TOMORROW'S WORLD

The global challenge

Anne Giacomantonio asks industry insiders and young innovators what's next for the engineering sector

The professional opinion

'We are still just at the tip of the iceberg'

Professor Dame Wendy Hall, 56, School of Electronics and Computer Science, University of Southampton.

"Due to advances in computing and communication technologies, we are increasingly living our lives online. But we are still just at the tip of the iceberg in terms of these developments. We can envisage a world where we will be seamlessly connected to communication networks wherever we go and whatever we are doing, using sophisticated, personalised mobile devices.

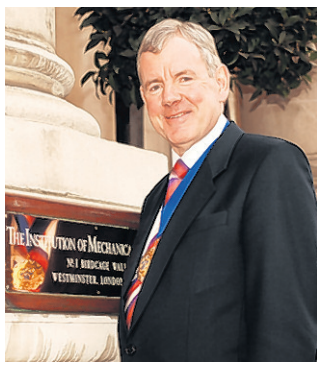
New forms of interfaces will enable us to interact with the digital world in ways we can hardly imagine today. Trust, privacy and security will become very important as this new world emerges – some solutions to these problems will be the matter of regulatory reform but others will be provided through the efforts of the engineers who are designing and building the technology that underpins these developments."

'When there is a problem, engineers have a knack of solving it'

Sir Anthony Cleaver, 71, co-patron of The Big Bang, The UK Young Scientists & Engineers Fair and chairman of the Engineering Technology Board.

"The solutions to the biggest problems facing society, from climate change, poverty and energy supply to access to fresh water and food, will draw on all the initiative, creativity and inspiration that are the hallmarks of engineers. But the biggest challenge may not be solving the next big problem – history tells us that when there is a problem, engineers have a knack of solving it – but rather making sure that we have engineers capable of solving the problem in the first place. We are making a start in the right direction, but there is still more to be done to ensure young people are encouraged and equipped with the skills to develop into engineers capable of solving the myriad challenges we face."

'For our society to function, we need to break our fossil habit'



Bill Banks, 66, president of the Institution of Mechanical Engineers.

"The next big problem is global warming and climate change. We live in a fossil-dependent world, which is using up its natural resources at an unprecedented rate. In the next few years, these resources will become even scarcer. For our society to function and for our environment to sustain an ever growing population, we need to break our fossil habit.

This will require a big breakthrough in energy. Engineers are the only people who can take the science and create, test, manufacture and globally distribute future energy technologies. And it will be these breakthroughs that will allow us to continue to be mobile and power our homes and workplaces without polluting our atmosphere or damaging the planet."

'The opportunities are immense'

James Smith, 58, chairman, Shell UK.

"The world needs more energy and a lot less carbon dioxide. The world's engineers and scientists need to step up to this great challenge. Think of taking the CO2 out of fossil fuels, think of sustainable bio-energy, wind, solar and hydrogen. Think of much more efficient cars and buildings. The opportunities are immense."

'Our engineers develop unmanned aircraft systems'

Chris Allam, 42, managing director, Autonomous Systems and Future Capability BAE Systems.

"One key challenge for our engineers is to develop autonomous unmanned aircraft systems that share civilian airspace safely with manned aircraft. Our engineers develop concepts for how unmanned aircraft will be used in the future by both military and commercial applications. The work we are doing about autonomy with aircraft today could well inform the development of future applications for autonomous systems in other areas tomorrow. For instance we could see autonomy used in our road networks, with cars switching to auto-drive when joining a motorway."

'Up to half the country's homes could be heated with biogas'

Janine Freeman, 37, head of Sustainable Gas Group, National Grid.

"We need to produce more renewable energy and we need to dispose of our waste in the most efficient way. The solution being put forward by National Grid is to use all waste streams such as food, wood and sewage and turn them into biomethane – a gas which can be injected into the country's gas transmission system.

It's incredibly efficient to turn waste into energy rather than use resources to dispose of it. And we are always going to be producing waste so it's a home grown and renewable source of energy. Up to half the country's homes could be heated with biogas in the future, according to our analysis. Everyone's a winner."

The voice of the future

'We live in uncertain times'

Tanya Budd, 21, Young Engineer for Britain 2005.

"We live in uncertain times. I would say that one of the few certainties in life lies within science and engineering. The financial services sector and banking industry, as we all know are in turmoil. I believe our future is in a knowledge-based economy.

The young people within our universities today who study maths, science and engineering subjects are our future. Their research work will be the basis on which our economy will grow. And it is their solutions

that will help to solve global warming, the energy crisis and many other current day issues that affect us all.

No doubt they will also develop better entertainment solutions, better housing and even better clothing!"

'Algae holds huge energy potential'

Leon Chen, 21, science and engineering ambassador for the Oxford Trust.

"Algae biofuels can possibly be developed fast enough to make a big impact. Algae holds the potential to produce the amount of energy equivalent to 10,000 gallons of oil per acre – which dwarfs the potential of crops such as palm oil at under 700 gallons. It's a great use of agricultural land. This also has the advantage of being carbon neutral as algae grows on CO2.

The technology can even be used near coal-fired power plants that are popping up on a weekly

basis in countries such as China. This technology is not reliant on soil or water and can actually be a financially viable product without the need for subsidies. The concept of 'directed evolution' of these algae present even more exciting potential."

'We must redesign products'

Emily Cummins, 22, British Female Innovator of the Year award 2007.

"I think that we have to stop focusing our engineering talents on producing flashy gadgets – we cannot continue to design and engineer luxury items that consume excessive amounts of resources. Instead we must pool our resources to redesign existing products so they are environmentally friendly. Trevor Baylis' wind-up radio is a great example of what innovation can produce. It's a product that's the same quality as its electrically-run counterpart but without the harmful carbon

emissions. To maintain the quality while neutralising the damage to the environment is an ideal that must, and can, be extended to all the other appliances we can't seem to function without. People will not change the way they live, so, instead, we must change the utilities that shape our lives."