



Aziz Rahman has been a professor of electrical engineering at Memorial University in St. John's for more than four decades and is well known in his field. But less well known is the fact that every Toyota Prius hybrid car on the road owes its technical achievement to Rahman. — Photo by Gary Hebbard/The Telegram

The man behind the hybrid

Memorial professor the mind behind technology that created Toyota's hybrid engine

By EVERTON MCLEAN
THE TELEGRAM

Aziz Rahman sits at his computer in his office at Memorial University, leafing through records and scanning his computer on a December afternoon. He has a picture of a Toyota Prius battery taped to his file drawer, along with a diagram on electrical generators and a note to students on how to reach him when he's not in the office.

The man who created the heart of the hybrid engine is surrounded by notes and records about converters and inverters, information on reluctance torque and magnets and how those forces can make an engine, or an air conditioner or, maybe, a wind-mill, much more efficient.

Rahman, a university research professor at MUN and a professor of electrical engineering, invented the technology at the heart of the hybrid car in 1980, a few years after he began teaching at Memorial. The grey, iron

cylinders of his prototype still rests on the floor of his laboratory in the engineering building, red and black wires stringing away from it. Rahman softly rotates a shaft in the middle of the apparatus and shows how crossing two wires stops the shaft magnetically.

"That's why the Prius doesn't need brake pads," he says. Although, he adds, they have them, for emergencies.

It was that same grey prototype that led to the technology, known as the interior permanent magnet (IPM) motor and generator, which allows Toyota hybrid vehicles to use energy from a battery and a gas engine, as well as from the IPM motor itself, for traction.

Meanwhile, the IPM generator charges the battery using energy taken from the vehicle's momentum, making sure the juice is always available.

Every time the machine coasts, brakes or goes downhill, that energy

is transferred to the battery.

The overall technology allows Toyota's hybrid to be more than twice as efficient as the Corolla — a small car known for good fuel economy.

Scanning through articles about his work, Rahman reads from a story by a journalist writing for his alma mater, Carleton University, calling him the father of the hybrid.

"It is preposterous to take credit from previous people," Rahman said, noting the work others have contributed to the project.

"But it happens that I am the inventor of the hybrid electric vehicle for which the key technology is the IPM motor-generators."

He smiles at the thought. More than 1.6 million cars run using his technology, helping Toyota to pull ahead of the American automakers.

"Therefore, Toyota is surviving, General Motors is becoming back-ground," he said.

Rahman says the Japanese have used the technology to help cut ener-



Aziz Rahman sits in his 2007 Prius, a gift from Toyota. — Photo by Gary Hebbard/The Telegram

gy requirements, with most cars and air conditioners there using IPM machines.

When he goes to that country, he said he's overwhelmed by their grati-

tude. Even Toyota executives, who do not pay royalties for using the IPM show Rahman their gratitude with "in-kind" gifts, including a 2007 Prius

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Rahman has won many awards for his work, including achievement awards from four Institute of Electrical and Electronics Engineers' societies and an award from Carleton University.

But the professor said his greatest rewards come from people who drive vehicles with his technology in them.

He said a member of the medical school recently told him that "when ever he drives his car, he thinks of me."

Rahman said that's his greatest reward — to see his work affect people's lives. Now, he's hoping to soon change the world again — this time by applying the IPM to wind generators.

Rahman has been given a grant by the Natural Sciences and Engineering Research Council of Canada for five years to develop the technology. He said that improving wind generators should again relieve the world's dependence on petroleum, and he hopes his work will be accepted by generator makers the way car makers have welcomed his advances.

He said his work will make the generators "cheaper, more (prolific) and better, more efficient."