Ambient intelligence, identity and autonomy

By Ben Cotton

As technology has progressed over time, it has become increasingly closely adapted to the way we live and work. At the same time but to a lesser degree, we have also become adapted to technology. This mutual adaptation is inevitable due to the constant desire for greater efficiency and comfort both in our everyday lives and in the business world. More than ever though, this evolution is bringing with it serious issues that we as designers need to consider.

One way in which greater adaptation is being enabled is through the largely invisible integration of machine intelligence (i.e. computers) into a wide range of everyday products that in the past would have had no real intelligence of their own. This emerging revolution in consumer products is referred to as “ambient intelligence”.

This paper will investigate how “ambient intelligence” is being introduced into the design of consumer products and the benefits that could be derived from it. In showing the development of such products and how they work, some of the ethical and existential issues facing product designers will be illustrated. In particular, this paper will argue that the information gathering required to intelligently adapt to the user’s needs and the influence such smart products may have over the user could lead to the commoditisation of the identity and autonomy of the individual if we are not careful.

The body of this paper now follows in three sections. Firstly, basic privacy risks inherent to “ambient intelligence” will be established using the example of proposed next-generation electricity grids. From there, the argument will be expanded to look at the high-tech environment of the future and the threats to our individual identity and autonomy that it poses. Finally, this paper will look with a philosophical bent towards the wider ramifications of “ambient intelligence”.

As a first example of “ambient intelligence” this paper will consider the advent of “smart grid” technological initiatives, of which there are many, but all of which share key features. “Smart grids” are intended to be the next generation of electricity grid with the goal of increasing efficiency of electricity production and consumption (Cavoukian, Polonetsky, & Wolf, 2010). One key aspect of a “smart grid” is that appliances can negotiate their electricity usage directly with the power company via “smart meters” and the electricity lines (Cavoukian et al, 2010). This is in contrast to existing electricity grids which simply supply power to appliances when they require it, which is completely dependent on when and how their users choose to run them. Appliances on such a grid will have added intelligence to transmit information about how their users want to use them to the power company and gather schedules of electricity rates from the power company in return (Cavoukian et al, 2010). In this way, appliances and utility companies can coordinate the usage of power within limits set by the users of the aforementioned appliances so that for example, a dryer can be run only at times of off-peak power usage and at a correspondingly lower rate. Information about each

appliance's power consumption is also gathered into a centralised repository by the power company so individual consumers can easily monitor their own usage (Cavoukian et al, 2010).

Though there may be some benefits to switching to such an electrical grid, there are some quite clear privacy risks entailed by such a system. Given that data about personal usage of appliances connected to a "smart grid" is gathered and transmitted to the power companies, said power companies will be able to collect huge amounts of private information about the very people they are selling to. Cavoukian et al (2010) argue that although the raw data gathered in itself may not appear that useful, many conclusions about consumers' habits can easily be extrapolated from the data if every appliance is connected to the "smart grid". For example, if someone has an alarm system connected to a "smart grid" their power company can know what hours of the day they are home and conversely what hours they are not. Combine that information with details about when they use cooking appliances, how long they use them for and how often they use them, and a detailed picture of their lifestyle can quickly be built up. And since power companies know their identity as well, with this complete set of data they can potentially know individuals better than their friends and family know them.

Like the proposed "smart grid" where appliances will be in constant communication with power companies, so it is expected by technologists that appliances and a multitude of other everyday things around us will be in constant communication with each other in the the future (Bohn, Coroama, Langheinrich, Mattern, & Rohs, 2004). More than that, they will have micro-computers embedded in them to enable them to gather information and intelligently adapt to and anticipate the needs of the people using them (Bohn et al, 2004). This is just the natural next step as computer technology gets increasingly smaller and powerful and finds it's way into more things. Lighting fixtures and appliances could remember the preferred settings of each individual and switch to those settings when that individual enters each room (Mulligan, 2010); refrigerators could maintain an inventory of the food contained in them and automatically re-stock themselves (Brey, 2005); smoke alarms could automatically switch off gas appliances when they detect a fire (Mulligan, 2010); and parents could track their children by having them wear "smart" clothes (Bohn et al, 2004). These are just a few of the many, many ways "ambient intelligence" could be used in the world of the tomorrow.

Like in the previously mentioned example of "smart grids", there is a grave risk of destroying individual privacy with "smart" objects due to the way they will gather data about people as they use them and share this data amongst themselves and with third parties. However, as an consequential effect of this loss of privacy, the autonomy of people using these "smart" objects could also be eroded. Michelfelder (2010) argues that an important component of individual autonomy is the ability to present different "faces" in different contexts. As she explains it, every time we as humans are faced with a person or entity that we know is gathering information about us, we subconsciously put on a "face". Depending on the situation, this "face" could be a complete and honest representation of ourselves, or it could equally be a incomplete, filtered view of ourselves. de Vries (2010) puts forward a similar idea and elaborates: she argues that the identity of an individual in any given relationship between that individual and another entity is a product of that particular relationship. In an environment where people are surrounded by "ambient intelligence",

Michelfelder (2010) goes on to argue that they as individuals would be so overwhelmed with information-gathering entities that it would simply be impractical for them to switch "masks" for each. She suggests that in a sense they would be deprived of a major part of our autonomy: the ability to choose how they present themselves to the world. Furthermore, de Vries (2010) argues that a significant part of people's identities is derived from how other entities reflect ourselves back at us. If in the environment of tomorrow everything in continual flux due to constant, silent adaptation to people's needs, how will they as individuals form their identities and autonomy?

Given the erosion of identities and autonomy induced by the constant gathering of information and adaptation by "smart" objects, it is evident any such devices could potentially wrest control of people's lives out of their hands, without necessarily any malicious intent on the part of the product designer. More to the point, it's all well and good when "ambiently intelligent" products behave in ways people expect and want. But as Brey (2005) points out, given the primitive state of development of artificial intelligence, it would be all too easy for such products to get it wrong and leave people in conflict with the very things that are supposed to be making their lives easier. In an environment of constant invisible adaptation by our environment and the consequential reduction of identity and autonomy, it could even lead individuals to question themselves: do they really want what they think they do, or does the environment know them better than they do? An even more sinister consequence he puts forward is that private companies may be able to subvert the designer's intent and subtly extend an invisible influence into people's everyday lives by weighting the decision making processes of "smart" products in favour of their interests. A good example of this is the "smart" fridge mentioned earlier that is designed to automatically re-stock itself with food (Brey, 2005). A re-stocking system of this kind could easily be subverted by the manufacturer of the fridge to prefer brands of food that they also own. In such a way, private interests may be able to slowly but surely shift consumer preferences en masse without anybody even being aware of it.

However, not only could such a "smart" fridge manipulate consumers indirectly, the way things are going it could eventually manipulate consumers directly by openly encouraging changes in their behaviour. Products that do this have already been pioneered in the field of health. You can now buy toilets that analyse your waste and offer health advice based on it (Clever toilet checks on your health, 2005). And with regard to fridges, there are models on the market that offer basic meal-planning and nutrition advice (Luo, Jin, & Li, 2009). We have to be careful—if this kind of "ambient persuasion" becomes integrated into the design of many things in everyday life then the free choice of everybody could be completely undermined.

So it has been established that the technologist vision of a future where intelligence is embedded in everything would put the identities and autonomy of everybody at risk. Furthermore, it seems that by design we are slowly moving towards an "internet of things" (Mulligan, 2010), where everything around us is connected to, gathering information about and influencing everything else, human and non-human alike. If this eventuates, where will we as individuals stand?

Floridi (2007) argues that the development of technology and it's gradual integration into all things (i.e. "ambient intelligence") is leading to a fundamental change in the shape of the world as we know it. According to him, we as people are rapidly becoming organisms of information in a vast, fluid world of data that is expanding at an exponential rate; this change would only be hastened by

the injudicious application of the technology available to us. Arguably, such an future could bring about improvement in everyone's lives. But it also raises the question: if we as designers are complicit in transforming people into entities of information, will we take responsibility for ensuring that people don't become slaves to people who profit from the flow of information?

In summary, technological progress is leading us to the introduction of "ambient intelligence" into the design of many different things. However, thoughtless or malicious application of this kind of technology could lead to the undermining of the identity and autonomy of the individual.

By design, we are gradually transitioning to a world where vast quantities of information about everything flows freely; this is being done with the intent to improve efficiency and make things easier in our lives. The latent down-side of this is that as individuals everybody will be required to surrender information about themselves continuously, stripping us of means to shape our own identities and autonomy and potentially giving external interests control over these aspects of our being.

As designers, we are in a position to shape the future. It is important that we do not neglect to consider the major ethical issues and existential ramifications in the race towards a brighter tomorrow.

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