

Solar-powered nano sensor targets gases more polluting than carbon

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Credit: Alexander Malaver

(PhysOrg.com) -- A solar-powered sensor station to monitor in real time the concentration of gases that are key culprits in climate change and air pollution has been installed on a QUT Gardens Point roof as part of an international study on solar-powered environmental nano sensors.

Alexander Malaver, a QUT School of Engineering systems master student, said the sensor was a prototype for a planned network of solar-powered sensors that would monitor the environmental concentration of three main pollutants: [nitrogen dioxide](#) (NO_2) from engines and combustion, [nitrous oxide](#) (N_2O) and ammonia (NH_3) from manure and fertilisers.

"These gases are not commonly studied because they are found in low

concentrations in the environment but nitrous oxide and ammonia are more polluting than carbon dioxide, and we are developing new cheap sensors able to detect them," Mr. Malaver said.

"The aim of this research is to be able to let people know in real time the concentration of these gases around roads and farms so that they can change their behaviour if necessary.

"Also when we know the concentrations we can find out if these gases are harmful to humans or affect only global warming."

Mr. Malaver said the [gas sensor](#) network would be wirelessly connected so that every node could "speak" to the others and feed data in real time to a central monitoring station. He said the roof station was already providing precious data, which could be easily visualised by any computer within the QUT network.

"The new sensors are based on metal oxide nanowires and carbon nanotubes and are powered by third-generation [solar cells](#) - dye sensitized, which operate to capture [energy from the sun](#) in the same way plants do," he said.

"This form of solar power is ideal for this project because it costs less than conventional silicon-based technology and has less embodied energy in its manufacture. It also produces electricity more efficiently in low light conditions."

Mr. Malaver's study's principal supervisor is QUT's Professor Nunzio Motta with co-supervision from Professors Peter Corke and John Bell. The sensors are produced by QUT research partner, University of Brescia, the solar cells are produced by the University of Roma Tor Vergata using the Australian company, Dyesol's, patent, under the National and International Research Alliances Program Queensland

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