AGENDA CENG 5437   February 22, 2022
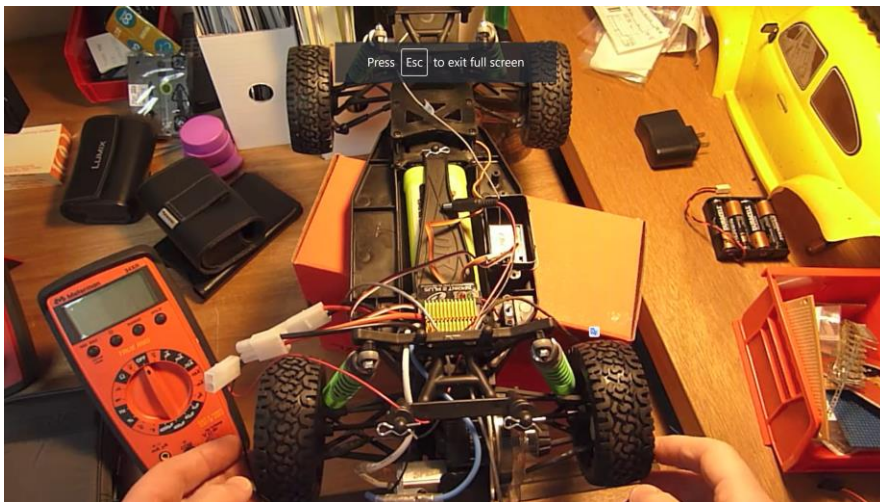
REMIND ME TO RECORD WHEN NECESSARY.

1. **Go Over - CENG 5437 HW 4 Mobile Robotics**
2. **2_5437_4391_Review2_2_22_2022a.pdf**

Robot Odometry Calibration   Video
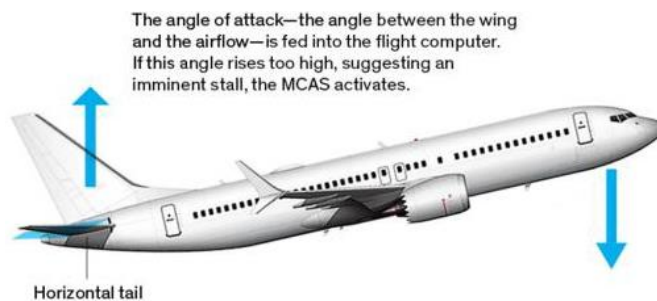9,586 views Jun 2, 2013 6:57

https://www.youtube.com/watch?v=qsdiIZncgqo

3. **3_SensorPhysicsPresentation1.pdf**

4. **4_Navigation_OdometryErrors&Variance2_22_2022Presentation1.pdf**
5. **5_MAX_737_Sensor Failurea.pdf**

The angle of attack—the angle between the wing and the airflow—is fed into the flight computer. If this angle rises too high, suggesting an imminent stall, the MCAS activates.

Safety Item #1: USE OF SINGLE ANGLE OF ATTACK (AOA) SENSOR: Erroneous data from a single AOA sensor activated MCAS and subsequently caused airplane nose-down trim of the horizontal stabilizer.

Horizontal tail

6. **6_SensorsErrors2_Computers.pdf**

Let's Drive

RADAR AND LIDAR

SensorsForSelfDrive_Videos_SP2021.pdf

How do self-driving cars "see"? - Sajan Saini
310,437 views •May 13, 2019 5:24
https://www.youtube.com/watch?v=PRg5RNU_JLk

TAKE A LOOK AT THE LIDAR AND INTEGRATED PHOTONICS TECHNOLOGIES THAT HELP SELF-DRIVING CARS
NAVIGATE OBSTACLES, NO MATTER THE ENVIRONMENT, WEATHER OR LIGHT.

Elon Musk on Cameras vs LiDAR for Self Driving and Autonomous Cars
149,830 views •Apr 27, 2019 10:23
See why Elton Musk thinks Cameras are better than Lidar sensors.

https://www.youtube.com/watch?v=HM23sjhtk4Q

TESLA AND ELON MUSK OUTLINE WHY THEY BELIEVE CAMERAS (VS LIDAR) ARE ALL THAT IS NEEDED FOR FULL SELF
DRIVING DURING THE TESLA AUTONOMY DAY FOR INVESTORS ON APRIL 22, 2019. ELON ALSO TOUCHES ON WHY
THEY DON'T CONSIDER HD MAPS AND PRECISION LANE MARKINGS TO BE ELON MUSK SAYS LIDAR "IS A FOOL'S
ERRAND" AND THAT ANYONE USING LIDAR IS "DOOMED."

HE GOES ON TO SAY THAT THEY ARE "EXPENSIVE SENSORS THAT ARE UNNECESSARY. IT'S LIKE HAVING A WHOLE
BUNCH OF EXPENSIVE APPENDICES. LIKE, ONE APPENDIX IS BAD, WELL NOW YOU HAVE A WHOLE BUNCH OF THEM,
IT'S RIDICULOUS, YOU'LL SEE." THERE QUITE A BIT OF DEBATE IN THE SELF-DRIVING WORLD WHETHER LIDAR IS
TRULY REQUIRED FOR FULL SELF-DRIVING CAPABILITIES ON AUTONOMOUS VEHICLES. LIDAR PROVIDES VERY A VERY
ACCURATE, HIGH PRECISION DEPTH MAP OF THE WORLD AROUND THE CAR, BUT IS CURRENTLY STILL FAIRLY
EXPENSIVE AND ALSO HAS CHALLENGES SEEING THROUGH OCCLUSIONS, LIKE RAIN, SNOW AND FOG. TESLA'S
ARGUMENT IS THAT ROADS WERE BUILT FOR HUMAN DRIVERS WITH VISION AND THAT VISION SYSTEMS, SUCH AS
CAMERAS WILL DO A BETTER JOB TRAVERSING THAT ENVIRONMENT THAN OTHER SENSORS, READING ALL THE
VISION QUEUES MEANT FOR DRIVERS, LIKE ROAD SIGNS, ETC. IN ADDITION, TESLA BELIEVES THEIR VISION SYSTEM
(PLUS RADAR) ACCURATELY HANDLES DEPTH SENSING PROBLEMS AND THAT LIDAR IS NOT NEEDED FOR THAT
FUNCTION.

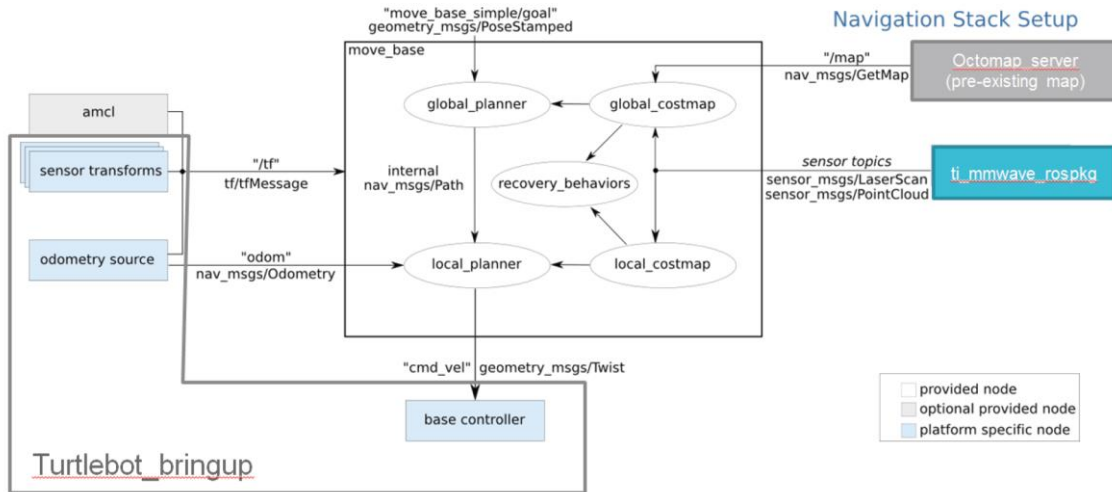6_TI Radar Video.pdf

7_TI_radarSensors_spry311_ROS.pdf

Figure 10. ROS library navigation stack used with the IWR1443BOOST-equipped Turtlebot 2.

CAN WE FIX THINGS? SENSOR FUSION

Sensor Fusion
9,706 views •Jun 16, 2016   3:55   For Cars, cameras, lidar, radar Data fusion

https://www.youtube.com/watch?v=JamDa-qNjPI