

Column: 2000 Plus 70 - The Future
“ENTERTAINMENT Get’s PERSONAL

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THE YEAR is *2000 plus 70* and you’re attending an international virtual conference while gliding in a highly functional robotic transporter – the popular RT, or robo-taxi. The conference presenters are based around real people although the video and audio are all computer-implemented and extremely convincing. Video life form morphing and audio lip-synching only require digital text, audio files or a combination. There’s some minor coaching (no one calls it editing) from the “director”, actually a media technician who does more tuning than correcting. You think back on the long history of telecom that’s been the main driver for electronics during the 19th, 20th, and the 21st centuries. Alas, where have all the people gone, the real ones? While Don McLean told of the loss of great entertainers in his long song with the symbolic title, *Bye, Bye Miss American Pie* (People in Entertainment), you wonder when someone will memorialize the passing of People in Media. It probably began with Internet radio where your music was customized by a personal DJ who happened to be a computer. But the level today, in 2070, is *spooky cool*, since the virtual people on the conference panel will answer your questions while simultaneously answering hundreds of others. And the finale will be a panel Q&A summary with synthesis derived from all these questions from the worldwide audience.

Where will it end? But you know where entertainment is headed as one helping to pioneer one more *paradigm shift* – an old, but appropriate term that you’ve used sparingly through your 80-year career. While the auto-media software is incredible, hardware has also become magical. You’re watching and listening to tele-symposia using the latest device, the Personal Interface - the PI. But even state-of-the-art technology only feeds two senses and portable video/audio has been available since the late 1900s. It seemed to take forever to abandon panel displays that were clearly the wrong form factor. Today’s wearable stereo vision technology is a big improvement, but there’s still a lot of bio-matter between the digits and the brain.

Earlier developers eventually understood that audio output devices should be directly connected to the ears for good stereo acoustics. Why send a signal through a long air path that squandered power, added hardware and gave up privacy? The video crowd ignored the concept of short path delivery for decades. But it was so obvious! Why use a size-limited flat panel display when the retina is so tiny? People actually lugged big-screen computers onto aircraft that, while portable, were power hogs needing external power before the pokey flight was over. It didn’t make sense! The next “innovation” was the eye-straining netbook, and then intermediate sizes – all with no change in the flawed delivery concept. Well, the Boom Box had a long run before finally being displaced by better sounding and infinitely more practical ear buds, so go figure.

It took a real push to popularize the wearable display until consumers realized that 3D was a natural attribute. Perhaps few have knowledge of the incredible View Master introduced over 130 years ago that delivered superb color 3D, albeit as stills. But to be fair, there were technical issues with early “eyeglass displays”, mostly related to pixel density. But today, eyeglass viewers

are made with Printed Organic Electronics (POE) on plastic substrate making them highly robust and economical. What's more, the displays have adjustable transmissivity so you can “watch and walk” -- at your own risk, of course. But the PI goes beyond simple entertainment, attested by the conference you're attending. Just about every field uses PI products. Some of the real high tech units are used in law enforcement where a Micro Cam face recognition system lets the cop pull up personal data in 2 seconds. Talk about loss of privacy! You can't see what's going on. And would you trust a tech to check out your personal robot, let alone you're beloved Robo-Mate, without knowing that the manual was displayed on his PI?

But the popular PI could be made obsolete by implants. Already, audio implants are replacing the discrete ear sets, even the in-the-ear invisible wireless units. And corneal displays are promising, but they're not true implants -- more like those old-fashioned contact lenses. The trend? Direct Cerebral Interconnect (DCI) is the path forward but continuing controversy is slowing the pace. Clinical trials on simple wireless implanted transceivers have been successful and bio-batteries running on glucose make sense. The added payoff is that “low battery” becomes a health warning.

By 2075, the portable embedded communicator/entertainer system could be a reality, but its longevity might be short if the *biomed morphers* succeed. Now that DNA decoding (not to be confused with sequencing) is almost complete, extra sensory ability could be programmed into life forms. Already, lab animals can hear radio frequencies. So it's just a matter of time before we will *bio-mod* humans into creatures that experience wireless directly. To be sure, demodulation and decoding are challenging and a human wireless protocol is probably a necessity, but stay *tuned*.

The PI Technology

The Personal Interface uses principles that were known in the late 1900's, but needed refinement and extreme miniaturization. The PI could have been built at the beginning of the 21st century, but there were obstacles including marginal display technology, excessive power consumption for wireless linking, and lack of a good short-range wireless infrastructure. But by 2030, most of the technology was in place and PI products were being refined. Yet it wasn't until 2040 that really good display technology became available and affordable as Printed Organic Electronics achieved significant density and control to build variable transmissivity HD displays thanks to nano-physics. But the ability to rapidly transmit very large files over short, power-conserving distances wasn't fully implemented until 2050. Downloading, especially for hours-long stereo HD videos, using gigabit data-burst photonics eventually became the preferred mode.

Printing with MEMS-enabled nano-scale fluid jetting made the plastic heads up display affordable since tri-color OLED nanodots could provide the rich color palette demanded by savvy consumers. While ink jet technology is old and well understood, it was the advent of MEMS jetting strips (wafer diced into long strips) and true nano-inks that made it all come together. In 2070, semiconductors are mostly organic and more and more jetted photonics is being added.

While IC implants are nearly 100 years old, launched with RFIDs, entertainment device implants were not seriously considered until later in the 21st century, probably because of the association with early RFID, so called, “spy chips”. Audio chips had already been developed for medical reasons (e.g. artificial cochlea), but entertainment applications had to wait. The same held true for vision implants. Artificial retina, and other sight-restoration devices were developed around the beginning of the 21st century, but entertainment video implanting ideas were deemed

silly. But by 2050, polymer-based artificial cornea had been developed that could receive video data using very short-range photonics. This technology was later modified to create contact lens displays that could handle short-range RF data. Now, in 2070, eye contact displays are becoming practical but require a system module in close proximity to transmit wireless data and power. And a commercial implanted wireless module may be a ways off, but it may not matter.

Biochemists, bio-nanotechnologists and medical researchers say they have the killer app. They say we don't really love gadgets, just the super-human powers they bestow. So, their answer is simple. Give the customer the do-all gadget performance, but do it with bio. If all goes well, they expect to be able, through gene restructure, to give the human the ability to directly see and hear radio signals by 2080. It's just a matter of extending the receptive spectrum – well, there's more than that, but it's the starting point. So the entertainment future is going to be awesome spooky cool.

