

## DST Geospatial Hackathon-StartUp Challenge By IIIT Hyderabad

### **Idea Details:**

What is the problem? Explain specifically what is being attempted.

COVID 19 has brought about a revolution in the thinking of cities across the world to reprioritise walking and cycling for building healthier and more resilient cities. With 100 smart cities on the anvil in the country, Indian cities are only now seeing provisioning of cycling tracks. Encroachment of cycle lanes by motor vehicles is putting lives at risk and derailing the efforts towards creating safe cycling eco-system. It is important to wield disincentives to make safe cycling infrastructure work as intended. However, with the lack of understanding of the usage of the lanes since they are a brand new infrastructure, it is important to bring in enforcement as an important aspect of maintaining infrastructure that encourages people to cycle. The staffing in the police will not be able to catch up to manually enforce violations.

What is the solution/idea?

Develop contact less solutions to identify violation in use of cycle lanes, capture evidence of violation (infringement by other vehicles for movement or stopping) and alert the same to concerned authorities for enforcement.

What is the technology used to solve the problem?

Usage of computer vision, image recognition etc. can be utilised for developing a fool-proof enforcement solution. The solution should be cost effective, so that it can be scaled for use at multiple locations across a city without consuming too much resources like internet bandwidth, storage space, etc.

What are features built in the POC?

The solution so developed should be able to automatically detect different forms (shapes, weight, and footprint) of cycles, including smaller cycles designed for children and distinguish from other vehicular forms like motorbikes, mopeds, scooters, etc., which are not allowed on cycle lanes. Cycles are driven at speeds ranging from 10 kmph to 60 kmph, so the solution should be able to detect cyclist travelling at any speed. The cycle lanes can be of dedicated or shared by design. On shared lanes, mixed use of cycles and other vehicle modes are allowed, however priority on such lanes shall be for cyclists, the solution should be able to detect such situations, where other vehicles fail to yield to a cyclist and capture evidence of the same for reporting. In order to ensure that the solution is configurable to meet changing policies on cycle lane use, the solution should have user interface, where authorised personnel can configure what (type of active mobility) use is legally allowed or not on cycle lanes.

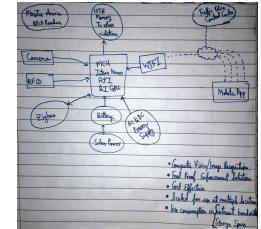
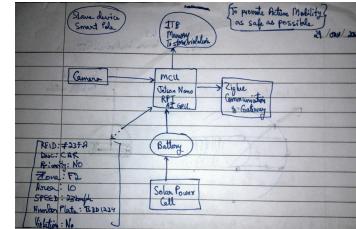
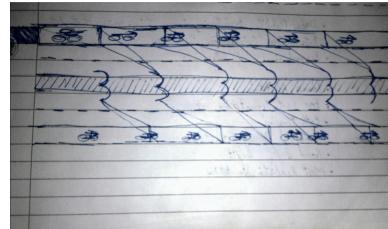
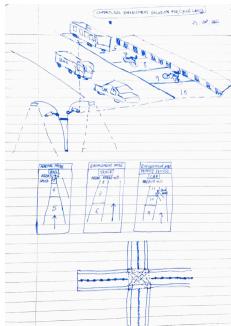
What will be the key implementation steps (for the full solution)

Usage of computer vision, image & video recognition, tracking & recognising vehicle information via FastTag RFID, etc. can be utilised for developing a fool-proof enforcement solution by installing IOT based Hardware product at every Street Light Poles. However, the solution will be cost effective, so that it can be scaled for use at multiple locations across a city without consuming too much resources like internet bandwidth, storage space, etc. There will be special Mobile App that will guide vehicle users whether to join in special shared lanes (if no cycles/public transport is there in particular stretch of road) or it can be way for faster means of commuting based on incentive engineering concept.

**POC Code/ Video:**

Submit the basic POC or design of your idea (PDF or Video)

[https://drive.google.com/file/d/1IHuSIGn9OwOBbNhJSZoaKEjqeHJo\\_jh9/view?usp=sharing](https://drive.google.com/file/d/1IHuSIGn9OwOBbNhJSZoaKEjqeHJo_jh9/view?usp=sharing)

**REQUIREMENTS:****Task1:**

Track all vehicles with unique number plates from external cameras & captures its location and display it in google map at android app.

Penalise all vehicles who are in priority lane (in their task@2 account), except in Task3.

**Task2:**

Road lane management system using Task1 solution [location movement].

Respective Vehicle Users should have real-time movement in particular road lane.

Priority lane should display Green/Red as per Task3

Users have freedom to go priority lane if they enable in app as per Task3. Activate the number plate.

**Task3:**

If there is cycle/buses on priority lane from Task1, then Task2 priority lane should display red, otherwise green.

If there are vehicles who have enabled priority mode & are in priority lane from Task1, Task2 priority lane should display red, otherwise green.

Cycle: Planning and Navigation App

Bus: Planning and Navigation App

Normal Vehicle: Planning and Navigation App

Those with GPS: Camera 1,2,3,4,5 can spot them & make their real-time location instantly at Particular stretch.

**Competitors:**

PUSHPAK.AI and PARK+

**VALUE PROPOSITION:**

- Any vehicle can follow rules without need of this solution as he/she can easily spot cycles/bus in priority lane & hence will maintain distance from them.

For one exception, there is a value.

- What if one wants to travel in priority lane, other than buses and cycles.
  - To avail priority lane Rs 10k or any specify demand-supply peak pricing, needs to be paid.
  - Otherwise, if no one has availed, then normal traffic at same lane except presence of buses & cycles.
- 

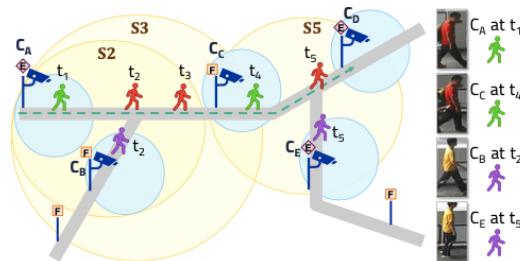
#### Algorithm:

Camera-1,2,3,4,5:

- Capture the wrong-lane violators.
- Spot Cycles & buses-Keep them in loop.
- Transfer the data to Gateway.

ENTRY ROAD		ZONE-1	ZONE-2	ZONE-3	ZONE-4	ZONE-5	EXIT ROAD	
R	C	-----					R	C
F	A						F	A
I	M	— — —	— — —	— — —	— — —	— — —	I	M
D	E	— — —	— — —	— — —	— — —	— — —	D	E
1	R	— — —	— — —	— — —	— — —	— — —	2	R
	A	— — —	— — —	— — —	— — —	— — —		A
1	1	— — —	— — —	— — —	— — —	— — —	2	2
->	->	— — —	— — —	— — —	— — —	— — —	->	->
		CAMERA-1	CAMERA-2	CAMERA-3	CAMERA-4	CAMERA-5		

- Activated-List of FastTag ID.
  - CAMERA-I, check list of all members plate.
  - Compare FastTag ID & Number Plate spotted.
- [1] If found~Following Rules  
[2] If not found~Not Following Rules-Impose penalty on violators.



*Spotlight* strategy for camera activation while tracking.

- Blue circles are the FOV of cameras CA–CE.
- The person icon shows people on the road at times t<sub>1</sub>–t<sub>5</sub>.
- A red person means the entity of interest is in a blindspot.
- A green person means they are in the FOV of a camera.
- A purple person indicates someone not being queried for.
- The yellow circles S<sub>i</sub> are the calculated spotlight regions that indicate which cameras should be active at time t<sub>i</sub>.
- The purple diamonds with an E indicate edge devices co-located with the cameras.
- The orange squares with an F indicate fog devices present across the city.