Internet of Technology – Assignment 1

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Approach:

We were required to track 6 vehicles using 6 UAV. The condition was that each UAV should track one vehicle and the delay from HQ is 10 seconds, so UAVs should orient themselves.

For this, every 10 seconds, we send the location of vehicles to all the UAVs. Once each UAV receives the locations, it calculates each vehicle's distance from its location. Since the UAVs cannot communicate with HQ to tell them which device to follow, we communicate between UAVs to orient themselves.

Once each UAV has calculated each vehicle's distance, it shares the same with all other UAVs. Each UAV now has distances from every other UAV to vehicles and itself to other vehicles. To orient themselves, we find the most closest UAV for each vehicle.

The algorithm is as follows:

```
for v in vehicles:
      find the closest UAV
      assign the UAV to this vehicle
      remove the UAV from the pool of available UAV's
      repeat until all vehicles have a UAV assigned to them
```

Since all UAV's are using the same algorithm and calculating locally, each UAV will get the same result. We sent this result back to HQ.

This ensures that only one vehicle is being tracked by one UAV and that a vehicle always has one UAV tracking it.

No of messages sent:

In 10 minutes,

- 6 messages sent from HQ to 6 UAVs
- 1 message is sent from each UAV to the other 5 UAV. Total messages = 5*6 = 30 messages
- 6 messages sent from UAV to HQ

Total messages = 6 + 30 + 6 = 42 messages.

We can reduce the number of messages sent between UAVs by broadcasting on the same topic. Then each UAV will need to transmit only one message.

The time required for this calculation is minimal and takes less than 1 second from transmitting HQ's message to receiving a reply at HQ. Since the time required is very little, and UAVs only have to communicate once, a slow UAV will not slow down others in the group, and others can keep track of vehicles even if one slows down to find its vehicle.