

We all wear dark glasses now

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Abstract. The story describes a world of the future in which there are two entirely different groups of people, one involved in the development and reproduction of the industrial base of the country and ruled by a centrally controlled virtual reality that is subject to constant innovation through a totally controlling fashion machine. The ruling group who control and maintain the other group have access to the full richness of the technology they administer and use to keep the world in order and are free to experience reality in an entirely different way. This is about the way that a breakdown in the system is dealt with and is told from the perspective of a third party observing these two groups

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1. George's World

George Bentley woke up at 8.00. George always woke up at 8.00, he was a man of habit never changing any thing in his neat little world. The ceiling that was displaying the time was now showing an 3D HDTV channel. Dragging himself out of bed into the kitchen George ate the coffee and toast that his intelligent home had prepared for him. He sat musing over the day ahead hoping everything would be the same as any other day with no unexpected surprises. The cereal box flashed and adverts scrolled and moved across the surface. George liked to ignore cereal boxes and wondered what it would do this morning. Almost as if it read his mind the box grow legs and started a very silly dance singing about all the vitamins and goodness contained within. George was unimpressed and tried to grab the box missing it several times. His hand just passed straight though the box at one attempt, but George thought this absolutely normal and finally grabbed it and threw it across the kitchen into the bin.

Breakfast over, it was time to head for the bathroom. The bathroom was as usual, spotlessly clean due to the new insta-clean nanotechnology surfaces he had installed with new bathroom 15 years previously. It was amazing he thought what great value for money the new suite was. Luxury at this level would have been totally out of reach of a mere office worker a few generations back. Now everybody lived in a palace. What was also amazing was the speed in which the new bathroom was installed. The installation was arranged by the company and scheduled to take just one working day. However having just left for work on the big day he changed his mind about a few details and thought it not too late to consult the fitters who may well have arrived to start work. However on returning home after only half an hour he was amazed to find the bathroom completely finished and no sign of the fitters. They hadn't even eaten the biscuits and cake left for them.

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Looking in the mirror the reflection showed a young face. Yes, time had been good to George, no grey hair, wrinkles, or other giveaways that he was 10 years off retirement. This must all be due to the anti aging food additives that are so important these days. If the company says so then it must be true. The briefest use of the new USonic Shaver was all that was needed get that baby smooth skin. In fact it seemed sometimes that just placing the shaver near to the skin was sufficient to remove the overnight stubble. Well at least visually. George never found it odd that he could feel stubble on his face at any time, even after a shave with the companies superb USonic Shaver. A quick shower and blow dry and a new clean young good looking guy was ready to step into the Everclean suit. Just how does one company develop so many cutting edge technologies and make ones life so good? Suit on and ready for another hopefully predictable day at the office, he walked toward the front door.

Then something very unexpected happened. The world flashed. Something happened. A brief image of some other place had appeared around him. George wasn't too concerned. The odd flashes, curved surfaces becoming blocky he considered all normal and always had been as long as he could remember. However he couldn't recollect having something like this happen before and was a little agitated and worried that this day was different to yesterday. Routine will solve the problem and with that thought he left the spotlessly clean flat and drove to work in his classic 1957 Cadillac and changed the bodywork colour to burgundy on the way. As he drove he heard what sounded like the pitter patter of water hitting the car windshield and the tyre noise changed. If you didn't know better you would swear that the glorious weather outside was actually quite wet. However the garage had informed him many years previously that it was caused by the cars autoclean system. Initially it seemed rather strange that there was never any sign of water when the system switched on, but he was brought up by the company never to question such technical aspects in his life. Technology had got to the point that it was essentially indistinguishable from magic and certainly not understandable by a nontech. The city was where George was born and had lived his entire life and never wanting for anything. The company provided all. Education, food, transport, accommodation, indeed all the essentials for a comfortable life. He always considered himself very fortunate to live in the safest city on the continent. In fact leaving the city would most surely be suicidal. He had learnt from an early age of the dangers that lay beyond the shimmering city wall. George was always pleased with the clean city streets, the beautiful white curves of the sun bleached buildings, and the ever present blue sky. However, today looked oddly different somehow. Was it his imagination or did things look a little grubbier and worn down. There also seemed more cars on the road. The only other cars George usually saw were the odd few he was following and all the other streets empty. He sometimes wondered why that was and came to the conclusion it was something to do with the autodrive mechanism. He buried these thoughts away and convinced himself every thing was normal and this day would be like every other day. However on nearing the office building he was quite alarmed to see what looked like a new building on the opposite side of the road. But that's crazy he thought, you can't just pull down a five story apartment building and rebuild another one overnight. A few seconds later it became clear that the situation was if anything even more bazaar. The 'new' building was actually much older and looked totally filthy with stained grey walls of concrete with brown rust marks here and there. How the hell can that have happened over night and why aren't there any people

standing in the street gaping at it? Then he thought that perhaps the frontage had been covered with wood and painted to be used in some film shoot later in the day. It was however a very desperate attempt to retain some sanity since he knew full well only very eccentric directors still used real sets. He parked the car and crossed the empty road via the foot bridge to get a closer look. The building was really there and looked very old indeed. At a guess the architecture suggested early 21st century. George then saw a couple approaching and about to enter the building. He rushed over and asked what had happened overnight to the apartment block. They just looked back bemused, looked at the building and asked him to clarify the problem. On doing so they looked at each other in a strange way and quickly disappeared into the grimy depths of the building. George turned around and started to walk towards his office thinking I must sit down and get back into my normal routine. As he walked he tried to place his feet in the centre of each paving slab, thus walking the same route to the office door every day. He even knew how many steps were required to accomplish the task. He felt that with each step the world was being brought back into alignment and normality restored. Yes he certainly was a man of routine.

Unfortunately any hope of a normal day went out of the window when George walked into his office. "What the hell has happened to my office!?". No, this was not my office he thought and immediately turned around to check the level room numbers. It definitely was his office or at least it was yesterday. He slowly moved back to the room and gingerly went in hoping things may have somehow returned to normal. They hadn't. It looked like somebody had replaced all the furniture with tatty old rubbish. But it was more than that. The floor was covered by some dirty hard wearing plastic material. The yellowing walls obviously had never been cleaned and had mould growing in the corners. Impossible of course since the room was totally self cleaning and all office maintenance systems were guaranteed a life time. He moved to the desk still half convinced this was not his office and looked at the computer. Very odd, the computer looked like a dummy with a filthy brownish area that would have been the keyboard. It was however in the exact same position that he left it the day before. The chair also looked like it was the right angle and position but was in a terrible state of repair. It looked like the same cheap plastic as the floor. By now George was feeling faint and desperately needed to sit down and although the chair was clearly filthy he decided to use it. Strange, it felt just like his own chair. Indeed the plastic almost had the feel of leather. In total frustration he banged the table with both fists.

The world changed. One second George was in his office and the next in what appeared to be the desert. Deep blue sky, a few wispy clouds, yellowish rock and sand. He just had the chance to glimpse a magnificent silver tower on the distant horizon stretching up into the void like a thread. Shielding his eyes from the sun he looked up and felt himself falling, falling back. Enough was really enough. George senses slowly returned but he refused to open his eyes and tentatively touched the surface he was lying on. Well it wasn't sand and could well be the office floor. Not wanting to risk things he slowly crawled to where the door should be, assuming this was his office. On feeling what felt like the door sill he cracked open an eye and was greeted with an image of the corridor. On seeing it he ran along it down the stairs and out into the street without looking back. Was he going mad!? What was happening to him? A trip to the company doctor was definitely the order of the day.

The drive to the doctors was uneventful. However George was trying to avoid looking at anything apart from the inevitable slow car in front. As he approached the hospital he began to feel calmer and the disjunction between what he saw and what he thought he saw seemed to abate. In the hospital itself there seemed to be no disjunction between the real and the apparent world at all nevertheless he made his way quickly and ran to reception to request a consultation with his doctor.

Within 10 minutes he was describing all that had happened in the last three hours to Doctor Sally Richards. She was a striking woman, tall, elegant, professional and charming. George particularly liked the glasses she was wearing, sophisticated, suave, cool he thought, I must see if I can get myself some of those.

He was part way through explaining why he had come to see her when she stopped him. "Have you been under a lot of stress recently Mr Bentley, or may I call you George?" George paused and thought to himself, yes I have been under a lot of stress and yes she could call him George. He liked the thought of her calling him George, it suggested a sort of intimacy which he would have welcomed. "Yes" he said. She smiled at him kindly and said "Well then George, I think we have identified the problem. You have a stress related affect disorder with dissociative side effects." George swallowed, that sounds bad he thought to himself and began to crumple. "No need to worry, back in the twentieth century we would have had to hospitalise you for an indeterminate period and feed you lots of drugs but today it is a simple procedure and nothing you need to worry about." George almost stopped worrying. "How long will it take to be treated he asked?" "We will admit you immediately and you should be fit and well to return home this evening." "Really!?" said George incredulously, "That is such a relief. Thanks you Doctor". "Not at all" said Sally "all part of the service". Sally pressed a button and within a few seconds a nurse entered the room. "Please go with the nurse, she will take you to the Treatment Centre. You do have up to date Company Insurance don't you?" "Oh yes, and thank you again Doctor."

After he left the room Sally bleeped her colleague in the T.C. and said "We have another BioSpek snafu, probably just need to download the latest OS but give it a full spectrum test anyway in case there are hardware problems." "He is part of the Company so the sooner we return him to reality the better. Back on your heads chaps!" she laughed. She could afford to laugh, she could afford to live in reality rather than in the virtual Perky Pat reality [1] that had proved so productive for the Company that Georgie Porgie lived in. Sally left her office via a back door that signaled a context change and entered another world. No longer the concerned physician she was once again the research scientist.

2. Technological Developments

Sally was preparing a presentation for the induction of a number of new recruits to help them understand the background to the development of BioSpeks. "Once fashion ruled and was often driven from the bottom up, think of Punk she would say. But this meant that there was uncertain control of the lower orders and some danger that their fashions might even subvert the money making enterprises that had dominated since the mass production of the motor car had generated the mass consumers of the modern world."

“Back in the old days, mid twentieth century or earlier, dark glasses were the acme of cool, she explained. Back then on the Left Bank wearing black, and shades, hanging with the existentialists - Juliet Greco, De Beauvoir and Sartre – the first encounter with continental chic and garlic, outside a vampire movie; Luc Godard in shades, Belmondo in shades, so modern. Think Jackie O in shades and the high jinx at Camelot. Think of Jack and Marilyn. This was sweet, the president was cool, the president was setting the standards of taste.”

“Think of the beat generation forerunners to the hippes and the yippes and then generation X she continued. Hitching across America the Beats wore shades listening to Miles and Bird when jazz was the avant garde music of the future. Mingus, Dizzy, Sonny, who also wore shades to signify the degree to which they were the acme of cool or to just cover up the drug and booze filled eyes, or the lack of sleep, or the chagrin at the apartheid that was Amerika then. These counter cultural types also were remarkable for the use they made of dark glasses, shades, which had a derogatory undertone then and could have today if it was ever to become fashionable again since BioSpeks are the mark of shades in the afterlife, or should that be Second Life, sense.”

She wanted to lighten things up a bit so she went on to the sun and surf and the surf and turf end of the iconic use of the devices. “Driving through Malibu in a Porsche with Jimmy Dean, or down in Venice at Muscle Beach with Bryan Wilson, tanned, surfin’ dudes driving beach buggies in shades which later morphed into Raybans, or had always been Raybans. Whether that was before or after Andy and the Factory brought a new lease of life to them, urban chic New York style, bleeding into punk and the Ramones, Lou Reed and the Velvet Underground, always iconic, always out there, always on the edge.”

“So how come *they* all wear dark glasses now?” she asked, clear eyed and without any optical aids, looking round the small lecture theatre at the bright eyed bushy tailed and spectacle-less group of student whose vision was 20/20 thanks to the genetic tuning they had undergone. She continued.

“The problem was that the invention of 3D imaging for film and television, for advertising, news and sport, became so ubiquitous, despite the false start of the 1950’s that the need for an everyday way of providing the means by which these images could be decoded became critical. The obvious answer was for everyone to wear polarised lenses at all times so that wherever you were you could receive the 3D output that had become the norm. The fact that the ozone layer thinned and the temperature rose and the glare on an ordinary day anywhere became difficult to tolerate only helped to fix the habit since the truth is that people who lived by night, subterraneans as Kerouac would have it, still wore their shades at all times too. Indeed the new shades became a 24/7 product due to built in night vision and the ability to lull you to sleep with low level white noise and specially developed light patterns.”

“But there was something else about shades that led them quite naturally to punch above their weight without looking silly or gauche. They had big lenses, quite often wrap around lenses, which meant that the inside of the lens was an ideal surface for a display or an immersive alternative reality. They had heavy frames which meant that you could hide a whole host of smart electronics in them, cameras, microphones, other sensors and effectors so they became the ideal and fashionable host for the mobile

phone, the camera, the PDA, the eBook, the iDisplay, head mounted display (HDM) [2] and the iPod miniaturised and made personal.“

“Eventually as we all know, personal processing power became so great that reality overlays became possible. The built in cameras, GPS and other sensor could match position and orientation to the real world perfectly allowed real time 3D virtual images to replace reality. [3] Buildings, cars, indeed an entire world could now be themed simply by using the latest shades and of course ‘Google Reality’. Packing all this power into such a small space became a serious problem and the ever larger frames had a very real chance of not looking cool any more. Fortunately all that built in processing power could solve this problem too! By utilizing intelligent body tracking software it was possible to create reality overlays for people too. Thus the overly large and rather uncool shades suddenly looked extremely cool again.”

“Eventually people just could not bear reality without their shades. Massive savings on infrastructure could be made by using shades. For example schools would not be required. Many simply went on holiday in their armchairs so transport of all kinds was finally reduced.”

“The final solution was inevitable. BioSpeks were developed to be used from birth. They were not removable and the frame was biological and became part of the face. The space between the screen and the eyes was filled with a fluid with a built for life cleaning and oxygenating systems.”

“This has led to the current situation in which we administer the whole industrial base through virtual and augmented reality processes but we are ourselves free of the need for these devices. Partly because we have been genetically modified not to need them and partly because we have an entirely different culture to them.”

3. Sally’s World

Sally lived in the real world, a real world of as much as you could ever want and then some. She was employed by the Company to maintain and repair their workers when their BioSpeks went wrong. Their BioSpeks delivered a virtual reality for them so that all of the old problems of envy and jealousy that beset labour relations in the old days were avoided. The workers lived in what appeared to them to be a land of milk and honey and thrived on it. The reality was of course that they were being exploited to the maximum by the Company and their real world was more like shit and shinola it just didn’t feel like that to them as long as the BioSpeks worked seamlessly.

Sally wanted for very little, she was after all a part of the ruling class and had most of what she could imagine at her beck and call. Furthermore the technology that had made drones of so many was also available to her in a much enhanced form to explore the new possibilities that ubiquitous computing might allow. This involved her being able to travel in frightening detail to anywhere in the world and beyond that she might find interesting, to meet anyone at all within the glitterati of the entertainments world that she wished to meet, and more. The move beyond BioSpeks to complete body suits had begun to open up a whole new world, a world far more accessible and to be honest far more friendly than the real extra-terrestrial worlds available to her or anyone else.

Suddenly a combination of virtual reality and whole body suits had made the world of imagination her and everyone else's oyster; everyone else that could afford it of course.

So now she could travel almost anywhere, real and imagined, with almost anyone, real or imagined, and do anything within the limits of her imagination; some how however it still wasn't quite enough.

4. Commentary

We have both been working in the design and development of intelligent inhabited environments in a University Computer Science Department for several years. One of us has specialized in the hardware end of the whole process, the design, development, fabrication and testing of hardware devices from sensors to robots while the other has been involved in the more social end of the whole Intelligent Environments research. We have both been keen to develop agents that are interactive and continuously adaptable to the behaviours of the occupants in intelligent buildings in a continuous and seamless way. This is a problem that has proved to be a lot harder than you might think.

One of the recurring themes in intelligent buildings is the degree to which the reality we inhabit is a shared and objective reality or a personal and subjective reality since the adequacy of modeling behaviours will stand or fall on the question of whether the behaviour is a good indicator of the intention of the agent and whether in the round the agents intentionality can be captured through the sum of the behaviours that s/he carries out. A side issue of this is the idea that the emotions a person experiences are essential for us to be able to map and understand these behaviours and we have been involved in research into the capturing and use of emotional data in conjunction with agents mapping behaviours which suggests that this information can enhance the performance of the IE agent.

One aspect of the processes of understanding others behaviours which is intriguing is that you cannot know for sure what someone else is thinking when they carry out an action. There are limitations to our ability to sense others mood despite the evolutionary background and advantages such an ability provides. This is made more difficult by suggestions that the senses rather than being a bridge to a shared external reality are both subjective and personal and likely to lead us astray. In this story we exploit that side of the argument by suggesting that who you are can be totally manipulated by what you sense.

Overall the approach that is being used to paint a picture of some possible future dystopian society is that of an augmented reality technology being used without the knowledge of the workers or drones as they might be called by a ruling class who impose this technology upon them. [4] This is the opposite of the sort of vision that inspires most of the people working to develop this technology whose intentions and hopes are usually focused upon its potential to liberate us from the hum drum day to day aspects of existence. However we have a history of technological advances bringing as many opportunities for domination as liberation so we should be very careful about what we wish for. In a recent internet article (<http://techcrunch.com/2010/01/06/augmented-reality-vs-virtual-reality/>) it is argued that interest, as measured by internet searches on Google, in *virtual* reality is being

outstripped by interest in *augmented* reality. Somewhat against this trend the underlying split between these two technologies in the story is in favour of a totally immersive virtual reality as the playground of the rich and a convincing but more clunky augmented reality as the means for informing and controlling the worker class.

The fact that research interest in virtual reality at the moment may be suffering relative to research into augmented reality may be a clue as to the tractability of each of these technologies in the short term.

Replacing reality totally and convincingly and enabling someone to sense in the widest possible meaning of that term that they are somewhere else totally seems to require a sophisticated whole body suit plus the means of delivering high quality information to the major senses of the eyes ears and nose. Perhaps immersion in a relaxation tank with sensory feed of some description would be a more comfortable option but makes tactile stimuli more difficult to deliver?

The idea of somehow capturing another person's experience and then replaying it on a different person's brain, as in the film *Strange Days* for instance, would seem to be a more elegant solution but is clearly limited by our continuing, if improving, lack of understanding of the brain and is probably never going to be possible. Another alternative is some form of psychotropic drug that might be engineered to deliver specific sorts of experience [1] but this too is currently a very long way from being a realisable prospect even if it is used in science fiction novels. [5]

When it comes to augmented reality however there are a lot of research efforts underway (see the list of web resources at the end of this section). Many of the main examples used involve glasses and the idea of visually overlaying information on the normal visual field is widely applied with or without the use of glasses.

Technically the challenges involved are considerable since it is not just a matter of packing a lot of technology into the glasses but the whole infrastructure to support the convincing presentation of a different reality to the one that would be immediately apparent to the unhindered senses. This might involve the distribution of information about each location to local transmitters, much like the cell phone network, so that local information and control could be tractable. However the overall cost of developing and sustaining such a system would seem to make the alternative of actually improving the lives of the workers a more attractive proposition.

If each person has something like a high quality broadband connection to a set of transmitters of information and this information flow is interactive in real time the problems of maintaining this across a wide population are substantial. There may already be such communities in existence, groups of geographically remote people playing interactive games in real time on the internet now in which case we are already rehearsing this sort of possibility.

If however the augmented reality was the equivalent to an upbeat channel of information or a series of such channels i.e. a controlled but distributed media service then this too is being rehearsed as we speak. The 'old fashioned' distribution of media services is undergoing immense transformations and the idea of a personal and personalised way of receiving and responding to such services is in the process of growing enabled by of the spread of the internet and information superhighways etc as an essential part of everyday life. It is already the case that many people feel

themselves to be part of a community that is predominantly virtual i.e. not a face to face community, and it is not uncommon to for this virtual community to be of more importance than the groups of people with whom the person is in daily contact. In short the ubiquity of mobile phones, laptops etc means that you can spend you day in the company of your friends without being anywhere near them physically.

References

- [1] Philip K Dick:- The Three Stigmata of Palmer Eldridge, 1965
- [2] Azuma, Ronald T.:- Augmented Reality: Approaches and Technical Challenges. In Fundamentals of Wearable Computers and Augmented Reality, Woodrow Barfield and Thomas Caudell, editors. Lawrence Erlbaum Associates, 2001, ISBN 0-8058-2901-6. Chapter 2, pp. 27-63.
- [3] Paul Milgram, Fumio Kishino:- A Taxonomy of Mixed Reality Visual Displays
- [4] Vernor Vinge:- The Coming technological Singularity: How to Survive in the Post-Human Era, 1993
- [5] Mike Villas's World:- IEEE article discussing the technology of the book Rainbows End

WWW resources relating to Augmented Reality

<http://www.howstuffworks.com/augmented-reality.htm>

<http://www.wired.co.uk/news/archive/2010-01/11/augmented-reality,-up-close-and-personal>

<http://www.wired.co.uk/news/archive/2009-10/05/%27visual-walkman%27-merges-real-and-virtual-worlds>

<http://www.wired.co.uk/news/archive/2009-10/27/terminator-style-imaging-glasses-print-on-your-eyeballs>

<http://econsultancy.com/blog/4288-10-mindblowing-augmented-reality-apps-and-videos>

Some science fictions stories dealing with the same processes

Philip K Dick:- The Three Stigmata of Palmer Eldridge, Flow My Tears the Policeman Said, Maze of Death

Vernor Vinge:- Rainbows End, 2006