AVnet3D NEWS
ADVANCED VISUALISATION NETWORK

Issue 2 | TECHNOLOGY | EVENTS | FUNDING | RESEARCH | PROFILES | December 2002

EVENT

FUTURE AVNET WORKSHOPS

An AVNET event "Advanced Visualisation Technologies for Competitive Advantage" was recently held at the Heritage Motor Centre, Gaydon, West Midlands.

There was an excellent turn out with representatives from the automotive sector together with academics, technology suppliers and consultants. Group discussion sessions enabled participants to make suggestions for the format and content of future AVNET workshops and also gave those attending the opportunity to offer to host future AVNET workshops. Workshops hosted by member organisations will give those attending an excellent opportunity to experience demonstrations of the visualisation technologies and concepts being discussed. Comments and feedback made by participants at the November event will be utilised when developing plans for future AVNET workshops.

Julian Thompson, Jaguar Cars Ltd, leads a group break-out session

The first AVNET workshop will be a one-day event held on Thursday, 30th January 2003 and will be hosted by TWR at Leafield in Oxfordshire. The topics to be addressed at that workshop will be "Overview of Visualisation Technologies" and "Rapid Concept Styling Environments". Information on this workshop will be updated regularly under "Events" at www.avnet3d.co.uk. Future workshops are scheduled for April and July 2003.

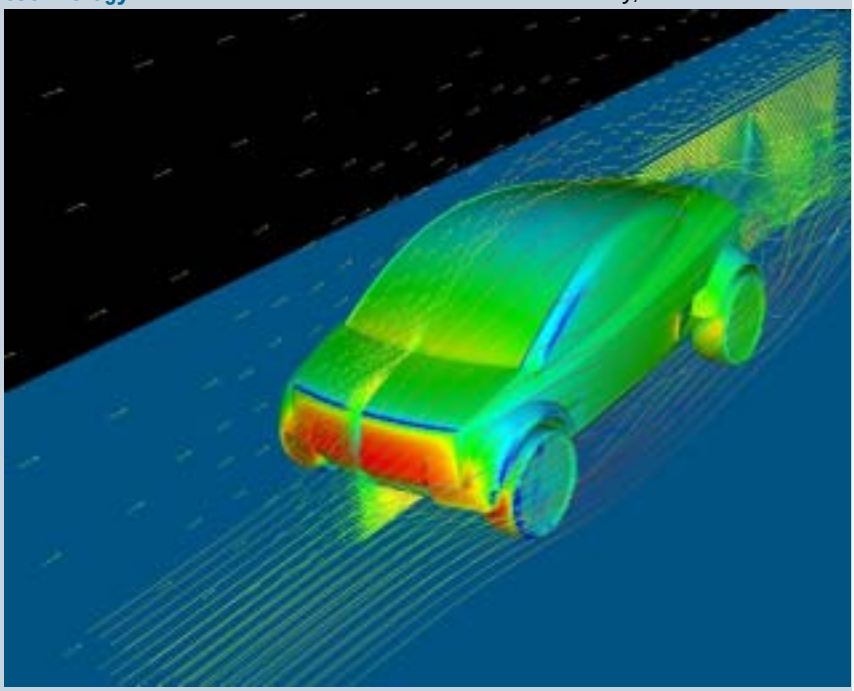
AVNET is featured in the current edition of the IMechE's Professional Engineering Magazine

MEMBER PROFILE

TWR & VIRTUAL REALITY

TWR, the UK-based automotive design, engineering and manufacturing consultancy, specialises in accelerated programmes, achieved through the application of leading-edge digital technology.

TWR's Leafield Reality Centre, established in partnership with SGI, came online in May 1999. It has the distinction of being the U.K.'s first curved-screen, full-size immersive virtual reality environment. It seats 15 to 20 comfortably, and has a 24-foot



TWR's 3PV car and computational fluid dynamics

TWR's attention turned to Virtual Reality in 1998, when the company was looking for a solution that would help it move beyond the limitations of desktop CAD technologies when designing and engineering for its OEM clients. TWR's aim was to exploit the latest technologies, encourage innovation through faster analysis and feedback, increase end-product quality, reduce time to market and reduce project costs.

spherical screen which provides a 170° x 46° field of view. It has become an integral tool in TWR programmes, and has been used for simultaneous Virtual Reality presentations with OEM customers in Detroit and Melbourne. Real-time visualization has done much to impact time-to-market for TWR customers. For example, by using real-time visualization of high fidelity, 1:1 scale (and larger) 3D vehicle renderings, TWR was able to eliminate

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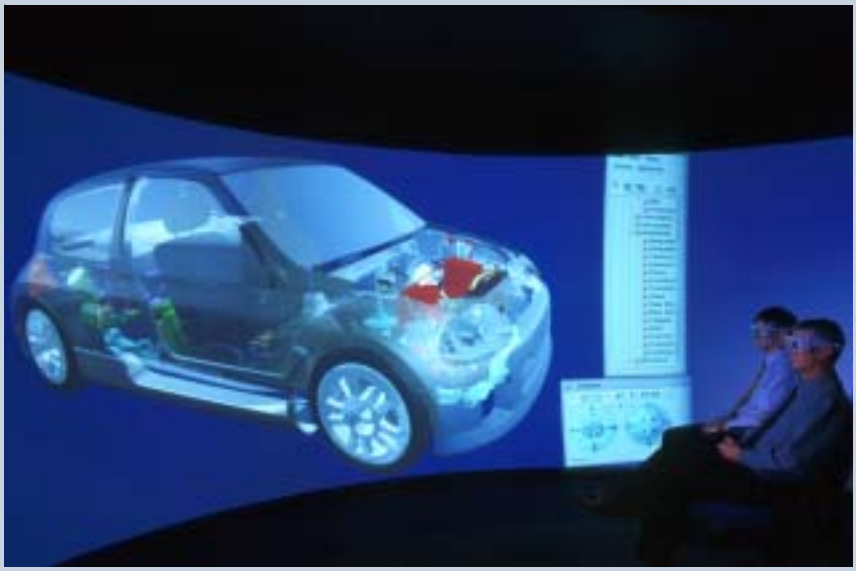

Clio in TWR Reality Centre

the need for a significant number of full-size clay vehicle prototypes in the creation of the original Renaultsport Clio V6. The Reality Centre made it possible for participating designers and engineers from TWR and Renault to interact with every part of the vehicle's design and achieve consensus early on. It also helped to reduce what would normally be a three to four year time-to-market to just 16 months.

Virtual crash testing provides a further illustration of how time and cost can be reduced. Crash testing actual vehicles is a significant expense, as physical crash test models must be fully developed and assembled prototypes; performing preliminary simulations in Virtual Reality minimises the number of actual crash test models needed.

TWR also uses Virtual Reality in its manufacturing programmes, designing and testing a vehicle's manufacturing process before transferring the data to the real manufacturing facility.

Background: TWR's primary business is the design, engineering and manufacture of road and racing cars, and road and racing engines. In addition TWR is a source of design and performance enhancements for current vehicles and engines. TWR employs more than 1,500 people in Great Britain, the United States, Australia, New Zealand, Norway and China. To-date TWR has worked for 62 customers, 42 of them automotive brands. The majority of its work remains confidential, but TWR was instrumental in the creation of the Aston Martin DB7 and Vanquish, as well as the Jaguar XJ220, Volvo C70 and Renaultsport Clio V6, which it has also manufactured.

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MEMBER PROFILE

COLOUR 3D SCANNING FROM ARIUS 3D

Arius3D Inc. is a company formed expressly to define, establish, support and grow the cross-industry, global reference standard for 3D colour imaging. The company has secured a world-wide exclusive license to commercialise state-of-the-art, three-dimensional, colour, laser imaging technology from the National Research Council of Canada (NRC). The technology is patented by the Government of Canada and Arius3D Inc. and it consists of a laser camera and a motion control system for moving the camera. The shape and colour measurements are completely independent of the effects of ambient light. Scanned data are recorded and processed by software to transform the data into high-quality, 3D colour images.

How it works: The laser scanning mechanism characterises each point on the scanned object according to its colour and location in 3D-space. It does this by scanning the surface of an object with three different laser wavelengths (red, green and blue) in one focused beam, and recording the reflected light. The X co-ordinate of each point on the object is calculated from an accurate measurement of the position of the scanning mirror in the camera. The Y co-ordinate is calculated from an accurate measurement of the camera motion system. The Z, or range co-ordinate, is calculated through laser triangulation within the camera.

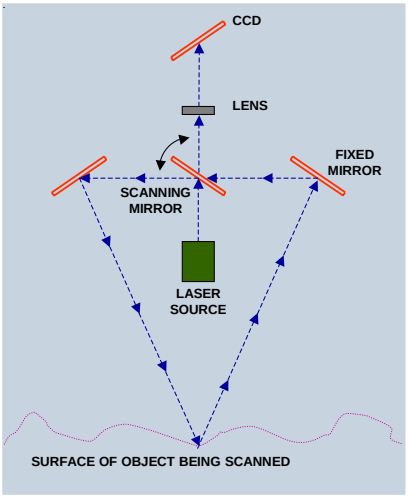
At the same time the colour information at each point is gathered by measuring the intensity of the three returning laser beams. Colour intensity measurements are an accurate measurement of the surface colour of the scanned object and are completely independent of ambient light.

Each point on the object is described by 6 numeric values; positional values X, Y, and Z, and surface color values R, G, and B.

X-axis: Scanning in the X direction is accomplished by a galvanometer-driven double-sided mirror. The position of each point on the X-axis is developed from the known angular position of the mirror.

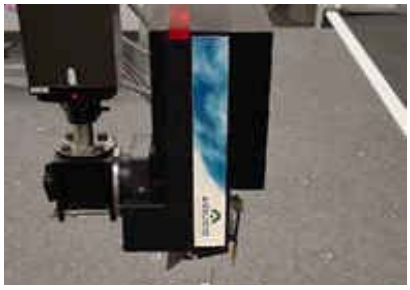
Y-axis: Scanning in the Y direction is accomplished by motion perpendicular to both the laser axis and the X-axis, usually implemented as a turntable or translation stage.

The position of each point on the Y-axis is developed from the known



Optical geometry of the sensor head

position of the turntable or stage. Z-Axis: The position along the Z-axis (the laser axis) is measured by laser triangulation, enhanced by the application of synchronised scanning geometry. This patented method uses one side of the galvanometer-driven mirror to deflect the laser across the scanned object while the opposite side of the same mirror is used to cancel the return beam's angular movement across the CCD sensor. With this geometry, only a change in the position of the light spot along the Z-axis produces net movement across the CCD sensor. A patented sub-pixel interpolation scheme is used to enhance the resolution of the CCD sensor.



Arius3D scanner

Previous applications for Arius3D technology include reverse engineering and rapid prototyping.

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MEMBER PROFILE

VISUAL ADVANTAGE INTERNATIONAL LTD

Automotive manufacturers and their supply chains today employ a multitude of CAD systems, each optimised for different purposes. For example, in an automotive design project, it is not uncommon for the "body in white" to be designed using Dassault CATIA solutions, and for the powertrain to be designed using PTC's Pro/ENGINEER solutions. In addition, a variety of other systems may be used to design smaller sub-systems, and to conduct various simulations of the components. Somehow, everything has to fit together and work together on the production vehicle, with as few re-works as possible, despite these differences.

Increasingly, the industry looks to Digital Mockps throughout lifecycle of a new vehicle project. Digital Mockups can be used to get a higher-quality "right first time" design to market sooner, thereby winning market share and increasing top-line profitability. The technology reduces the cost and number of clays and prototypes required. Interactive Digital Mockups can be used to understand styling issues, by employing realistic multi-pass rendering algorithms for paint surfaces (eg SGI Clearcoat 180/360, HP IBR). Design alternatives can be rapidly tested and evaluated. The vehicle can be inspected in different contexts, e.g. a showroom, a car park, or your driveway. Digital Mockups can be used to conduct engineering design reviews, perhaps collaborating with designers and manufacturing engineers around the world. Interference testing, measurements, sectioning etc can be performed in a digital model, derived from disparate systems. All this can be conducted using panoramic stereo computer displays, with real-time interactivity and real-time results presented meaningfully for anyone involved with the project.

Visual Advantage International Ltd provides global visualisation and collaboration consultancy and services for industries working with large amounts of 3D CAD data in a large shared design environment. Our experience comes from the past 12 years working at DIVISION and PTC, where the team has designed, implemented, and supported sophisticated interactive visualisation and collaboration facilities around the world. Our primary expertise is with Division Mockup, Division REALITY, and the other PTC Visualization products. We have configured and trouble-shooted the most complex Mockup installations, in search of increased performance, larger model-loading capability, and better stereo projections. Recent projects which can be mentioned include Mockup simulations for Bentley, Cosworth, and Alvis.

In addition to expertise in high-end visualisation in the Automotive, Aerospace, Shipbuilding, Oil & Gas, and Architectural sectors, we also have extensive knowledge of today's desktop/web enterprise-wide visualisation technologies suited to any type of discrete manufacturing. These technologies open a route for re-engineering older, less efficient business processes. For example, it is no longer necessary to print an image of a problem, write on it, then fax or mail this somewhere in order to communicate it. Similarly, the 3D CAD model can be used directly to generate training materials, user and maintenance technical publications, and marketing materials.

Previously, large scale visualisation technology was very costly. Today, it is realistic for Tier 1 and Tier 2 suppliers, individual departments or even projects to own and operate dedicated visualisation facilities. We can help with design, installation, training, and general services related to visualization and collaboration. Our head office is based in Bristol, England. We have working relationships with organisations in Europe, the Americas, and Australiasia. For further information, please contact:

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EVENT

CONFERENCE: "CONCURRENT ENGINEERING: 10 YEARS ON"

April 14-16, 2003, "Concurrent Engineering: 10 years on" at Plymouth University, UK and Sponsored by:DaimlerChrysler, Audi AG, T Telekom, Ghent University, The European Technology Institute

The ECEC 2003 will be co-located with the EUROMEDIA 2003 (Multimedia, Telematics and Web Technology) conference. Paying registration for either one of the conferences allows you to visit sessions from both conferences. Both conferences are located at Plymouth University, Plymouth, UK

Conference aim: ECEC'2003 will provide European Researchers with a forum, where they can discuss the latest developments linked to concurrent engineering focused on European research projects. ECEC'2003 aims to identify the progress that has been made in Concurrent Engineering over the last year. The ECEC provides a forum for the exchange of experiences in developing and implementing CE based solutions across the wide spectrum of manufacturing and engineering industries. The conference is targetted at industrial enterprises, industrial associations, universities and research institutes.

Who should attend: The conference will be of direct benefit to process, production, design or development managers in manufacturing, strategic directors, quality managers and technical directors. The conference will also be of interest to industrial and academic researchers.

Scientific Programme: The 2003 Concurrent Engineering Europe Conference is structured around a number of major topics. The following topics are particularly relevant to AVNET:

* Supporting Technologies
* Digital Mock-Up
* Virtual prototyping
* Rapid prototyping
*Synthetic environments and simulation on the factory floor
* Reverse engineering
* Assembly and disassembly
* High precision manufacturing
* Intelligent manufacturing
* Sensor and robot assisted machining

Submission Deadlines: 15 December 2002, 20 January 2003 (final submission).

For details on submitting a paper to this conference and for registration information please see:

http://biomath.rug.ac.be/~scs/conf/ecec2003

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EVENT

DTI's GRID OUTREACH PROGRAMME

The DTI's Outreach programmes exists to encourage collaboration between academia and industry. The current programme of events is the Grid Outreach programme.

The Grid Outreach Programme is a seminar series featuring presentations and demonstrations of Grid technologies. Themed seminars in this programme are looking at real time and collaborative visualisation, 3D climate simulation models and the optimisation and simulation of engineering design. For details or to register interest go to **www.gridoutreach.org.uk**.

The Software Technology Outreach Programme has run seminars on Virtual Reality Technologies in the past. The applications of VR technology are becoming broader and there is potential for this subject to be revisited within the ST Outreach programme, any interested people should register their interest online **www.st-outreach.org.uk** to be notified of future seminars by the DTI event management centre.

FUNDING

FRAMEWORK PROGRAMME 6

Framework Programme 6 is the EU's next programme of support for technological research and development. The first call for proposals under Framework Programme 6 will take place on 17th December 02 with first deadlines for submission of proposals expected to be April 04.

For details visit: **www.europa.eu.int/comm/research/fp6/index_en.html www.cordis.lu/fp6/ and www.ukro.ac.uk**

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JOIN AVNET!

Membership of the Advanced Visualisation Network is open to any organisations or individuals interested in new collaborative research into 3D visualisation technology applied to design and manufacturing processes. The focus of the network is automotive applications. Organisations which could transfer their technology to the automotive sector are also welcome to join the network.

The primary aim of the network is to facilitate the formation of new strategic partnerships for future joint research projects at the leading edge of visualisation technology.

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