



Brian Ceccarelli, PE **Consulting Engineer**

Licensed professional engineer in the State of North Carolina. Many years of career engineering and science experience spanning many disciplines including mining engineering, mechanical engineering, space exploration, biophysics and transportation engineering.

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Education

2021 **Cornell University, Data Science**
2021-2022 **University of Texas, Cloud Computing**
1979-1983 **University of Arizona, B.Sc. Physics**

Registration

2016- **Professional Engineer**, North Carolina, License #043760
2016- **Professional Limited Liability Company**, North Carolina, License #P-1693

Professional Experience

- 5 yr **Engineering Technology International - Principal Software Engineer**
Responsible for the physics, mathematics, and the coding of the company's mining software. Projects included rendering open pit mines with 3D graphics (linear algebra with GIS problem), slope stability analyzer for open pit mines, a cave-in warning system for underground mines which notified miners of rapid microseismic events (physics, triangulation, 3D graphics), and an underground room-and-pillar stability analyzer which used finite element analysis.
- 6 yr **S & H Machine and Engineering - Principal Software Engineer**
Author of MasterCAM -- a 3D graphics computer-aided machining system which automated the generation of CNC programs. By incorporating analytic geometry, trigonometry, limit series, calculus-based surface fitting and normal computations, MasterCAM automatically generated the tool paths for complex parts including wave guides for communication satellites and artificial bones for animals.
- 2 yr **Lunar and Planetary Laboratory - Principal Software Engineer**
For the Mars Observer space probe, programmed the data platform for the gamma ray spectrometer. The spectrometer measured gamma ray emissions from latitudes and longitudes over the Martian surface. The purpose was to enable scientists to analyze the spectra and then draw a map of the minerals on the Martian surface for future mining operations.

The platform received the telemetry and distributed its various kinds of data into tables of 16 relational databases. The platform translated the telemetry into standard physics MKS units. The platform stored time to the UTC microsecond so that a special kind of data, gamma ray burst data, could be combinable with

burst data from other space probes. Given the location of the other probes, scientists could triangulate the source of the burst. A burst is a curious oddity of the universe. Like a flash from a camera, the whole universe lights up with gamma rays about once every 3 months.

1 yr **North Carolina Department of Transportation - Applications Architect**
Identified a mathematics algorithm error in software the NCDOT uses to synchronize traffic flow. The error was in the boundary conditions. The error caused a congestion problem on Capitol Blvd in Raleigh.

15 yr **Talus Software PLLC - Owner and Principal Engineer**
In 2009, I identified several physics errors in the Institute of Transportation Engineers' (ITE) yellow change interval practice. To verify the errors, I designed a software system to organize and analyze raw red-light camera event data. By combining NCDOT traffic signal plans and raw data from Redflex, the system confirmed that physics errors in the ITE yellow change interval spec cause about 90% of red-light running. I informed ITE and the NCDOT of these errors and their consequences.

In 2020, the Institute of Transportation Engineers (ITE) conceded that its yellow change interval practice was incorrect. ITE published a new practice. The new practice incorporates a new math formula from a colleague and adopts two recommendations directly from me. The first recommendation was the addition of a statement aimed against zero tolerance red-light camera operations. The second recommendation was to remove the word "rate" from the phrase "deceleration rate". The proper physics term is just "deceleration".

Talus Software has other clients whose businesses are e-commerce. These e-commerce clients are not listed here.

Publications/Presentations

- 2023 **North Carolina Society of Engineers**, Raleigh, North Carolina
Physics of the Yellow Change Interval, Winter Conference
Physics of the Yellow Signal Light Parts I and II, Durham Engineers Club
- 2020 **National Society of Professional Engineers**, National Webinar
Physics of the Yellow Signal Light -- ITE's First Recommended Practice
- 2019 **Professional Engineers of North Carolina**, Webinar Series
Part I: Physics of the Yellow Change Interval
Part II: Misapplications of Physics of the Yellow Change Interval
Part III: Physics, Engineering Practice and Jurisprudence
- 2017 **Autonomous Vehicles Symposium**, Novi, Michigan
Signalized Intersections Prevent Travelling Legally from Point A to B
- 2017 **American Society of Civil Engineers**, Raleigh, North Carolina
Physics of the Yellow Change Interval
- 2016 **Autonomous Vehicles Symposium**, Stuttgart, Germany
The Yellow Change Interval—Physics in Opposition
- 2015 **Institute of Transportation Engineers**, Hollywood, Florida
Traffic Signal Timings Expert, Panelist at International Convention

2013 **Technology International**, Brian Ceccarelli, Dr. Joseph Shovlin;
*Does the Multibillion Dollar Red Light Camera Sector Owe Its Existence
—and Its Profits—to Traffic Engineer’s Misapplication of the Yellow Change
Interval Formula?* London, England; Oct/Nov 2013

Expert Witness

2017- **Pitt County Superior Court**, North Carolina
Kinematics of Traffic Movements. Testimony unrefuted.

2017- **The Expert Institute**, New York, Texas, California, Florida
Photo Enforcement / Traffic Signal Timing

2016- **Suffolk County, New York**
Red Light Cameras, Physics in Traffic Engineering

2009- **Wake County Superior Court**, North Carolina
Kinematics of Traffic Movements

Professional Organizations

2018- North Carolina Society of Engineers (NCSE)
2018-2022 National Society of Professional Engineers (NSPE)
2013-2021 American Society of Civil Engineers (ASCE)
2013-2021 Institute of Transportation Engineers (ITE)