

Designing robots that can keep secrets

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Nao, an advanced-programmed humanoid robot. Credit: Ed Alcock

Humanoid robots are not just the stuff of science fiction: these computing devices are likely to be walking around our streets in the next decade.

That is why Oxford University researchers are exploring the privacy concerns around surrogate robots in their EPSRC-funded project 'Being There: Humans and Robots in Public Spaces', which will be described at this year's Oxford London Lecture on 18 March.

At the lecture, which aims to connect the widest possible audience to Oxford's ground-breaking research, Dr Ian Brown will explain his work to embed privacy in the design of robots. While they can record and transmit what they see and hear, his research is trying to find ways to prevent them from unnecessarily revealing the identities of the people they have captured.

Humanoid robotics is an emerging research field that will become increasingly important as robots start to assist people in their daily lives – for example, becoming companions for older people in their homes. Dr Brown, Associate Director of Oxford University's Cyber Security Centre and Senior Research Fellow at the Oxford Internet Institute, and his Oxford colleague Dr Joss Wright, are part of a UK team of researchers working on this £2 million three-year project examining the implications of robots in public spaces. The issue is around how much information is gleaned and stored, particularly as these sociable human-seeming devices could lead to us being less guarded about what we reveal.

Dr Brown said: 'When we begin to interact with friendly-looking humanoid robots, our expectations and assumptions shift. New questions arise about how much we trust these devices. Some people might develop an emotional attachment to them, particularly in situations where robots play the role of companions. It is important, therefore, that we design robots that have privacy embedded into their design, so their information gathering is restricted to what is needed to interact and carry out their tasks, and information about the identity of their human users is kept to a minimum. Otherwise, these robot "friends" could betray the trust of the people they come into contact with, passing on information to third parties.'

The research team, from the Universities of Oxford, Bath, Exeter, Queen Mary University of London and the Bristol Robotics Laboratory, is measuring how people respond to robotic surrogates in public spaces. The researchers are introducing an advanced-programmed [humanoid robot](#), 'Nao', to the public in Bristol in 2015. Finding ways of preventing information stored on the [robot](#) being hacked or passed on to others is one of the main challenges.

'Humanoid robots have the potential to gather, store and analyse data about our movements and activities,' said Dr Wright. 'While they

provide opportunities to make our lives easier, the potential loss of control over this information should concern us. At Oxford we have been exploring how individuals can maintain control over information about themselves, while still enjoying the potential benefits of robotic technology.'

The techniques being developed for providing information without compromising users' privacy include matching people into groups with similar interests, either online or at social gatherings, without needing each person to share their interests. This would also allow commuters to search for car-pooling partners without broadcasting their home location and work route, which will be useful as self-driven cars start appearing on Britain's streets. It would also help motorists plan routes allowing for rush-hour traffic without the need for pervasive monitoring infrastructures.

Dr Brown's previous research on privacy-enhancing technologies includes smartphone software that selects adverts to show to users based on their browsing behaviour, without notifying advertisers of individual interests. The system works especially efficiently for location-targeted adverts and, unlike existing behavioural-advertising systems, users' profiles are kept under their control.

The Oxford London Lecture, 'Keeping our secrets', will explore wider privacy issues around computing and communications technologies. Dr Brown will argue that technologies need to serve the public good as well as private interests, and that privacy should be embedded into hardware designs, software code, and system architectures. He will address two very pertinent questions: 'Who should decide on the values that determine our networked society?', and 'Should governments intervene to ensure this happens?'

Provided by Oxford University

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