**Smart Traffic Management using Artificial Intelligence**

**Introduction:** "Greetings, judges. I am Shreyansh Garg, and today I am excited to present our project: **“Smart Traffic Management”** using Artificial Intelligence.

[start here]

“Imagine a city where traffic lights can adapt in real-time to ensure the fastest possible response for emergency vehicles and minimal wait at busy intersections. This project aims to make that vision a reality."

**Problem Statement:** "As per data released by the Road Ministry of India, every day, around **1200** motor accidents take place and **400** deaths are caused by them every day **[“that’s 19 deaths every single hour”]**.  Moreover, a report by India Today emphasized that about half of road crash deaths could be prevented if victims received appropriate medical care within the first hour.

**Solution:** "My solution involves using an AI model to detect vehicles at intersections and controlling traffic lights accordingly and managing “traffic barriers” to prevent rash driving.

**"Let’s talk about technicalities”**

**Training AI:**

1. **Data collection:** In the beginning,we collected around **3000 images** of Ambulances, Fire trucks, cars and a few pictures of the road itself, these images were then labelled by my team to train a custom model for our project i.e. creating Artificial Intelligence
2. **Labelling:** Labelling means drawing a rectangle from the top-left corner to the bottom-right corner of the vehicle we want our model to detect and feeding it to a base AI model.

**In our code:**

* **Data Processing:** Our camera captures real-time footage of this intersection. In our code, we resize each frame to a smaller size. The resized frame is processed by our custom model which detects all object in the image, checks for the presence of emergency vehicles and determines whether the vehicle is on the left or right street.

**Traffic Light Control**: Count of the number of vehicles on each side is saved in a variable. Our code sends a single signal to a microcontroller based on this variable which controls the LEDs and the barriers here.

**[start demonstration]**

* Now suppose, there is an ambulance on the left street and 3 cars on the right street, the lights for the left street will remain green until the ambulance passes.

[demonstrating code functionality]

* Suppose, there are 3 cars on the left street and a single car on the right street, the left street light will remain green until a balance is achieved in the number of vehicles.

[demonstrating code functionality]

**Challenges and Solutions:** "Throughout this project, we encountered several challenges:

1. **Model Training:** Training an AI model requires diverse images. For example; we faced many false positive results while testing meaning that the model was detecting the background as a vehicle. We overcame this issue by adding a few images to the dataset without any detections, so that the model learns that there may be no vehicles in a frame.

**Results:** "The system shows promising results. It accurately detects vehicles and prioritizes emergency vehicles, improving traffic flow and reducing response times for emergency services in suburban areas. It is easy to decrease the detection time in future using better processors. "

**Future Work:** "In the future, I plan to enhance the system by:

* **Integrating Advanced Sensors:** Placing multiple better cameras at a greater altitude to increase visibility under varying weather conditions and enabling us to expand the system to cover larger intersections and integrate it with city-wide traffic management.
* **Machine Learning Improvements:** Continuously updating the model with new data will help with efficiency with new vehicles such as jeeps and trucks.

**Conclusion:** "In conclusion, my Smart Traffic Lights project demonstrates how technology can improve urban traffic management and enhance emergency response times. With computer vision and real-time data processing, we can create safer and more efficient cities.

Thank you for your time. We are now open to any questions you may have."