

# Data Driven, Smart, Non-Pneumatic Tires

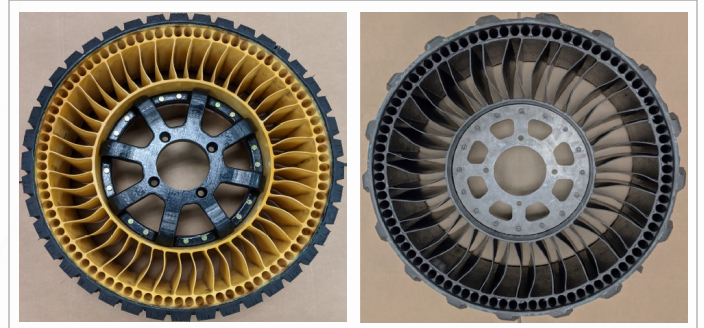
VTIP 21-079: “Data Driven, Smart, Non-Pneumatic Tires”

## THE CHALLENGE

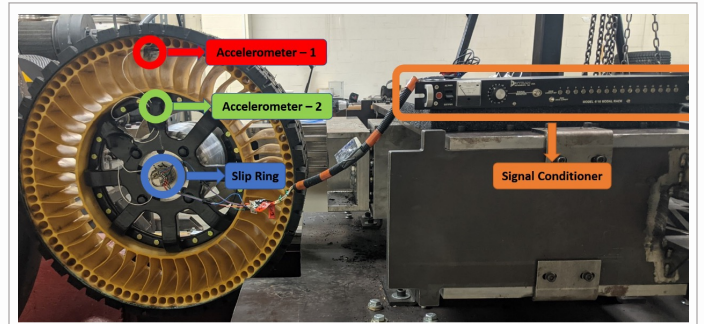
Non-pneumatic tires provide two main advantages over pneumatic tires, namely resistance to puncture and common road hazards which can result in tire blowouts. Currently, non-pneumatic tires are hampered by problems such as heat dissipation and ride discomfort, as the air in regular pneumatic tires dampens vibration.

## OUR SOLUTION

Virginia Tech researchers have developed a non-pneumatic smart tire which uses real-time tire vibration data to stiffen or dampen structural aspects of the wheel-spoke framework based on road conditions. In order to obtain this data, the tire utilizes two accelerometers mounted on the wheel spokes in combination with machine learning algorithms to help to assess the efficiency of the wheel spoke structure in dampening vibrations.



Two non-pneumatic tire designs: The tire on the left with yellow spokes has increased stiffness compared to the tire on the right with black spokes.



Two accelerometers (red and green) within the smart tire which provide data that informs the stiffness of the spokes. The slip ring (blue) permits data transmission from the rotating tire to the stationary signal controller (orange) which provides power to the accelerometers.



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