**Introduction**

**Situation**
- The traffic issues of Dubai cost the city and its residents millions in wasted time and fuel.
- Although major projects have been undertaken to ease traffic congestion in Dubai such as the Dubai Metro project in 2009 and the recently completed Dubai Tram project and various road widening projects, the traffic issues of Dubai cost the city and its residents millions in wasted time and fuel.
- For this purpose the Sheikh Mohammed bin Zayed road is subjected to study in order to represent it as a sample of Dubai’s peak hour traffic woes.
- The Sheikh Mohammed bin Zayed road is a major highway which connects Dubai to the emirates of Sharjah, Ajman, Fujairah and Ras Al Khaimah.

**Identification of problems:**
- Peak hour traffic is one of the major problems for congestion in the Sheikh Mohammed Bin Zayed road since it is one of the easiest and fastest ways to travel from Dubai to Sharjah.
- Major construction works lead to closure of lanes which exponentially decreases traffic flow. Whether it be constructing new roads or bridges, the need to close the lanes causes major delays and problems.
- The nonlinear growth of vehicles is cited as the primary reason for ever increasing traffic congestion issues.

**Solutions**

**Traditional solution**

The traditional solution to traffic problems on highways is building extra lanes. The main step in this type of solution is the decision making whether to go with the traditional solution or not. This is done based on a demand model which is created by extensive data collection.

**Issues**
- Cost: Example in USA it takes about $2 to $10 million per lane mile.
- Space limitation
- Time frame of completion: on average it takes 1 year per lane
- Conflicts of interests between city officials.

**Automated highway system**

- Automated Highway System, Platoon system, is used describe two or more vehicles following each other at a very short distance. The traditional solution to traffic problems on highways is building extra lanes. The main step in this type of solution is the decision making whether to go with the traditional solution or not. This is done based on a demand model which is created by extensive data collection.
- String stability used for safety and stability of vehicles
- Spacing 2-4 meters
- Reduces Consumption of fuel
- Autonomous vehicle preferred
- SAPERE AND PATH conducted successful experiment

**Issues**
- Complexity of the project
- Lack of Control of driving
- Reliability

**Straddling bus**

- Straddling bus was roused by a Chinese innovation in 2010.
- A subway design 2 meters above the ground.
- It uses electricity and solar panels as a power source.
- It runs at an average speed of 40km/h and a maximum speed of 60km/h.
- Will straddling bus solve the traffic congestion problem?
  - Capacity of 200 passengers.
  - Reduces the number of public transport vehicles.
  - 20-30% reduction of traffic congestion.

**Barrier Transfer machine (BTM)**

Barrier transfer machines, are heavy vehicles that are used to exchange lanes from one side to another in order to relieve the traffic congestion during rush hour by creating a dynamic extra lane. Moveable barriers are in permanent use in cities such as Auckland; Montreal; Canada; Philadelphia, Pennsylvania;

**Types of Application used by BTM:**
- Temporary Application:
  - Temporary application is used generally for maintenance, repair or construction.
  - The Barrier Transfer machine makes the construction safer and secure.
- Permanent Application:
  - In this application used for creating a dynamic lane where there is traffic. It reduces the traffic congestion when there is traffic on the peak time.

**Design and Working**

S-shaped conveyor in the undercarriage of the vehicle. The vehicle starts by going around the concrete lane barriers and taking over one lane while it finishes its job. The barriers (T-shaped) are lifted off the ground and onto the conveyor belt under the machine.

**Traffic monitoring**

The BTM system makes use of a centralized control system which utilizes the information obtained from CCTV cameras with thermal sensors. The system takes the video information and sends it to the video detection board. According to FLIR, with the help of thermal and responsive command and control software. We can collect the data of ongoing traffic. This helps the barrier transfer machine to recognize when it should replace the barriers and by how many lanes.

**References**