



HSI (Hetrogenous Systems Integration)



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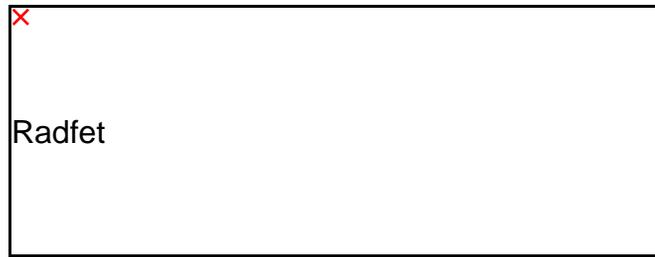
Hetrogenous Systems Integration

The creation of electronic systems from devices with different technological backgrounds is the role of the Heterogeneous Systems Integration group in Tyndall. The technologies utilised to achieve this stem from a combination of semiconductor packaging technologies and silicon fabrication processes which operate at the wafer scale.

All of these technologies reduce the length of interconnect that electrically connect the system to the outside world and enable it to act faster and more efficiently. These internal system level connections reduce system footprint and improve electrical performance.

The group is supported by a number of national and international collaborative research projects which address systems

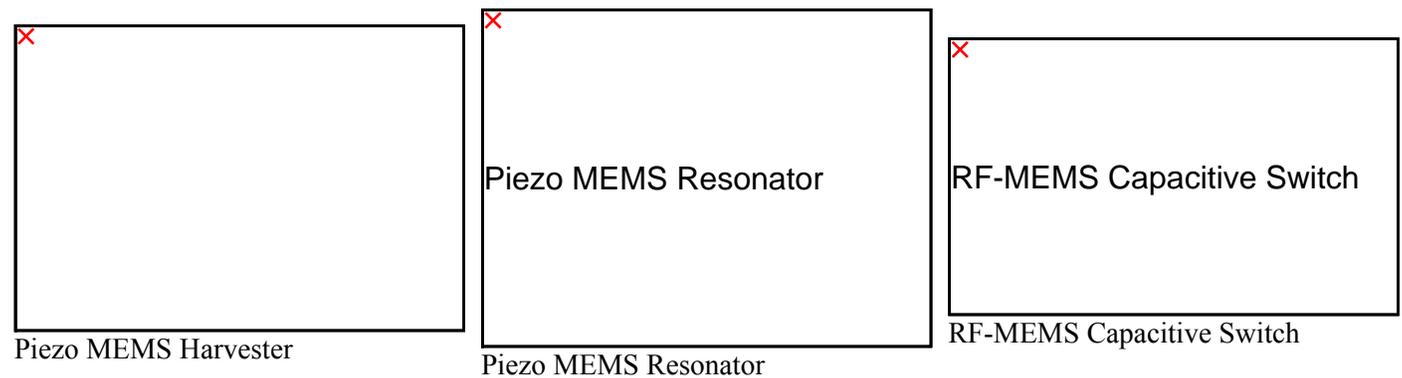
integration aspects across a broad range of application areas. However, the motive force which is driving our research agenda is to fully integrate systems which have been prototyped within the Wireless Sensor Networks group with whom we closely collaborate.



Radfet Diagram

All electronic systems need to be connected together by some form of interconnect technology. This could be done by conventional semiconductor packaging technologies such as wire bonding or solder bumping or by more advanced system level interconnect technologies such as nanowire-polymer combinations and flip chip assembly on flexible and rigid substrates which all form part of our research activities. Extensive use of numerical simulation informs this research activity.

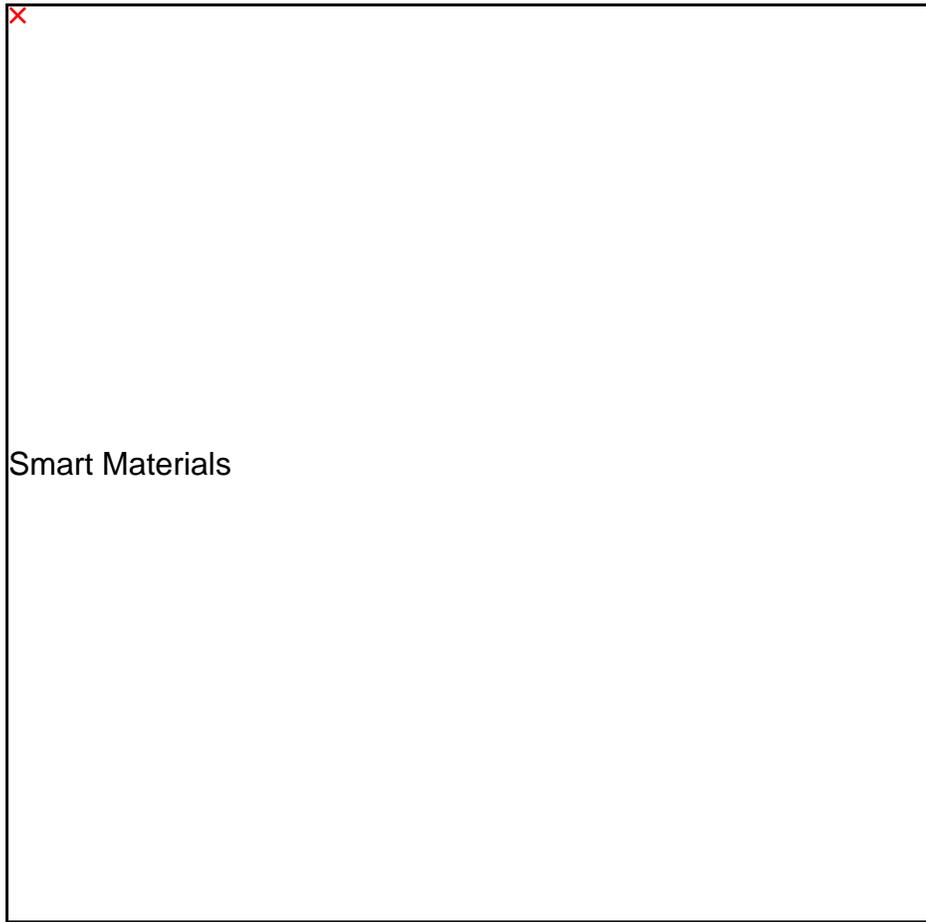
In addition to interconnecting different systems electrically to create we have started to develop packaged MEMS based systems which incorporate different types of MEMS structures which are integrated together to perform mechanical and fluidic functions.



There are four major groups involved in the creation of miniaturized systems in the HSI team. These are:

- Energy Harvesting comprising microscale vibrational and thermoelectric voltage generators
- PiezoMEMS and RF MEMS to actuators and switches
- Radiation Detection
- NanoMaterials for sensing, interlayer interconnect and charge storage





Smart Materials

High quality AIN deposited on (*top*)
silicon and (*bottom*) polymer substrate for increased flexibility and biocompatibility

Contact enquiry (at) tyndall (dot) ie for all Business Development enquiries

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