Powerhouse of research

By MMA Ansari, representing University of the Witwatersrand, Electrical and Information Engineering

The importance of a higher learning institution is that it is able to identify and nurture the embryonic developments inherent in its students.

The goal of any University is to not only educate, but also to stimulate ideas. The University of the Witwatersrand's School of Electrical and Information Engineering (Wits EIE) does this to a heightened degree.

By promoting innovation through cutting edge research, Wits EIE plays an integral role in developing creative graduates. The School has an extensive research department that acts as an incubator for advancements in technological development.

In addition to the theoretical components of the Wits EIE degrees, research forms an important part of the syllabus. The School has identified three predominant research thrusts: Energy, Information and Systems. Different laboratories exist, where individual projects are housed and each one draws expertise from these research thrusts. Research not only acts as a catalyst for further technological development, but it is also an important bridge between the learning institution and industry.

The Machines and Drives research within the School is divided into Electrical Machine Assessment and Electrical Machine Design. Condition monitoring and machine modelling complement the development of special synchronous reluctance motors, large single phase motors, linear machines, permanent magnet motors and machines that utilise advanced materials, such as superconductors.

New higher efficiency solar panels will boost efficiency by 50%.

Future trends

Once the big companies have built their multi-billion dollar energy projects, we will see the upsurge of smaller players. These entities will enter the market with technology such as micro-grids and islanded systems. This technology will be connected via the internet and mobile devices, to provide energy to rural areas that are not reached by the larger transmission lines. This is the ideal solution for African countries where large areas are under-serviced in terms of power supply.

New, higher efficiency solar panels, such as the photovoltaic cell developed by Solar Junction, will boost efficiency by more than 50%. These lens diffraction based systems will one day become the norm and will be cost effective enough for mass consumer consumption. The Solar Junction cell is built with three regions, known as junctions, which are stacked on top of one another. Each junction absorbs a different spectral region of the sun's rays, resulting in a device that delivers far more energy than conventional cells do.

Automated metering in these outlying areas will be available using wireless transmission and smart meters. This will allow for real-time metering and monitoring to provide better response to power outages.

There is a great possibility that new battery technologies, like the liquid metal batteries and iron-phosphate, will evolve into ubiquitous power houses of energy storage, possibly used everywhere. It is envisaged that both large power centres where people go to 'top up' their energy, as well as each household or business having their own smaller storage facility, are likely. The latter option will probably be more common, at least initially.

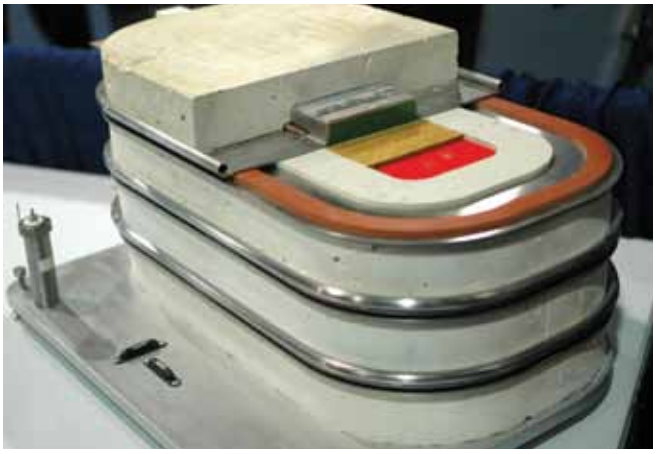
Specialisation and generalisation

All these technologies are currently in development, but will take some time to bear fruit. This delay will be exacerbated by institutional inertia. However, due to rapid world changes, such as revolutions, protests and recessions innovation will accelerate, out of necessity. The mobile web and the internet will also facilitate this development. To navigate this future, one will need to work with large institutions initially to be able to build and adapt existing systems, while concurrently working on DIY home projects. After a number of iterations, one DIY project might gain exponential market adoption. This would allow other projects, which require larger funding, to proceed with relative ease.

Smart meters will allow for real time metering and better response during power outages.

Conclusion

With the attrition of a number of tertiary educational facilities in South Africa, we have seen an increasing move towards a combined pool of generalists and specialists. These institutions have a highly concentrated amount of speciality within a small region, as opposed to other regions of the world where the specialisation is dispersed. This allows each area of speciality to impart valuable tools and skills to all learners. Wits is already doing this well and is set to become more seamless and collaborative in the future.



New liquid metal batteries and iron-phosphate battery technology will revolutionise the way energy is stored.

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