

# VEHICLE-TO-VEHICLE COMMUNICATIONS

SHIRLEY XUEMIN HE

# BACKGROUND

## TESLA AUTOPILOT FATAL ACCIDENT

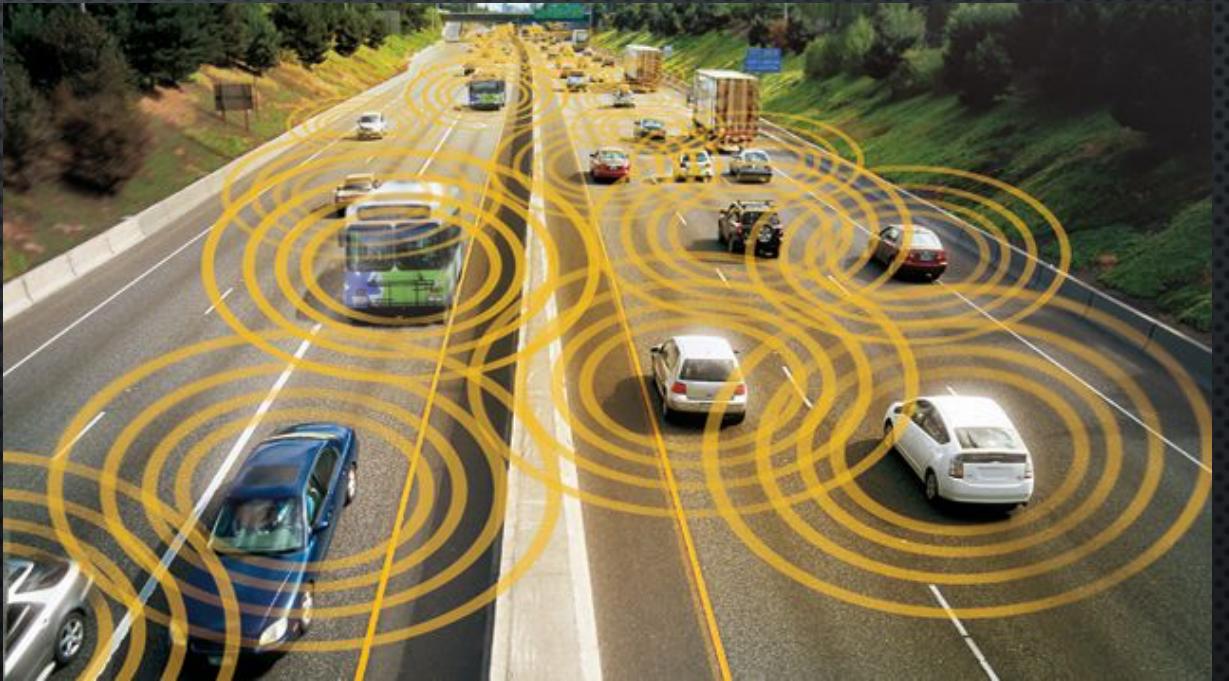
- FIRST FATALITY OF AUTOPILOT DRIVING
- THE VEHICLE WAS TRAVELING AT 74 MPH IN A ZONE WHERE THE LIMIT WAS 65 MPH WHEN IT HIT A TRUCK
- TESLA'S AUTOMATION FAILED TO SEE THE WHITE TRUCK AGAINST A BRIGHT SKY.



WHAT IF THE TESLA AND  
THE TRUCK IT HIT HAD  
BEEN ABLE TO TALK TO  
EACH OTHER?

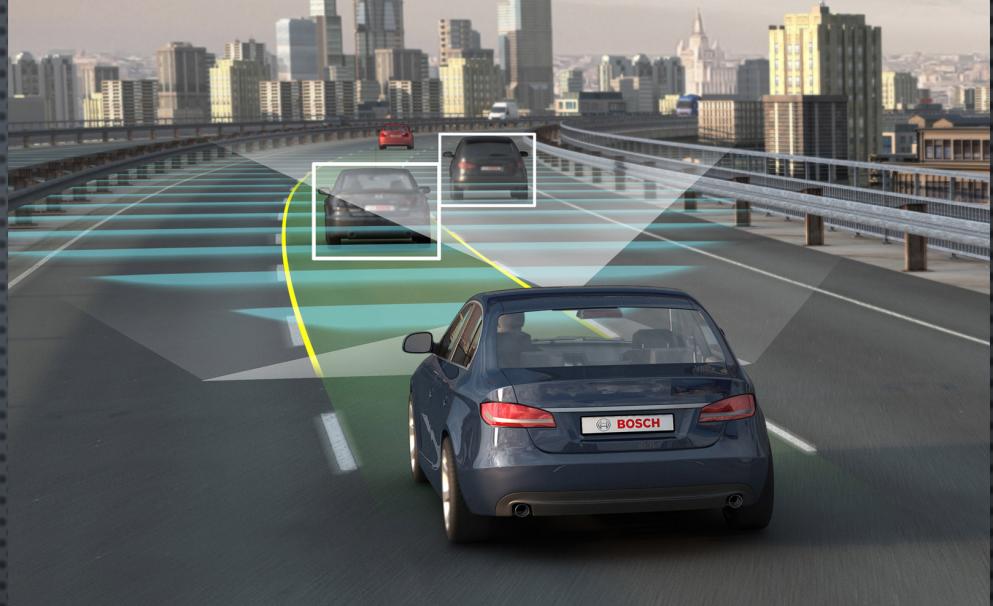
# VEHICLE-TO-VEHICLE COMMUNICATIONS (V2V)

- BROADCAST POSITION, SPEED, STEERING-WHEEL POSITION, BRAKE STATUS, AND OTHER DATA
- RANGE: AT LEAST 1,000 FEET IN ANY DIRECTION, THROUGH BARRIERS SUCH AS HEAVY SNOW OR FOG.
- PROCESS DATA 10 TIMES PER SECOND
- EACH TIME CALCULATING THE CHANCE OF AN IMPENDING COLLISION
- BICYCLES AND PEDESTRIANS CAN BE LINKED USING PORTABLE DEVICES



# CURRENT TECHNOLOGY

- CARS ARE ALREADY CONNECTED IN MANY WAYS:
  - SATELLITE-BASED GPS NAVIGATION
  - IN-VEHICLE Wi-Fi HOTSPOTS
  - SMARTPHONE APPS THAT REMIND YOU WHERE YOU PARKED
- CURRENT OBSTACLE DETECTIONS USING RADAR OR ULTRASOUND
  - LIMITED RANGE OF A FEW CAR LENGTHS
  - CANNOT SEE PAST THE NEAREST OBSTRUCTION



# EXPECTATIONS

- UNIVERSITY OF MICHIGAN EQUIPPED ~3000 CARS WITH EXPERIMENTAL TRANSMITTERS
- RECORDS FOR THESE VEHICLES IMPLIED THAT V2V COULD PREVENT >500,000 ACCIDENTS AND >1000 FATALITIES IN THE U.S. EVERY YEAR
- REDUCE FUEL USE AND CARBON EMISSIONS
- MORE EXTENSIVE APPLICATION: <1 YEAR

# CHALLENGES

- MORE RESEARCH: HOW BEST TO FEET DATA GATHERED FROM SENSORS TO IN-VEHICLE WARNING SYSTEMS
- POSSIBLE PRIVACY VIOLATIONS, CYBERATTACK VULNERABILITIES
- LIMITATIONS OF VEHICLES THAT ARE NOT CONNECTED

# SOURCES

- [HTTPS://THECONVERSATION.COM/SAVING-LIVES-BY-LETTING-CARS-TALK-TO-EACH-OTHER-59221](https://theconversation.com/saving-lives-by-letting-cars-talk-to-each-other-59221)
- [HTTPS://WWW.TECHNOLOGYREVIEW.COM/S/534981/CAR-TO-CAR-COMMUNICATION/](https://www.technologyreview.com/s/534981/car-to-car-communication/)
- [HTTP://WWW.SAFERCAR.GOV/V2V/INDEX.HTML](http://www.safercar.gov/v2v/index.html)
- [HTTP://WWW.NYTIMES.COM/2016/07/30/BUSINESS/TESLA-FAULTS-TESLAS-BRAKES-BUT-NOT-AUTOPILOT-IN-FATAL-CRASH.HTML](http://www.nytimes.com/2016/07/30/business/tesla-faults-teslas-brakes-but-not-autopilot-in-fatal-crash.html)