:

- Development of network Technology with node chips and database
- system to continuously update the information to the customers mobile application
- Customer Support

REVENUE STREAMS:

- Subscription Fees
- System maintenance fee

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KEY PARTNERS/CUSTOMERS:

BMTC:
We will be partnering up with BMTC because it is more concerned about the development of Bengaluru and it provides economic benefits to bmtc

KEY ACTIVITIES:

- Connecting the fleet of buses to the LAN at the bus stands
- transmit live data from the bus to the network,
- Provided to the customers waiting in the bus stand

KEY RESOURCES:

- Local area network Infrastructure for each Bus stand in the city.
- Ticket management system in each fleet buses so that we can provide
- microcontroller development board (say, **NodeMCU**)

VALUE PROPOSITIONS:

Traffic optimization:

- The customer doesn't know if there is a bus that will come to their particular stand that will go to the customer's desired destination, and whether there is space for the customer to board the bus.
- The junctions then we can send data to the mobile application to the customers.
- The number of passengers on board of a bmtc bus.

CUSTOMER RELATIONSHIPS:

- **Self-service**: The company enables customers to access the service with the help of mobile applications.

CHANNELS:
B2B channel of having tie up with the administrative body of BMTC.

CUSTOMER SEGMENTS:

- Metropolitan citizens who travel using the services provided by public transport co-operations like BMTC

COST STRUCTURE:

- Development of network Technology with node chips and database
- system to continuously update the information to the customers mobile application
- Customer Support

REVENUE STREAMS:

- Subscription Fees
- System maintenance fee

CONCLUSION

Our traffic light optimization project, while unsuccessful in its initial form, yielded valuable insights. We learned the existing system is already effective. Moving forward, we have two options: partner with the Traffic Control Room to focus on road safety using our real-time data expertise, or explore a new area in traffic management, potentially developing a real-time incident detection system or integrating with navigation apps. Regardless of the path chosen, this project has equipped us with valuable knowledge to make a positive impact on Bengaluru's traffic system.