MOODY'S MEGA MATH CHALLENGE 2016:

Share and (car) share alike: Modeling new approaches to mobility

Automakers are investing millions of dollars in developing new technologies to meet the demands of consumers, many of them millennials, who want the benefits of using a private car without the costs and responsibilities of owning one. Many high school students don't yet have a driver's license let alone a clue what autonomous driving technology, electrified vehicles, and mobility service providers are. But that all changed in February when nearly 5,000 students competed in Moody's Mega Math (M^3) Challenge, using mathematical modeling to make recommendations about the future of the auto industry.

During the intensive M^3 Challenge weekend, over 1,100 teams of students from throughout the US spent 14 hours gathering and evaluating data on the rapidly-changing landscape of the automotive industry, in which automakers are transforming themselves from car builders into "mobility companies" that will provide the transportation options of the future. First charged with building a mathematical model to categorize US individuals by the amount of time they spend using their car and the number of miles they drive each day, M^3 Challenge participants then had to evaluate four emerging car-sharing business options, taking into account new technologies that are close to entering the mainstream, and predict which option would garner the most participation in a given city.

The submitted solutions, representing the work of more than 5,000 high school juniors and seniors, underwent three rigorous stages of judging. Students from St. John's School in Houston, Texas, were awarded top honors – and top dollar – in late April 2016, when their team of five seniors was named "Champs" at the eleventh annual Moody's Mega Math (M^3) Challenge. They received $20,000 in scholarships for presenting the *best* answer to the question.

Moody's Mega Math (M3) Challenge is a math modeling contest that gives high school students the opportunity to answer broad questions by applying mathematics and quantifying the related variables, and encourages them to study and pursue careers in science and math. The Challenge is free, requiring only accessibility to the Internet. M3 Challenge is organized by the Society for Industrial and Applied Mathematics (SIAM) and sponsored by The Moody's Foundation. For most participants, M^3 Challenge provides a fun and unique opportunity to work collaboratively on a problem they had likely never considered before. It may even ignite a future academic or career interest for some. With 90 scholarship prizes totaling $150,000 up for grabs from The Moody's Foundation, many can't help but be motivated by the chance to earn some cash to help with college expenses.

The following is the Champion team's paper from the 2016 Moody's Mega Math Challenge **with some reviewer suggestions incorporated**.

Complete information about the M^3 Challenge is available at http://m3challenge.siam.org.