On October 23, 2021, the world will see its first head-to-head, high-speed autonomous race at the Indianapolis Motor Speedway, the Racing Capital of the World.

The competitors—university students from around the world—will make history.
The Challenge

The Indy Autonomous Challenge is a $1.5 million university prize competition to build AI algorithms and compete in the world’s first autonomous race at the famed Indianapolis Motor Speedway (IMS).

In May 2020, the IAC announced that 37 universities from 11 countries on four continents, including 14 U.S. states, had registered to compete. Teams are composed of undergraduate and graduate students, PhDs, faculty and industry mentors, concentrating in AI and machine learning, computer science and robotics.

The IAC taps into the power of incentive prize competitions to inspire the best and brightest in universities worldwide to advance technology that can speed the commercialization of fully autonomous vehicles and deployments of advanced driver-assistance systems (ADAS). These enhancements will lead to increased safety and performance in all modes of racing and commercial transportation and increase public awareness of the transformational impact that automation can have to improve vehicle safety and performance.

While the task is really hard, the rules are simple: university teams must develop AI to drive a modified Dallara IL-15 racecar 20 laps around the 2.5-mile famed IMS oval (50 miles) and the first team to cross the finish line, wins $1 million. Additional funds to make up the $1.5 million purse are being provided to winners of various hackathons and simulation races held prior to the October 2021 IAC race.

The Indy Autonomous Challenge is the brainchild of Sebastian Thrun, winner of the 2005 DARPA Grand Challenge, Mark Miles, president and CEO of Penske Entertainment Corp. and Paul Mitchell, president and CEO of Energy Systems Network (ESN). The ESN team has organized the competition, supported by a consortium of leading corporate sponsors and contributors.

Throughout the race, student competitors must solve “edge case” scenarios—problems that occur only in extreme operating environments, such as avoiding obstacles at high speeds while maintaining vehicular control. Running autonomous vehicles at very high speeds of up to 200 mph is a demanding platform to test new technologies. It is an exhilarating competition that will draw the world’s attention to see what the next generation can accomplish—something no major commercial company has done to date.
The IAC Racecar

The official vehicle that all Indy Autonomous Challenge teams will use is a modified Dallara IL-15 racecar, which has been retrofitted with hardware and controls by the Clemson University International Center for Automotive Research (CU-ICAR) Deep Orange 12 students to enable automation. Since 2001, Dallara has been the sole supplier of racecar chassis for the Indy Lights series, whose main goal is to prepare young drivers for the NTT INDYCAR SERIES. See renderings of the IAC Dallara IL-15 racecar here.

The CU-ICAR students are tasked with determining the sensor types and locations to provide the vehicle with computer vision at high speeds. Technologies include, but are not limited to, radars, lidars, cameras, and GPS sensors. Integration of these sensors on the vehicle is also a difficult challenge since vibration levels may be high and the presence of sensors will influence the aerodynamics of the vehicle. Many IAC sponsors have also provided additional advanced hardware and software which the CU-ICAR students are tasked with engineering into the racecar integration.

Clemson University’s Deep Orange 12 students regularly seek input from IAC teams on the engineering of an autonomous-capable version of the IL-15 chassis to help ensure it can accommodate the IAC entrants’ driverless algorithms. Teams are directly involved through monthly virtual design reviews (VDRs) and other feedback channels throughout the competition. The algorithms will complete all actions normally performed by a driver.

The focus of the IAC is on innovating automated vehicle software. To facilitate this goal, the modified Dallara IL-15 used by all participating teams will be standardized. Thus, modifications by the IAC teams to the IL-15’s chassis, sensors, computers, or hardware are not permitted.
IAC Rules

The IAC is a competition among accredited universities worldwide to create software that enables automated-capable racecars to compete and aspire to finish first in a head-to-head race at the Indianapolis Motor Speedway. The competition is normalized around software. Teams will not be asked to develop and produce automated vehicle computers, sensors and other hardware nor the racecar chassis itself. Instead, the focus is on developing new generations of software that can ensure precision control of vehicles at high speeds during the competition and reduce fatalities on public roadways afterwards.

PDF versions of the Official Rules can be downloaded from the IAC website here.

Indianapolis Motor Speedway

The Indianapolis Motor Speedway (IMS) has been an incubator and proving ground for automotive innovation since it opened in 1909 and will provide the same critical value for the Indy Autonomous Challenge. The famed IMS oval is the most prestigious racing stage in the world and will push the limits of performance and safety for this autonomous head-to-head race.

“The IAC is a challenge unlike any other. These are some of the brightest minds in the world who are thinking, not just for today, but about 10, 15 or 20 years ahead of most of us—testing the technology of the next generation.”

— Doug Boles, President, Indianapolis Motor Speedway
IAC Teams
Thirty university teams have registered to complete. However, as the competition progresses, teams are strategically merging. The IAC is represented by teams in 11 countries on four continents, including university teams from 14 U.S. states.

Women are often underrepresented in the robotics and STEM fields, so I’m very grateful to have the opportunity to be in the position to lead our team.

– Nayana Suvarna, University of Pittsburgh

Having 10-15 cars on the track simultaneously creates a ridiculously complex scenario... There are no lanes, no real rules and you really have to understand what the other teams are trying to do.

– Alexander Wischnewski, Technische Universität München
IAC Timeline

Track practice days are planned at the Indianapolis Motor Speedway (IMS) for June 5-6, 2021, Sept. 4-6, 2021, and Oct. 19-20, 2021. The final race qualification will take place at IMS Oct. 21-22, 2021. The final race will take place at IMS on Oct. 23, 2021. See the full timeline [here](#).

IAC Sponsors

The Indy Autonomous Challenge would not be possible without the support of its partners and sponsors:

> The Indy Autonomous Challenge is a groundbreaking event bringing young engineering minds and industry leaders together to deliver the next generation of autonomous technology, and Bridgestone is proud to be part of this effort to move the world ahead.

— Bridgestone

> For more than 100 years, IMS has served as a breeding ground for technological advancements. We’re continuing that legacy by putting Ansys Autonomy, the most comprehensive autonomous vehicle simulation software on the market, into the hands of students who will ultimately play a vital role in bringing safe, autonomous vehicles to public roadways.

— Ansys
FORTUNE

Self-driving cars will hit the Indianapolis Motor Speedway in a landmark A.I. race

September 19, 2020

Story

WALL STREET JOURNAL

Autonomous Vehicles to Race at Indianapolis Motor Speedway

July 20, 2020

Story

ZDNet

Self-driving Indy race cars to compete for glory

September 8, 2020

Story

"Next year, a squad of souped-up Dallara race cars will reach speeds of up to 200 miles per hour as they zoom around the legendary Indianapolis Motor Speedway to discover whether a computer could be the next Mario Andretti."

– Jonathan Vanian, FORTUNE

"Thousands of drivers have raced their cars across the finish line at the Indianapolis Motor Speedway over its 111-year history. Next year will be the first time the cars do it alone.

– James Rundle, Wall Street Journal

"There are few pursuits more taxing for team and driver than keeping an open-wheel race car on the track while competing at speeds in excess of 200 miles per hour. But take the human driver out of the equation and the enormity of challenge balloons. That is exactly the point of the Indy Autonomous Challenge (IAC).

– Greg Nichols, ZDNet"
Sign Up For The Leaderboard

The Indy Autonomous Challenge publishes a monthly newsletter, THE LEADERBOARD, with messages from IAC principals, descriptions of the technology used in the IAC and profiles of our sponsors, partners, and university teams. Sign up to receive the newsletter [here](#).

**Indy Autonomous Challenge Leadership**

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