

Development of GIS and Web-Based Pavement Management System at NAU

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**NAU Construction
Materials Laboratory**

Background of automated pavement condition assessments

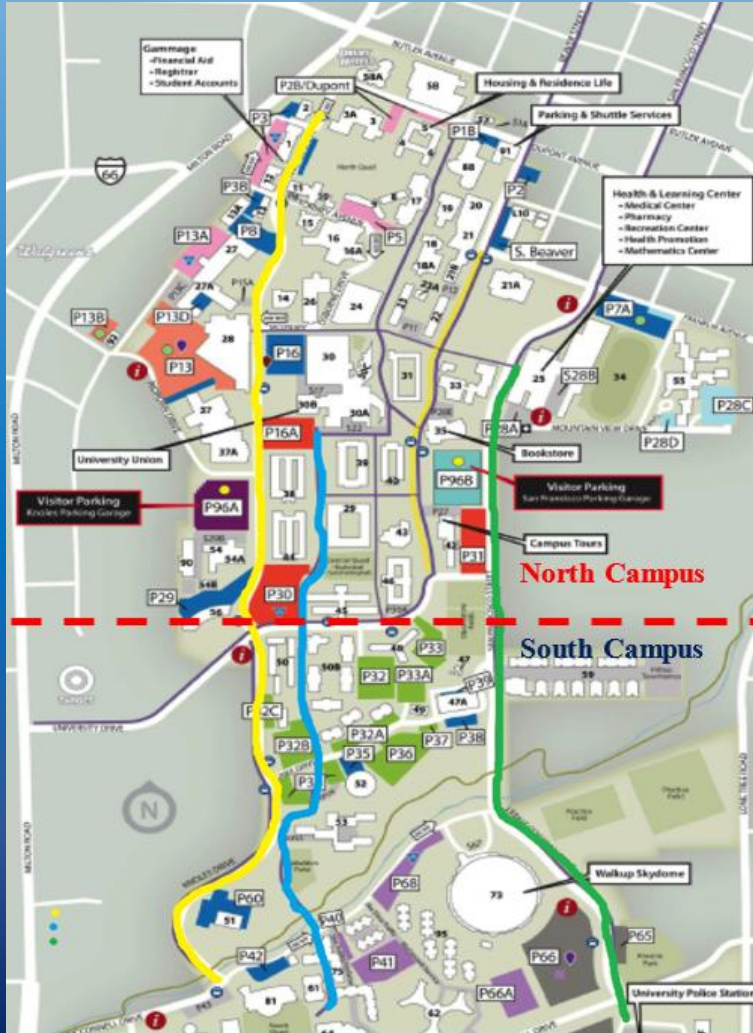
- Sensor embedded in:
 - Vehicles
 - Bikes
 - Smartphones
- Vibration responses:
 - Varies depending on types of vehicles/bikes
 - In need of algorithm to filter raw data
- Mapping: GIS

What have we implemented at NAU

- Accelerometer embedded in smartphone: Bike trails of NAU campus
 - Five groups/year travelled along bike on NAU campus to collect vibration data
 - Video filming while biking
 - Ongoing
 - 1.5 million data points have been collected and analyzed, and major distress points have been located and shown on GIS maps

Crowd-sourcing based assessments

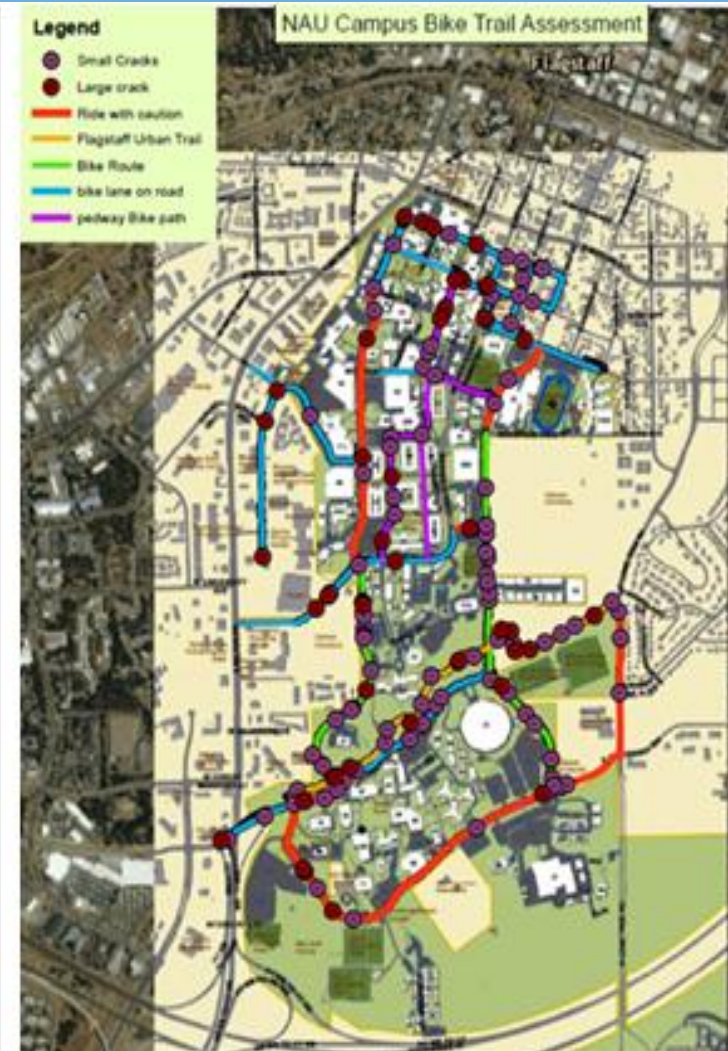
Campus map



Team 1

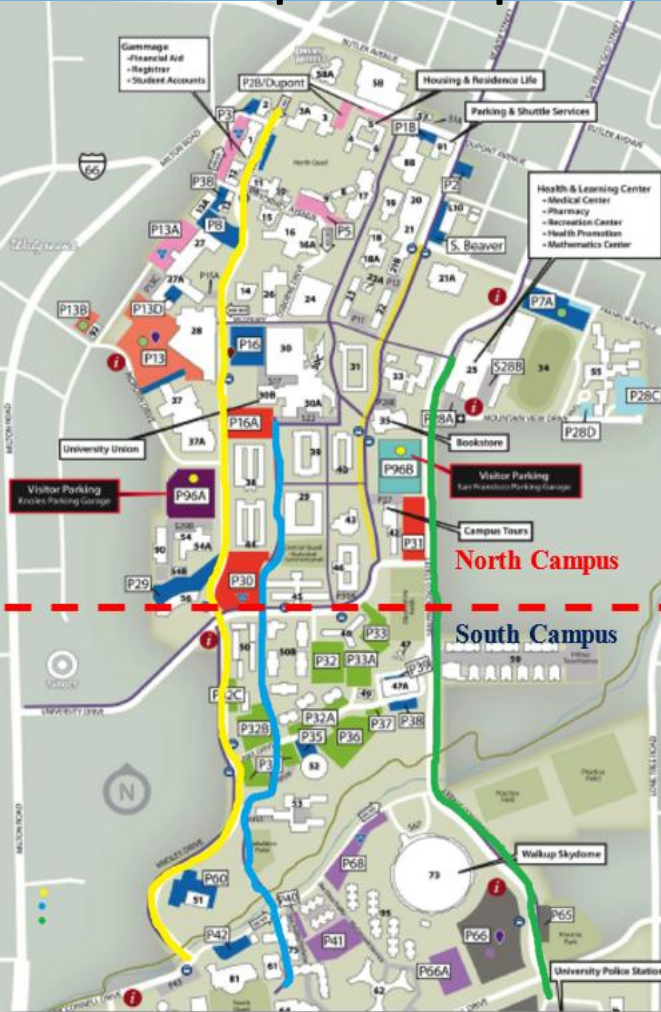


Team 2



Continued

Campus map



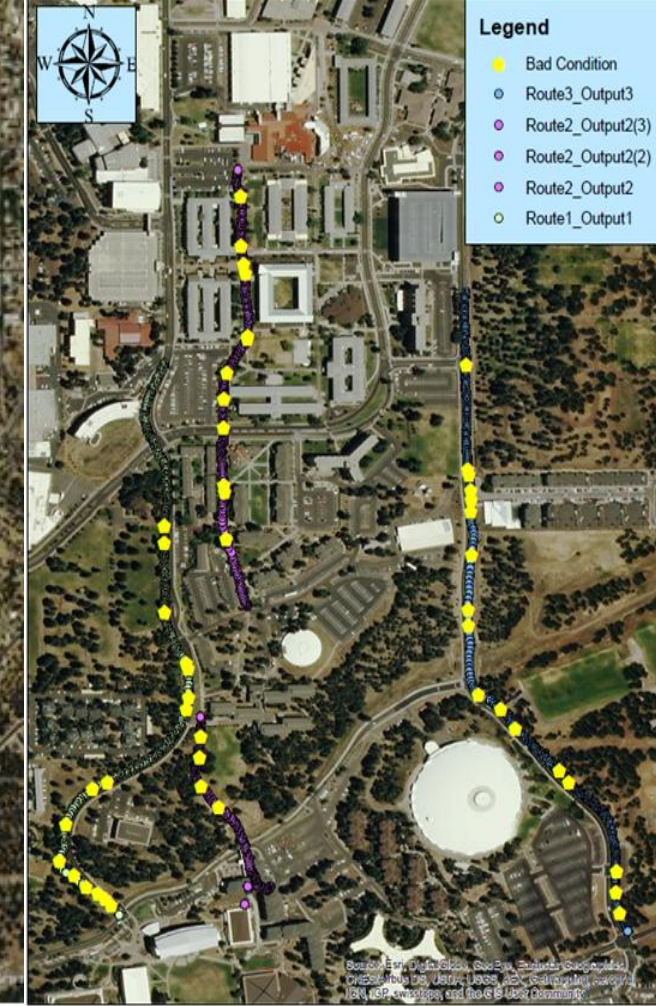
Team 3



Team 4

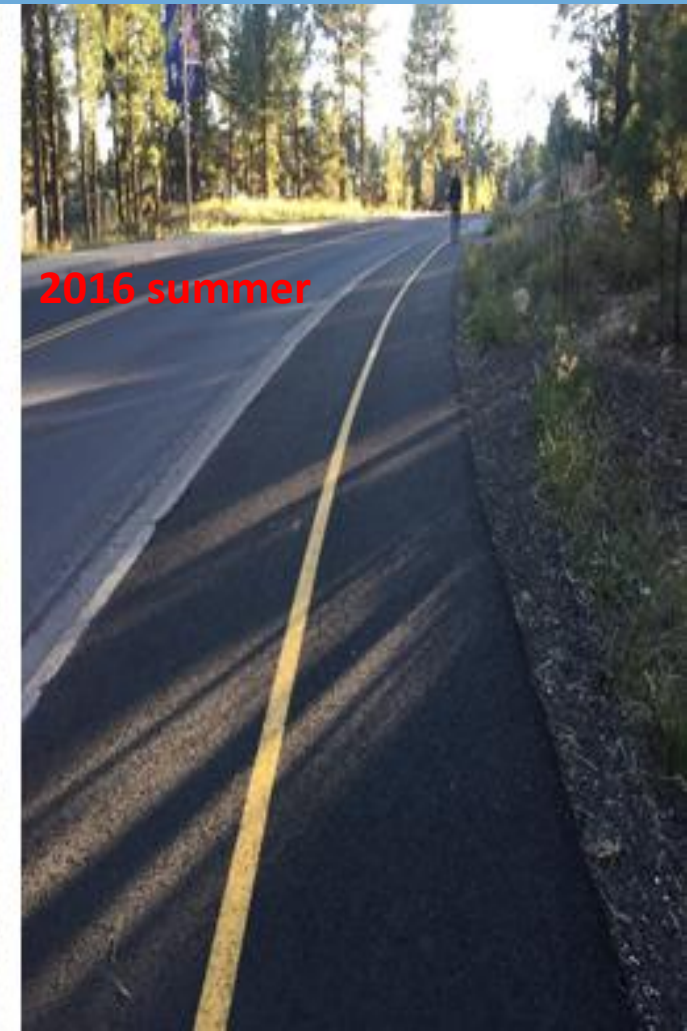


Team 5



Connection between GIS maps and Maintenance

- How did GIS maps help with prioritizing maintenance need?



Introduction to Web-based Pavement Detection and Evaluation System



Pavement Automatic Detection and Evaluation system

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Projects



Map



Chart



Repts



Team



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Integrate vibration data/sensing signals into a user-oriented environment

- Manage vibration data at a variety of ways
- Convenient to integrate multiple vibration data from different assessment methods
- Locate interested points to see the detail of data
- <http://www.itycu.com:681/>
- Website still under development and testing

Conclusions

- Sensing technologies (more accurate, precise, faster transmission, wireless connection, signal processing...) have been substantially improved to help with data collection and pavement distress detection.
- From an end user standpoint, a web-GIS based pavement system will be needed to better manage vibration responses from the roadways and display all results in a way that can effectively communicate with maintenance crews