

Dreamless Seamless: A Vision of Seamless Mobility

Although a work of fiction, the vision below is not beyond the horizon of our current engineering and technological achievements. The succeeding fiction is just an example of how seamless mobile technology has affected one family's lives for the better.

Sam Jones, a fourteen-year-old boy, waits impatiently for his new Portal. The pneumatic tube will deliver it any second and he twitches with nervous anticipation. Over the past few years the integration of devices into the environment in which we live, work and play has proved most successful. Objects in this environment feature the embedded systems that allow them to communicate not only with each other, but with animals and ultimately us, humans. The engineers and social analysts could only predict how this would bear out, and they have been pleasantly surprised with the results.

The key to this success was always going to rely on the Human-Device Interface, an object that forms the frontier between the individual and the new seamless digital world. The convergence of devices such as mobile phones, cameras, media players and diary's was the basis of many successful devices in 2006. These devices revolutionised the way we interacted with technology and each other, yet the next generation of control and interaction devices would need to be even smaller and simpler to control all the new electronics, media, information and technology in today's society.

A Portal is the key to this new digital world, and it is a right of passage of children to receive their first Portal. Just like the mobile phones before it represents their independence and freedom, as the Portal controls the environment they live in, *their* world. The Portal is able to interact with the displays that dot the conurbations, the lights that line the street, the service machines in cafes, restaurants and airports and with virtually any device using protocols based on OSI models.

Most variations of the Portal are not dissimilar from an electronic wristwatch in their exterior design; with the most popular models featuring brushed aluminium housing with a recessed ebony-black colour fascia wherein an organic LED display sits. A wireless link capable of achieving multiple simultaneous high-speed connections is housed within the body of the case. These link to all the other devices within range, which act as access points to the core IP networks meaning the individual can access their media, work and other devices anywhere. They coordinate data and select the most appropriate service using, where available, the ultra-high speed networks. These switch, apparently seamlessly, as the user moves between devices and networks. The Portal utilises a GPS, Geodesy and Navigation System (GNSS) to calculate its exact position in space, this has opened a range of possibilities and uses, allowing it to communicate with appropriate interactive objects in the vicinity. As the device is positioned on the wrist, where the median nerve travels close to the skin, it can detect the interaction and movement of the fingers on that hand, allowing the wearer to make gestures as control actions just by moving their digits. This has proved a highly successful and subtle method of interaction with many objects and, for the user, it is both simple and intuitive. When this is not suitable, a speaker and microphone allow the Portal to operate a natural language interface.

Often symbols of how the user will interact with the world are not articulated and, for that reason, the Portal must utilise prognostic, intelligent interaction. A body temperature sensor can indicate if the user is too hot or cold and the air conditioning be adjusted as necessary. Sensors on the carpal tunnel detect how tense the muscles are. Blood pressure and heart rate can also be monitored, and these can then be used in conjunction with other data to calculate the stress and health of the user. Possibility to adjust lighting, music and make informed predictions about the wearer's future actions can all be configured at the discretion of the user.

Much of the Portal's processing is not carried out by the watch, but by nearby processors, or by relaying information back to the central networks. This allows power consumption to be reduced; yet the wireless links still consume relatively large amounts of power. The power problem has been partially addressed by transmitting data to the closest possible device, which then routes it as necessary using a low-power, yet sensitive transceiver. In addition, the Portals battery have been charged upon manufacture and it is expected that will last about five years, with most of the required power for day-to-day use coming from the natural motion of the arm during normal operation, like similar hybrid kinetically-powered watches.

Sam decompresses the pneumatic tube, un-wraps the watch and scrabbles it upon his wrist. It has already been configured to recognise its eager owner, "Hello, Sam!" it greets.

Sam flicks his wrist and the displays in the living room burst into life. Music, Videos, Documents, Games, in fact all of Sam's media is here, there, anywhere. On-demand media is also available, and it is all stored in the central storage facilities, accessible through any compatible machine, display or audio device.

Sam's brother, Ian, is upstairs training hard. His Portal is monitoring his performance as his personal trainer assesses his regime and gives feedback from the central sports centre via the intercom on the main display. Together they can devise an effective fitness strategy for the new football season. The fitness instructor can also collate several areas of data from Ian's health as well as access other on-line sources and experts including dieticians and medical practitioners. This allows her to formulate not just a general plan of exercise but a bespoke solution tailored to Ian's lifestyle and goals.

Meanwhile, Sam is across the street with friends; the seamless technologies allow them access and control the latest games on any compatible device. Specialised rendering units are used instead of traditional games consoles, these bring high resolution gaming to connected displays; deep purples, vivid hues and subtle tones give a fully immersive, emotive experience. The ultra-wide networking bands enable players to collaborate their gaming efforts across cities and continents for truly massive multi-person online game play. Since the telecommunications networks were established their goal had always been to link divided peoples. As technology has advanced the physical separation between loved-ones and colleagues may have remained but the emotional and visual connection has never been so strong.

Mr Jones approaches his car. The vehicle unlocks and his Portal instructs it to warm driver's seat. The in-car entertainment resumes streaming his favourite music

collection he was listening to at lunch as he presses the engine start button. The music dims briefly as a low rumble signals the awakening of the V12. The head-up display in the car has all the feedback he will need to control the vehicle: speed, gear, etc. as well as non-distracting guidance and traffic information. It is not only Mr Smith who is responding to driving situations; the driver-assistive technology offers non-invasive prediction and prevention of traffic incidents. Seat-belt pre-tensioners, steering input correction, infra-red pedestrian and vehicle detection and pre-braking are not new technologies but now they can all be coordinated to enhance the driving experience. The voice activated in-car telephone responds when Mr Jones requests for an audio call with his mother, so he can enquire how the Portal he bought for her 80th birthday has been received. There is no answer.

Grandma Smith is on the floor and the communication control is out of reach. Her temperature and erratic pulse are cause for only one conclusion; a heart attack. Fortunately she realises the benefits of the Portal's assistive technology and took her doctor advice for her health to be monitored, so she could still enjoy her independence while never been out of reach of care if she needed it. An ambulance has already been dispatched.

It was only through seamless mobile technology that this level of intuitive automation could have been achieved; to allow children to achieve their potential, to allow business people to lead a managed life, to allow athletes to train and perform at their peak and to assist the needy. None of these groups are particularly technology knowledgeable, they don't need to be. That was always the aim of this technology; to be as subtle and non-intrusive as possible while still being readily available and adaptive, therein is the key to its continued success.