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July 2014

Learn
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American Solar Challenge

Formula Sun

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American Solar Challenge

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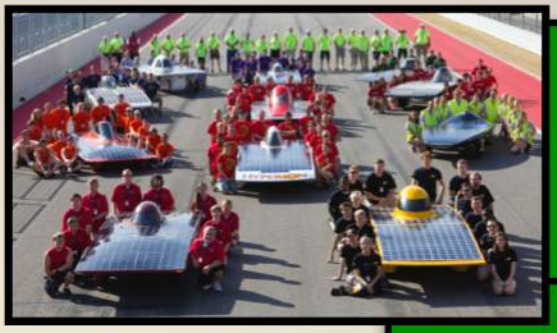
AUSTIN ENERGY

CIRCUIT OF THE AMERICAS

SOLARING UP THE MIDWEST



1700+ Miles

All Solar

7 States

8 Days

2014

Finish
Minneapolis, MN

La Crosse, WI

Ames, IA

Omaha, NE

Overland Park, KS

Wichita, KS

Norman, OK

Weatherford, TX

Start
Austin, TX

Race Schedule

Scrutineering
Mon-Wed July 14-16 at COTA

FSGP Track Qualifier
Thu-Sat, July 17-19 at COTA

Austin, TX Starting Line
Mon, July 21 at UT Austin

Weatherford, TX Check Point
Mon, July 21 at Weatherford College

Norman, OK Stage Stop
Tue-Wed, July 22-23 at University of Oklahoma

Wichita, KS Check Point
Wed, July 23 at Wichita Aviation Museum

Overland Park, KS Stage Stop
Thu-Fri, July 24-25 at Black & Veatch

Omaha, NE Stage Stop
Fri-Sat, July 25-26 at HDR

Ames, IA Check Point
Sat, July 26 at Iowa State University

La Crosse, WI Stage Stop
Sun-Mon, July 27-28 at Western Technical College

Minneapolis, MN Finish Line
Mon, July 28 at University of Minnesota

Scrutineering

July 14-16 – Circuit of The Americas

After months of designing and building, teams arrive with their solar cars for scrutineering. For three days, the solar cars will undergo a series of inspections covering all aspects of the car: mechanical, electrical, body and sizing, and dynamic testing. Inspectors make sure the solar cars are built in alignment with the regulations and have all required safety features.

Scrutineering also tests the abilities of the drivers. All drivers must pass the egress test, which requires drivers to get out of the car unassisted in 10 seconds or less. Drivers are randomly selected to complete the dynamics tests, which are as much about testing the car's braking, turning, and stability as about testing the experience of the drivers. Teams must pass all inspection stations prior to racing.

Qualifying: FSGP

July 17-19 – Circuit of The Americas

The order that teams complete Scrutineering is the same order that they start in the Formula Sun Grand Prix (FSGP) qualifier. This is a three day track race where the team with the most completed laps wins. In order to qualify for the cross country road race, the solar car must complete a minimum number of laps during FSGP with each of their drivers. The tight turns test the car's stability as well as driver skill. Only cars (and drivers) that prove reliable and safe on the track are permitted to participate in the ASC on-road event. The starting order for ASC is determined by the number of laps driven during FSGP.

Racing: ASC

July 21-28 – TX to MN

The teams that qualify for the American Solar Challenge (ASC) road race have already completed quite a challenge. Crossing 7 states in 8 days will determine the winner by the team that completes the route in the lowest overall elapsed time. Teams race during the day from 9am – 6pm following a detailed route book with step-by-step directions. Each solar car is escorted by lead and chase vehicles that carry the other team members and equipment for roadside repairs.

For two hours in the morning and evening, teams are able to charge their batteries using the solar car's array. Teams angle the solar array toward the sun for maximum exposure. During these non-racing hours, teams can perform maintenance on the car, check the weather, determine their strategy for the next day, and hopefully get some sleep!

Thanks to the Event Volunteers

Race Officials

The race officials perform a variety of roles from inspectors to stage/checkpoint crews to our route advance team and on-road EMTs. Many are also involved in the preparations prior to the event and reviewing the technical design reports submitted by the teams.

Dan Bohachick
Brian Call
Mike Calvelage
Gerald Chang
Alain Chuzel
Linda Chuzel
Steve Day
Dan Eberle
Gage Eberle
Hannah Eberle
Madi Eberle
Mark Eudaly
Sue Eudaly
Liyun Feng
Wade Johanns
Sam Lenius
Gail Lueck
Marie McMullen
Steve McMullen
Bernie Neidert
Ethan Reece
Dale Reid
Dick Roberto
Adem Rudin
Patrick Sanderson
Evan Stumpges
Greg Thompson

Observers

Observers spend a week on the road living and traveling with the teams. Their role is to ride in the chase vehicle, monitor the solar car's progress, and ensure batteries are impounded each night. Observers are the eyes and ears for the officials who get to experience first-hand the ingenuity and hospitality of the teams.

Pouria Aghajani
Gordon Alpin
Zachary Crawford
Rita Crocker
Ariel Dimston
Caitlyn Eberle
Chloe Gibbons
Kila Henry
Tiffany Hu
Alan Leoni
Bill Mayberry
Susan Nitta
Anna Olson
Robert Rieffel
Allen Rues
Dan Saulsberry
Elizabeth Smith
Bill Stilwell
Lisa Su
Peter Sun
Louise Werner

Special Thanks

Paul Hirtz
Tyler Coffey
Steve Belarde

Frequently Asked Solar Car Questions

How do solar cars work?

Solar cars are very similar to electric vehicles, except that they utilize energy straight from the sun as opposed to a battery charger. Solar cells on the car convert sunlight into electricity, which in turn powers an electric motor.

Why do they look so different?

Conventional passenger cars spend more than 85% of their energy overcoming air resistance, known as aerodynamic drag. Solar cars are designed to minimize the energy lost to drag, while also optimizing solar array area. This results in some unique shapes.

How fast can they go?

Teams must obey posted speed limits, and regulations limit them to 65 mph. During testing, solar cars have been clocked at over 100 mph.

Do the cars have air conditioning?

Though teams are required to provide driver ventilation, these are racing vehicles. Air conditioning, power windows, and other creature comforts would only consume electricity without improving the car's performance.

What about those not-so-sunny days?

Solar cars carry batteries that can be charged using the solar cells. When facing clouds or needing extra power, the cars use this stored energy.

Do solar cars have engines?

Instead of an internal combustion engine, most cars use a small electric motor mounted inside one of the wheels. Motor efficiency is typically over 90% and the peak power rating is typically less than 10hp.

Can I buy a solar car?

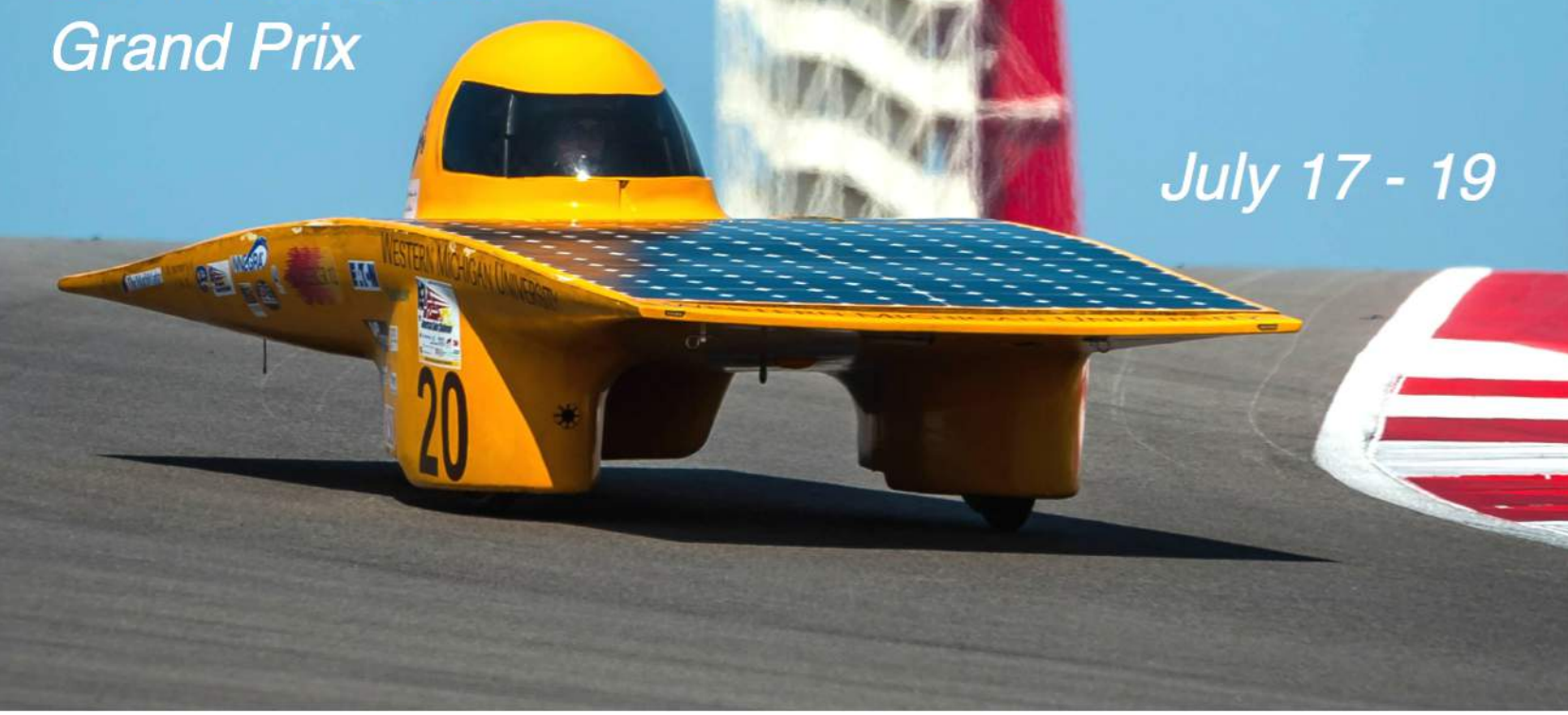
These solar cars are built specifically for racing and demonstration. They are not suitable for the general public. However, there are a number of electric, hybrid, and alternative fuel vehicles on the market and in use today.

Thank You!

AUSTIN ENERGY®

For Supporting The 2014 Formula Sun Grand Prix

July 17 - 19



CIRCUIT OF THE AMERICAS™

GREEN SPORTS ALLIANCE

Gold Level Green Business Leader Since 2013

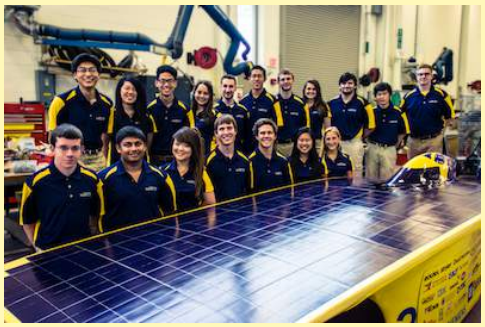
AUSTIN ENERGY® GreenChoice®

GreenChoice Subscriber

GREEN BUSINESS LEADERS Austin SUSTAINABILITY

Member Since 2012

University of Michigan
Quantum – #2



L x W x H: 4.88m x 1.52m x 1.07m
Weight: 145kg
Array: 1500W SunPower Mono-Si
Pack: 5kWh Li-Ion
Motor: 1.8kW CSIRO
Wheels: Three 16″ Rims - Michelin
Chassis: Carbon Fiber Monocoque

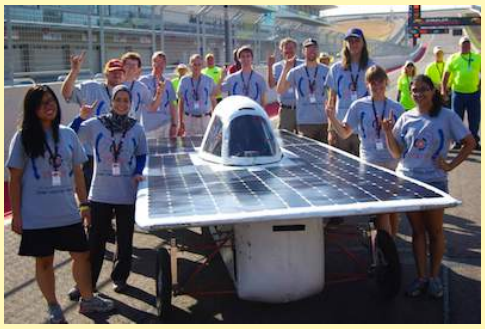
University of Kentucky
Gato del Sol V – #3

L x W x H: 4.90m x 1.70m x 1.00m
Weight: 240kg
Array: 1100W SunPower Mono-Si
Pack: 5kWh LiFePO4
Motor: 7.5kW NGM SCM150
Wheels: Three 16″ Rims
Chassis: Modular Al Space Frame

UC Berkeley: CalSol
Zephyr – #6

L x W x H: 5.00m x 1.80m x 1.60m
Weight: 170kg
Array: 1300W SunPower Mono-Si
Pack: 5.2kWh Li-Ion
Motor: Dual 1kW Mitsuba M1096-II
Wheels: Four 16″ GH Craft Rims
Chassis: 6061-T6 Al Space Frame

UT Austin
TexSun – #8



L x W x H: 5.00m x 1.75m x 1.40m
Weight: 215kg
Array: 1346W SunPower Mono-Si
Pack: 4.16kWh LiFePO4
Motor: 7.5kW NGM SCM150
Wheels: Three 14″ NGM Style Rims
Chassis: Tempered Al Space Frame

Iowa State: PrISUm
Phaeton – #9

L x W x H: 4.72m x 1.72m x 1.06m
Weight: 180kg
Array: 1200W SunPower Mono-Si
Pack: 4kWh Li-Ion
Motor: 7.5kW NGM SCM150
Wheels: Three 14″ 7050 Al Billet Rims
Chassis: 6061-T6 Al Space Frame

Netaji Subhas Institute of Tech: NSIT
Advay III – #10

L x W x H: 4.90m x 1.78m x 1.19m
Weight: 248kg
Array: 1200W SunPower Mono-Si
Pack: 4.7kWh Li-Ion
Motor: 3kW BLDC - Kelly Controller
Wheels: Two 17” Front & One 13” Rear
Chassis: ST-52 Steel Space Frame

Michigan State
Leonidas – #13

L x W x H: 4.57m x 1.52m x 1.35m
Weight: 250kg
Array: 1200W SunPower Mono-Si
Pack: 5.2kWh Li-Ion
Motor: 7.5kW NGM SCM150
Wheels: Three 14″ NGM Style Rims
Chassis: 4130 Chromoly Space Frame

Illinois State: Mercury
Mercury V – #17

L x W x H: 4.52m x 1.72m x 1.09m
Weight: 240kg
Array: 900W SunPower Mono-Si
Pack: 4.8kWh NiMH
Motor: EVT Global Hub Motor
Wheels: Four 14″ NGM Style Rims
Chassis: 4130 Chromoly Space Frame

Western Michigan: Sunseeker
Sunseeker 14 – #20

L x W x H: 4.94m x 1.59m x 1.22m
Weight: 272kg
Array: 1165W SunPower Mono-Si
Pack: 5.1kWh Li-Po
Motor: Dual 1.8kW CSIRO
Wheels: Three 14″ NGM Style Rims
Chassis: Plascore Composite

University of Florida: Solar Gators
Sol Power – #21

L x W x H: 5.00m x 1.80m x 1.8m
Weight: 318kg
Array: 990W SunPower Mono-Si
Pack: 3.65kWh LiFePO4
Motor: 7.5kW Perm Brushed
Wheels: Three 14″ NGM Style Rims
Chassis: Al Space Frame

Principia College
Ra 9 – #32

L x W x H: 4.40m x 1.75m x 1.20m
Weight: 226kg
Array: 1200W SunPower Mono-Si
Pack: 4.7kWh Li-Po
Motor: Mitsuba
Wheels: Four 16″ Carbon Fiber Rims
Chassis: 4130 Chromoly Space Frame

University of Minnesota
Centaurus III – #35

L x W x H: 5.00m x 1.80m x 1.10m
Weight: 175kg
Array: 1200W SunPower Mono-Si
Pack: 5kWh Li-Po
Motor: Custom PM AC
Wheels: Three 16″ Rims - Dunlap
Chassis: Fiberglass Monocoque

Missouri S&T
Solar Miner VIII – #42

L x W x H: 4.62m x 1.57m x 1.09m
Weight: 159kg
Array: 1124W SunPower Mono-Si
Pack: 3.7kWh Li-Po
Motor: 7.5kW NGM SCM150
Wheels: Three 14″ NGM Style Rims
Chassis: 4130 Chromoly Space Frame

Georgia Tech: Solar Jackets
Endeavour – #49

L x W x H: 4.80m x 1.80m x 1.22m
Weight: 273kg
Array: 1000W Sunvia Mono-Si
Pack: LiFePO4
Motor: 7.5kW NGM SCM150
Wheels: Three 14″ Al Rims
Chassis: 4130 Chromoly Space Frame

Polytechnique Montreal: Esteban
Esteban VII – #55

L x W x H: 4.95m x 1.75m x 1.01m
Weight: 240kg
Array: 1350W SunPower Mono-Si
Pack: 3.24kWh Li-Po
Motor: Dual 1kW Mitsuba M1096-II
Wheels: Three 16″ Al Rims
Chassis: Carbon Fiber Monocoque

Southern Illinois University: SIUE
Black Nova – #57

L x W x H: N/A
Weight: 192kg
Array: 1000W SunPower Mono-Si
Pack: 4kWh Li-Ion
Motor: 7.5kW NGM SCM150
Wheels: Three 16″ NGM Style Rims
Chassis: Tempered Al Space Frame

Qazvin Islamic Azad: QIAU HAVIN
HAVIN 2 – #73

L x W x H: 4.50m x 1.80m x 1.10m
Weight: 240kg
Array: 1200W SunPower Mono-Si
Pack: 5kWh Li-Ion
Motor: Dual 1.8kW CSIRO
Wheels: Four 16″ Rims
Chassis: Carbon Fiber Monocoque

ETS Quebec: Eclipse
Eclipse 8 – #92

L x W x H: 4.49m x 1.77m x 1.14m
Weight: 205kg
Array: 1200W SunPower Mono-Si
Pack: 5.07kWh Li-Po
Motor: 1.8kW CSIRO
Wheels: Three 14″ Rims
Chassis: 4130 Chromoly Space Frame

Western University: SunStang
SunStang 2014 – #96

L x W x H:	4.60m x 1.80m x 1.40m
Weight:	N/A
Array:	1200W SunPower Mono-Si
Pack:	3.85kWh Li-Po
Motor:	1.8kW CSIRO
Wheels:	Three 16″ Rims - 42J Moped
Chassis:	4130 Chromoly Space Frame

McMaster University
Spitfire – #116

L x W x H:	5.00m x 1.80m x 1.40m
Weight:	250kg
Array:	1200W SunPower Mono-Si
Pack:	3.85kWh Li-Po
Motor:	5kW Mitsuba M2096-II
Wheels:	Three 16″ Rims - Dunlap
Chassis:	6061-T6 Al Space Frame

MIT
Valkyrie – #179

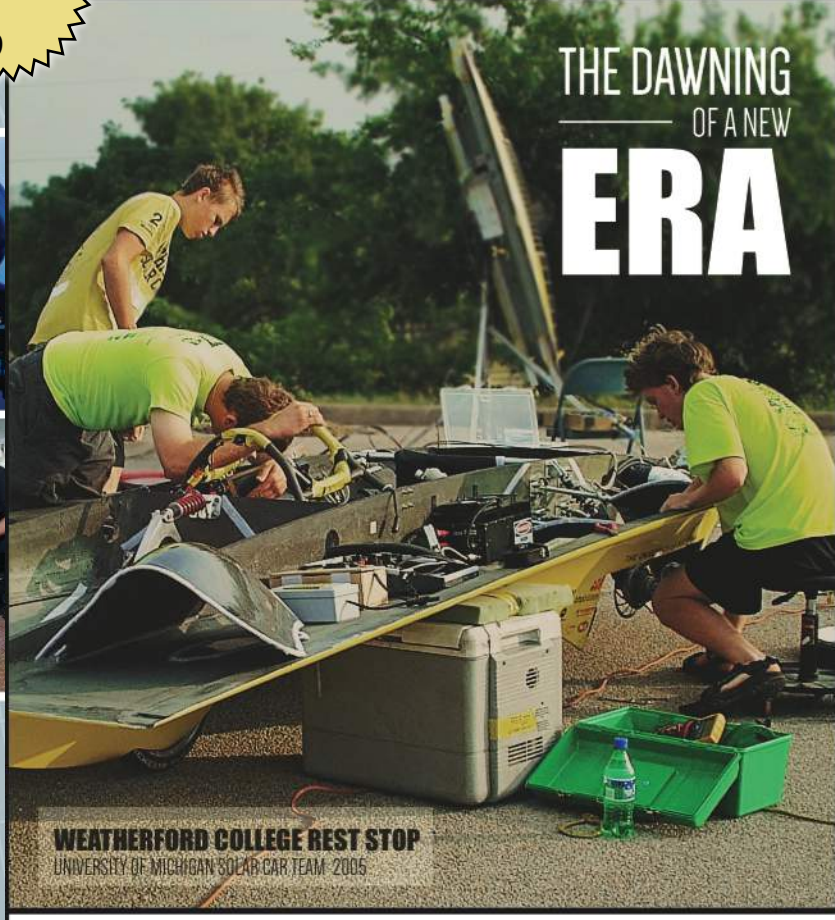
L x W x H:	4.98m x 1.78m x 1.00m
Weight:	160kg
Array:	1200W SunPower Mono-Si
Pack:	5kWh Li-Ion
Motor:	Mitsuba
Wheels:	Three 16″ Rims - Michelin
Chassis:	Carbon Semi Monocoque

Oregon State
Phoenix – #256

L x W x H:	4.97m x 1.79m x 0.96m
Weight:	220kg
Array:	1200W SunPower Mono-Si
Pack:	3.94kWh LiFePO4
Motor:	7.5kW NGM SCM150
Wheels:	Three 14″ Custom Rims
Chassis:	Titanium Space Frame

Puerto Rico Mayaguez: SERRT
El Wanabí – #787

L x W x H:	4.42m x 1.65m x 1.00m
Weight:	165kg
Array:	1232W SunPower Mono-Si
Pack:	3.86kWh Li-Ion
Motor:	7.5kW NGM SCM150
Wheels:	Four 14″ Spoked Rims
Chassis:	Carbon Fiber Monocoque



7:00 AM Batteries are released from the evening impound and the morning solar charging session begins.

9:00 AM Wait for the green flag to drop. Teams are released onto the race route in 1-minute intervals.

The Next 9 Hours... Drive. As necessary, stop in a sunny spot to charge, fix a flat tire, or switch drivers. Then get back to driving. There is no lunch break. Arrive at a Checkpoint. The team jumps out of the support vehicles and points the solar array towards the sun. Drivers of support vehicles go off to find the nearest fueling station. Observers are swapped, route updates are given, and the public gathers around to see the cars. After staying the allotted time, the solar car is off again.

6:00 PM 9-hours after the green flag, the race day ends and the evening solar charging time begins. There is a 45-minute grace period for teams to find a safe place to stop.

8:00 PM Battery are impounded with the observer and cannot be touched until battery release the next day.

Until Morning... Work on the solar car (except batteries), find lodging, eat dinner, check the weather forecast, get ready for the next day, and hopefully get some sleep.

The Next Day... Much the same schedule as above, except that the solar cars reach a Stage Stop where all teams will meet together for stage awards and camaraderie. A Stage Stop is an extended Checkpoint where teams will not depart on the next stage of the route until the following morning.

A day in the life of a solar car team during the American Solar Challenge

Who We Are

The Innovators Educational Foundation (IEF) is a non-profit 501(c)3 organization, which organizes collegiate level solar car competitions in America. The Formula Sun Grand Prix is our track event and the American Solar Challenge is a cross-country road event.

IEF is made up of a core group of dedicated volunteers; mostly former competitors. They know first-hand the value of this hands-on, multidisciplinary, innovative project to the education experience. In addition to experiential learning, solar car events promote energy efficiency and raise public awareness of the capabilities of solar power.

Get Involved

We appreciate your interest in the sport of solar car racing! Whether you are interested in starting a team, volunteering, or providing financial support towards the next event, we want to hear from you. We would be happy to discuss opportunities with you, your school, or your company.

Contact Us

Innovators Educational Foundation
PO Box 2368, Rolla, MO 65402
IEF@AmericanSolarChallenge.org

Teams at a Glance

#2 University of Michigan
#3 University of Kentucky
#6 UC Berkeley: CalSol
#8 UT Austin
#9 Iowa State: PrISUm
#10 Netaji Subhas Institute of Tech: NSIT
#13 Michigan State
#17 Illinois State: Mercury
#20 Western Michigan: Sunseeker
#21 University of Florida: Solar Gators
#32 Principia College
#35 University of Minnesota
#42 Missouri S&T
#49 Georgia Tech: Solar Jackets
#55 Polytechnique Montreal: Esteban
#57 Southern Illinois University: SIUE
#73 Qazvin Islamic Azad: QIAU HAVIN
#92 ETS Quebec: Eclipse
#96 Western University: SunStang
#116 McMaster University
#179 MIT
#256 Oregon State
#787 Puerto Rico Mayaguez: SERRT

Innovators Educational Foundation

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