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Mississippi State University

X-cited!

Through-the-Road Parallel Design Explained!

Special points of interest:

- *Through-the-road parallel finally explained! See adjacent article.*
- *See what each thrust is doing, article below.*
- *We finally have a new name for the newsletter. X-cited! is a play on words, capturing both our excitement to be part of Challenge X , and all the writing and citing of engineering terminology that goes into this newsletter.*
- *Kiran Solanki has a cup of tea, see page 2.*

A through-the-road parallel vehicle design is the newest emerging hybrid technology configuration, and MSU's Challenge X team has chosen it to implement in their vehicle.

"We chose a through-the-road parallel configuration because it is more efficient than other types of hybrid designs," said Christopher Whitt, Powertrain thrust leader for Challenge X. "Because there are less mechanical parts in this design, there are less parts that could cause inefficiency."

"Through-the-road parallel" refers to how the engine and motor are arranged and work together in the vehicle," Whitt said. The engine and transmission are located in the front of the vehicle as they would be in a normal front wheel drive car. However, in the through-the-road design there is an added electric motor that only powers the rear wheels. "The engine and the electric motor are only connected because both the front and rear wheels make contact with the road," said Whitt.

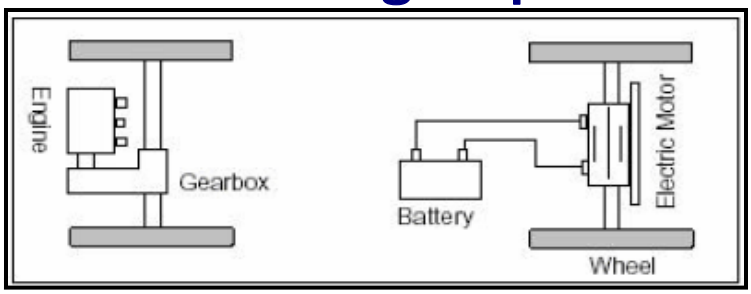

Illustration of through-the-road parallel hybrid arrangement.

Before the team chose this design, it considered other options, including pre-transmission and post-transmission parallel hybrid designs, and series hybrid designs, Whitt said. Because of things like additional gears and clutches in the other designs, they don't work as efficiently, and they weren't as well suited for the specifications of the vehicle that the team is designing.

Now the team is in the process of building the rear drive unit of the vehicle, said Whitt. The team will see how well their design fares when they display the unit for judges at the Year 1 competition at General Motors Institute this June in Detroit, MI.

Thrust Update Area: What are they working on?

Vehicle Modeling and Controls
Working on getting ready for pre-hardware inspection. Working towards control strategy, which is the brain of the hybrid vehicle. Working on Report #4.
Thrust Leader: Kiran Solanki

Mechanical
Completed mechanical fastener data. Finishing up documentation for rotating component guards. Continuing to work on complete vehicle aerodynamic simulations. Finishing up engine test stand. Helping the Powertrain group with the rear power unit mock-up.
Thrust Leader: Brian Christian

Electrical
The battery group has received 4 donated Pb-A cells and is currently testing their Battery Management System on these cells, and preparing design documentation for upcoming pre-hardware inspection.
Thrust Leader: Phillip Conley

Powertrain
The 1.9L Fiat engine has arrived! Our new Froude engine dyno is being shipped from Europe and is expected to arrive in four weeks. We are investigating NOx reduction technologies. Mocking up rear power unit of vehicle.
Thrust Leader: Christopher Whitt

Outreach Program
In the past two weeks we've done three Challenge X presentations to visiting middle and high school students.

We've also been working hard to get the word out about our upcoming discussion forum "Transportation Solutions to the Critical Energy Crisis" to be held on April 21st at 3 p.m. This is a huge outreach event for us this semester, and we have some really great panelists, so we hope you will all be able to attend! The forum will be held in the Parker Ballroom of the Hunter Henry Center.
Thrust Leader: Justin Crapps

Upcoming Events

April 21 Discussion forum in Hunter Henry Center "Transportation Solutions for the Critical Energy Crisis"

April 22 Pre-hardware inspection

May 9 Design Report #5 Due

June 5-9 Year One Competition, Detroit, MI

Atta-Dawgs

- **Phillip Conley** for great work on electrical procedures.
- **Bob Kirkland** for procuring sponsors and vehicle parts for us.
- **Brian Christian** for great progress on the engine test stand.
- **Marshall Molen** for getting the electric motor and test stand
- To **Christopher Whitt** for contributing his knowledge and tons of patience to this newsletter!

Please visit our website!
www.cavs.msstate.edu/projects/challengex/index.htm

Student in the Spotlight

This column gives you a behind-the-scenes look at the students who are working on the Challenge X competition at MSU.

This week's student is Kiran Solanki. Kiran is team leader for the Vehicle Modeling and Controls thrust. Kiran has put in many hours working on the Challenge X project, and always plays a key role in working on reports and other big projects. That's why we chose him to be this week's student featured in the spotlight.

Name: Kiran Solanki
Hometown: Chennai, India
Major: Pursuing a Ph.D. in Mechanical Engineering

Kiran Solanki loves antique cars, but his goal for the Challenge X project is making a car of the future.

As one of the team leaders, Kiran doesn't get a lot of time to spend on antique cars, one of his favorite hobbies, but there is not doubt that they are one of his passions.

Kiran Solanki inspects a new engine to be used in the Challenge X vehicle.

"Going to the General Motors museum and getting to see the old cars," Kiran says without hesitation when asked about his favorite memories of being on the Challenge X project so far.

But Kiran knows that for the vehicles of the future, designing something with a little better gas mileage is very important. And that takes a lot of work.

"Just the challenge itself is giving me a lot of experience," said Kiran. "I'm getting a lot of different kinds of experience, even leadership experience."

Kiran said that one experience he enjoys is "getting to meet industrial people who are doing real-time work."

Kiran said that one of the most difficult things he's done on the project is to implement theory into real-time systems. Meeting these people helps him learn how.

"I most enjoy getting to meet and work with people from different backgrounds," said Kiran.

After Kiran gets his Ph.D. in mechanical engineering, he wants to work in the field for a few years and then possibly teach. Learning about different fields is important to him, and that is one of the things he values most about Challenge X.

"I sometimes have a cup of tea and think about all the people on different parts of Challenge X, and how they are getting to work together," said Kiran. "All these people from engineering, industry, even government, helping students to learn more, it makes me so proud I'm part of this."

For newsletter suggestions or corrections, please contact Amanda McAlpin at amcalpin@cavs.msstate.edu.