LMC 6650: Seeing like a Bike

Surface Quality

Milestone 2

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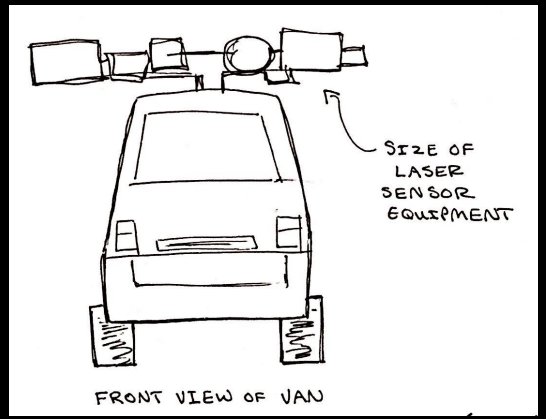
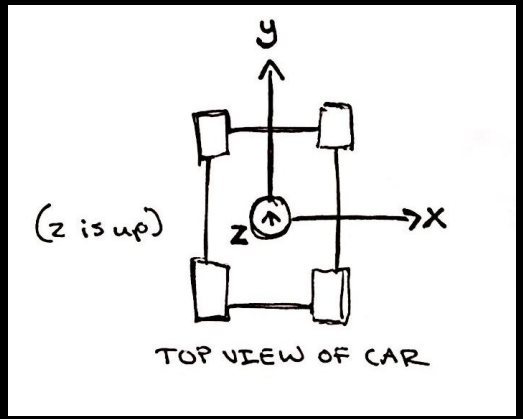
Progress: Meeting with Dr. Watkins' Students

- Talked to Dr. Watkins' students
- The laser surface quality detector they use is not feasible for this project (size of a microwave oven & 100,000 dollars)



Laser measures distance from laser to pavement; is not affected by light or reflection like a camera would be

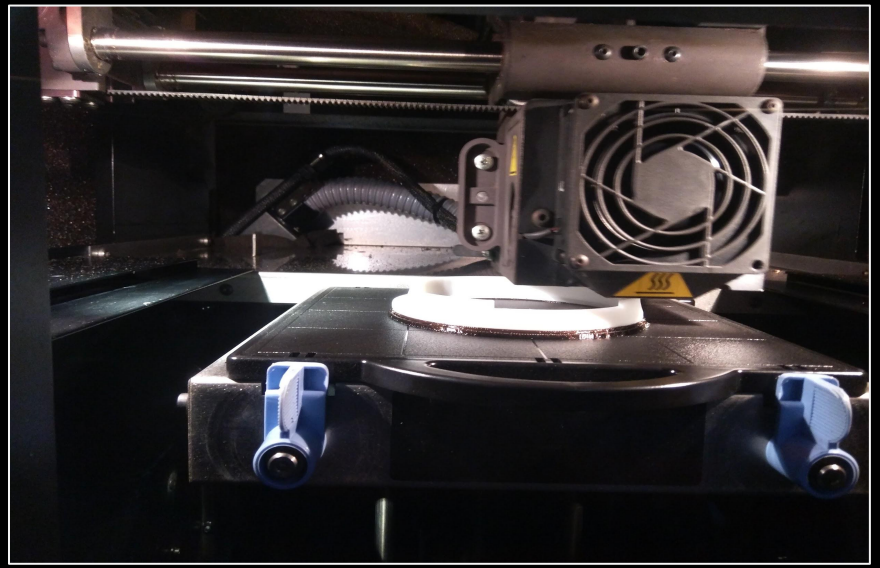


To calculate magnitude of deviation in bumps: $(x^2 + y^2 + z^2) = t^2$ (do not use square root because of powerful calculations needed)

Phone Location Services could be better than GPS chip because based on satellite, server towers, & wifi

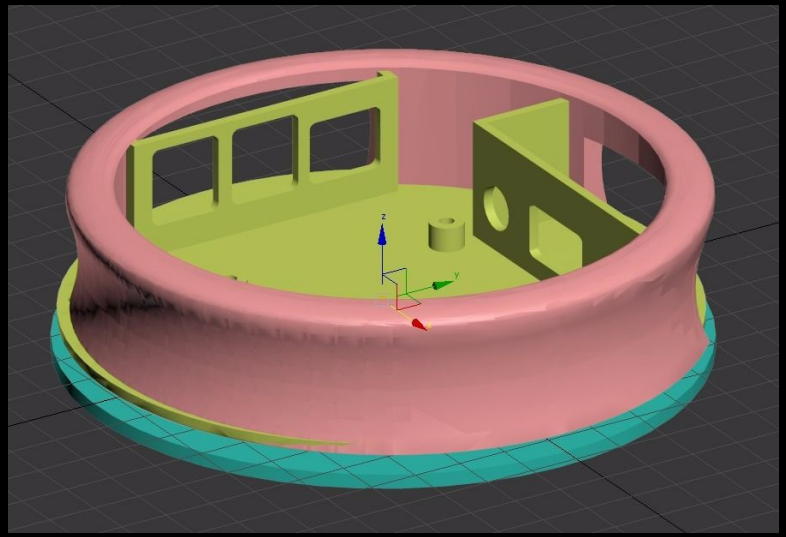
Progress: Case for the Matrix

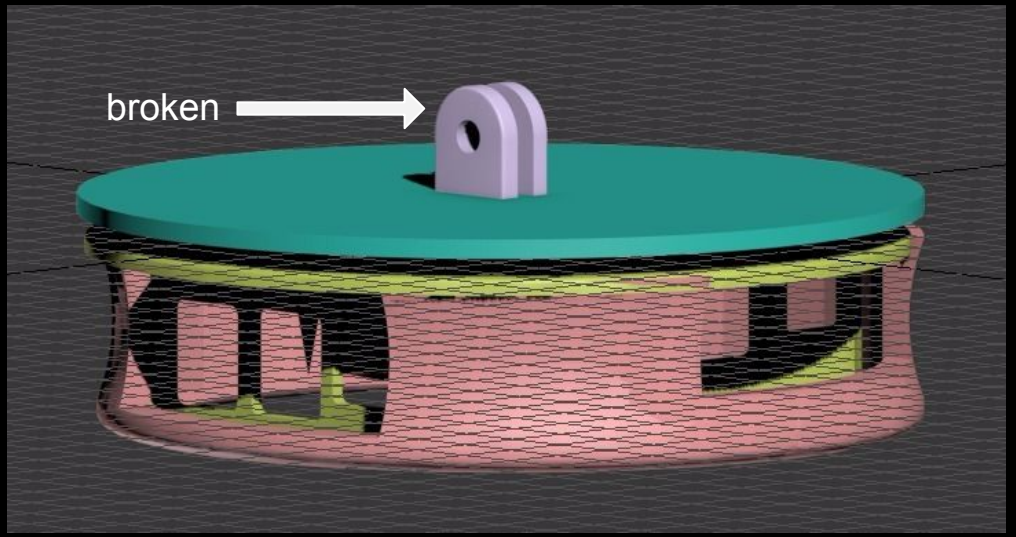
- 3D printed a case for the Matrix+Raspberry Pi
- Working on connecting the case to the bike with a GoPro mount



Progress: Case for the Matrix

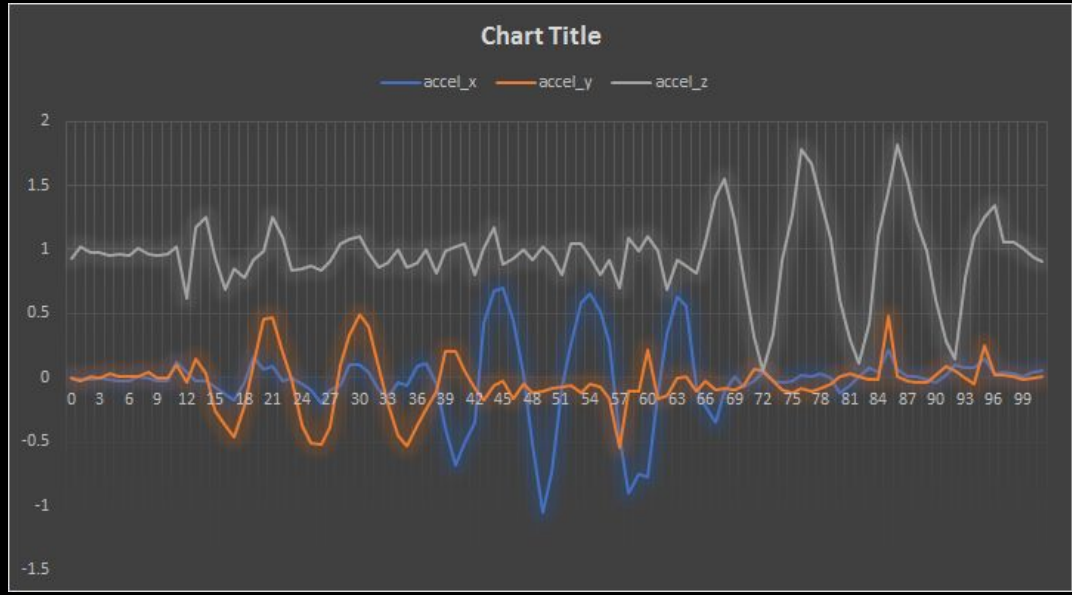
Designing the GoPro mount to hold the device on the bicycle. We ordered a GoPro mount for the bike & will complete prototype after the mount arrives.





Progress

- Accelerometer and gyroscope support for Matrix arrived last week; that is implemented - we are getting raw JSON values
- Dr. Watkins' students suggested logging timestamp, GPS and $x^2+y^2+z^2$ values if it is greater than threshold t^2, for purposes of efficiency.



Currently getting accelerometer, gyroscope and magnetometer data, coordinated with Air Quality team to get GPS data

Roadblocks:

- Laser surface quality detector Dr. Watkins' students are using is very out of budget
- 3D model's GoPro mount broke
  - We will glue it with epoxy & possibly some wooden stilts once we receive the GoPro bike mount (ETA March 2nd)

Questions to Answer:

- Got accelerometer/gyroscope/magnetometer data - need to determine appropriate interval for surface quality measurements
- Implemented serial interface for Pi - might have to interface with Arduino because Pi's Linux kernel is not real-time

Future Direction

- Determine appropriate intervals to collect data
- Determine & assign specific values to compare data against (ex: what constitutes a pothole, what constitutes a turn vs. a swerve)
- Implement a centralized server to collect data (will have to coordinate with other teams)
- Investigate optical measurements (OpenCV)
- Investigate acoustic measurements (will need to buy a surface microphone to investigate its data stream)