This is Frank's latest student project.

It was built by students at Nanyang Technological University in Singapore. It will be raced in the Shell Eco Marathon in February 2014 in Manila, the Philippines.

It is a 3-wheel, diesel engine powered, automobile built for the Shell Eco Marathon race. This race is held annually in Asia and the idea is to design and build an automobile that can use only 1 litre of fuel to cover 1000km (that's 2,800 mpg). The car has been built from wood, Nature's engineering plastic. Wood, which is composed of cellulose long chain molecules, has, at 12% moisture content, a strength-to-weight and stiffness-to-weight ratio along its grain that is similar to steel!

In fact since wood has a lower density than steel and aluminium it has a higher stiffness and strength per kilogram when compared to steel and aluminium when used in bending since the 2nd moment of area is higher per unit weight. Wood is also a wonderful prototyping material. You can cut it, saw it, laser it, shape it, drill it, glue it, bend it, laminate it, screw it, nail it, join it and smooth it. You can change your mind and cut it apart and modify it and reglue it.

The car has been designed with a stiff, strong and lightweight frame that supports the driver, engine and wheels. Then a stiff, strong, lightweight, non load bearing, shell system, made from 3mm thick plywood, clips on to the frame thus providing a highly aerodynamic shape. The car was deliberately built with a non load bearing shell so that the shell system can be removed completely thus leaving a naked, load bearing frame that means all parts of the car are easily accessible and can be easily worked on.

Inside the car is an on-board high precision instrumentation microcomputer that computes in real time the fuel usage together with the position, speed and deceleration of the car; the latter allowing calculation of the total drag force acting on the car; (recall that force = mass x acceleration).

The students who built the car are from Nanyang Technological University, NTU, in Singapore. Frank taught the students the design and manufacturing techniques and then together with help from the students we built most of the car. Then Frank told the students that the car must be discarded (their faces dropped) and they must start all over again so as to gain ownership of the project by building the car by themselves and add their own designed components. It was real hard work but they excelled themselves, as you can see, in the final product. Frank had to slap the students into shape. At the beginning they couldn't even drill holes or use a handsaw. At the end they were skillful engineering practitioners, well able to use tools and computers to design and build quality engineered products.