



coding isis

david roys

# CODING ISIS

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*To my wife Nikki with a lot of thanks*



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Jasmine ran along Beach Drive and headed towards the entrance to the park. The music playing through her earbuds helped her enjoy her run and forget the rest of the world, the craziness of the city, her problems at the university, and of course, it helped her to forget about Chris. She slowed as she crossed the intersection with Joyce Road, tilting her head down from the blinding sun as she left the shadow of the trees.

She looked at her watch and read her heart rate from the small display. 144 beats per minute was not nearly enough, she pushed harder, digging deep into her reserves, feeling her legs start to burn. Her chest heaved as she sucked as much oxygen as she could to fuel her muscles. She glanced at her watch again, 160 beats per minute. Still she kept accelerating and now the endorphins came and with them the happy glow that kept her coming back for more.

Jasmine never saw what made her fall but in an instant she was pitching towards the track. She threw her hands out to protect her face and they scraped in the gravel and dirt.

She lay on the ground, not wanting to move just yet. Her hands were stinging, her knees too. Her face was covered in fine yellow dust and she had grit and a taste of blood in her mouth which she tried to spit out. After nearly a minute of simply laying and feeling sorry for herself, she slowly pushed herself up on to her hands and knees, wincing at every tiny movement. Her head was still hanging low and she saw spots of blood fall to the track.

Slowly she got back to her feet and tried to take a few more steps and work back in to her run, but now she felt dizzy. After only running a few miserable yards she had to stop again. She pulled her earbuds from her ears and breathed deeply, leaning forward to try to stop the sick feeling. The sunshine started to fade and she felt woozy.

*I should have eaten before I came out,* she thought.

Her vision didn't clear, instead it was getting worse—dark around the edges, and now she couldn't hear a faint ringing noise. Something triggered in her mind, a memory of a lecture, or a magazine article, something about tunnel vision and hearing a ringing noise, something serious.

*Oh my God,* she thought, *I'm having a stroke. This can't be happening to me.*

Fear made her heart race, her vision faded to white and then there was nothing.

Jasmine opened her eyes and looked about her. She was lying on the running track staring up at the sky. It took her a while to remember what had happened and to realize that she must have passed out.

She tried to sit up but couldn't. The right side of her body was numb. The high-pitched ringing sound was faint but continuous. She thought she could smell burning toast.

*I'm having a stroke.*

She remembered now. She'd read an article about how to recognize the signs of a stroke. FAST: Face, Arms and Legs, Speech, Time. Time is critical. Time saved equals brain saved.

*I don't want to die,* she thought, *not here, not like this. I don't want to die alone.*

She tried to cry out, but instead of her plea for help, she heard a groaning sound—she didn't recognize her own voice.

*Stay calm. Plenty of people survive strokes. I need to get help. I need to call 911.*

She concentrated on her left hand and managed to move the fingers, slowly and weak at first, and then a little stronger. She managed to clench her fist. She tried to move her hand, it was hard but she

used her fingers to slowly crawl her hand up her body to her right arm where her phone sat in a holster. ~~She knew she could get through this if she could only manage to make a call for help.~~

Her movements were frustratingly slow and even the smallest were hard to make but after a long and painful struggle she finally managed to work the phone free and hold it in front of her face. She stared at the keypad but was horrified to see markings on the phone she didn't recognize. She knew where the numbers should be but these weren't numbers, they made no sense to her. Her heart raced.

*I'm going to die. Shit. I'm actually going to die alone, in a park.*

She started to cry great gasping sobs.

*If I can just hold on, someone will find me. I'll be OK.*

She managed to stop crying knowing that she needed to be strong. She lay and waited, unable to move, staring at the sky and watching the clouds drifting across her view. She started to feel at peace as though her life's problems were drifting away too. She was powerless, yet in a way, she felt liberated.

*So this is what it feels like to die, she thought.*

*It's not so bad.*

She heard a sound that cut through the ringing noise—footsteps—someone was coming. She tried to call out, but again she couldn't form the words. The noise was growing louder—someone was close to her now, she could feel it. Someone was bending down, touching her face, checking her pulse.

*Help me.*

*I'm alive, call an ambulance.*

Her head was pushed gently to one side, and then again, and again. She couldn't see the person and she couldn't work out what he was doing to her. The hand felt soft and rough, and it felt ... wet. A shape appeared over her face. A wet tongue licked her.

*Oh shit—a dog.*

The dog's dirty muzzle and tongue crowded her face, sniffing her; licking her. She panicked. Her inner voice screamed.

*Get off me.*

*Get off me.*

*Someone please help.*

*Get this damned dog off me.*

She was getting hysterical now and tried to swat the dog away with her good hand, but she could barely lift it.

A man's arm reached towards her and grabbed the dog by the collar, pulling it hard. She could see the man's face now.

*Oh thank God.*

He looked at her. She thought at first that he looked sick, as though he was in pain, but then she realized, it wasn't pain, it was revulsion. He turned away and put a phone to his ear. She strained to hear him through the ringing noise.

*I'm going to be OK, she thought. Thank you. Thank you.*

She listened to the man's voice.

'Yes, hello,' he said. 'I'm in Rock Creek Park ... I'm calling on my cell phone. You need to send an ambulance right now. It's a girl.'

The man turned and looked at Jasmine again but didn't make eye contact. It was as though he couldn't bring himself to look at her. She could still make out his voice, but the ringing sound was getting worse.

‘Yes, just past the tennis club,’ he said. ‘Yes I’m with her. She’s still alive. Send an ambulance quickly.’

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Jasmine felt relieved.

*I’m going to get through this. Help is coming. I know I can hold on.*

She felt her breathing slowing.

*Just hold on.*

Again she heard the muffled sound of the man’s voice.

‘I don’t know how long she’s got. She’s in pretty bad shape. She’s been shot.’

*What?*

*No.*

*It’s a stroke.*

Jasmine wanted to scream out, but she strained to hear what the man was saying.

‘There’s a lot of blood. And there’s ... a hole ... in her head. The back of her head is ... gone. Please come quickly.’

Jasmine looked up at the sky once more. She could see it getting darker now. It was getting cold too.

*Nothing to do now but wait.*

*Wait for help.*

*Wait.*

She closed her eyes.



Chris Sanders rubbed his tired eyes and looked at his watch. It was after 3:00 AM, Michelle would be pissed. He finished editing the final line of code and hit the key to compile. He'd been working for twelve hours straight and couldn't wait to see how the new graphics engine would look.

He took a long drink from a can of soda he found on his messy desk. He wasn't sure how long the can had been there, and the drink was flat. Pushing away from his computer screen, he stretched his aching back, using his hands to rub his tired muscles. Chris found one of the greatest things about working at George Washington University, was the access he gained to the latest computing technology. That, coupled with the funding from his benefactors, allowed him to build whatever he could imagine. And Chris Sanders had one hell of an imagination. The computer beeped to tell him the compilation had finished with zero errors. He put on his glasses and hit run.

Chris's latest programming efforts were to allow him to do something that man had been doing for hundreds of years. He was going to read a book, but the producers of those early books could never have foreseen what he was about to do. Hovering about eighteen inches in front of his face was a leather-bound Gutenberg Bible printed on vellum in the fifteenth century. The red leather binding was cracked and worn, particularly around the edges. In the center of the ornate border was a golden coat of arms for the Right Honorable Thomas Grenville. Chris had selected this particular book because it was believed to be one of the first books ever produced using the forerunner of the modern printing press and this made it seem, somehow, appropriate for a new world in publishing.

He reached out his right hand and carefully moved the cover, turning past the end-pages to the first ornately decorated text. Chris couldn't read the ancient Latin, but he had learned from others that the first chapter was Jerome's epistle to Paulinus—in truth he didn't care much about the content, it was the book rendering he was interested in and in a way it helped him to focus on the aesthetics of the book when he couldn't understand the words on the page.

With both hands, Chris grabbed the opposite corners of this ancient book and pulled it toward him until it filled his entire vision. The detailing of the vellum was perfect and he could even see through the translucent paper to the text of the page below. He tipped the book forward and examined its edges, his eyes told him he was holding an ancient book but he felt nothing in his hands. The new graphics code he had written was incredible; his sponsors were going to love this. He closed the book and tossed it aside and as the book fell away from him it faded to nothing. Now he wanted to test the eye-tracking cameras he had added to his glasses. The tiny cameras monitored the position of his eyes allowing the software to determine what was holding his interest. He decided to use another book, something he could read this time.

'I want to read a book by Conan-Doyle,' he said.

The computer system interpreted his voice commands and instantly a line of books faded in his view and stretched far away to his right beyond his peripheral vision.

'Something about Sherlock Holmes.'

The books that were not about Sherlock Holmes quickly faded and disappeared and the remaining books moved up to close the gaps. He was left with a line of books floating just in front of his view within arms-reach. He scanned the line of books and as he turned his head they moved and slid into view. He let his gaze rest on a book entitled *The Valley of Fear* and a second or so later, the others faded slightly and adjusted their positions so that this one could be in the center of the line.

Chris had spent a lot of time studying how people read. He'd used the eye-tracking glasses with some of his students and had recorded and analyzed the movement of their eyes as they read in order to learn from their behavior. He'd found that just prior to opening a book, or turning a page, their eyes would flick to the top right corner of the book and so he had built his augmented reality system to take advantage of such subtle gestures, which had resulted in a system that people knew instinctively how to use.

He gazed at the top right corner of the book and the cover turned and the pages flicked forward to the start of the first chapter entitled *The Warning*. The other books faded into the background as he started to read, and the miniature cameras continuously tracked the position of his eyes calculating exactly which word his eyes rested upon at any given moment. He stared at the word *vexation* and after a few seconds the word became highlighted and a series of boxes, like speech bubbles, floated around the word. Each bubble contained a synonym for the word, pulled directly from the thesaurus and a dictionary definition. He smiled to himself at this subtle enhancement his colleague had finished yesterday. As he gazed to the next word, the bubbles faded to nothing and he continued to read until he reached the bottom of the page. Subconsciously he looked at the top right corner to turn the page and the page flicked over. He had programmed the system so that as soon as the reader's eyes had scanned the last line of text, a look at the top of the page would trigger a page turn. It was a simple concept but the experience was, for many of his students, as close to magic as computers could get. It was as if though the machine was reading his mind.

He looked beyond the book and, as he did, it faded to five percent opacity—just enough to know it was still there but not enough to distract him from other tasks. He caught sight of the clock. It was past four; too late to go home now. Michelle would have given up waiting for him long ago, and by the time he'd driven home and got into bed it would be nearly time to get up again. Michelle was good to him and she understood his obsession with his work, or at least she said she did. He'd make it up to her once this meeting was out of the way. He thought about the meeting later on today and decided to check everything was in place.

'Show me the agenda for my meeting today,' he said.

The Sherlock Holmes book shrank and faded to a miniature version just in the lower corner of his vision and a piece of paper faded into view directly in front of him. He scanned down the list of bullet points, mentally checking them off. He had only the facial recognition routines to test, but that would need to wait until there was someone else around. He dropped his glasses on the desk and rubbed his hands around his neck and face. Protech were coming to see his progress tomorrow and he was pleased with how far he had come since those initial meetings when he had proposed his concept. They had believed in him and had practically given him a blank check. He'd been able to select his own staff, buy whatever hardware he wanted, and the university had even cut back on his teaching schedule to allow him more time to run the project. He still had no idea how they'd managed to swing that, but he appreciated it. He liked teaching the students, it kept him grounded in reality, but his passion was his research. He put his glasses back on and stared at the miniature Sherlock Holmes book, waiting for it to pop back into focus, but instead his phone rang and a picture of Michelle appeared. To the side of the photograph of his wife, a series of labels told him Michelle was calling from home using his office direct-dial number. He'd made the phone interface as intuitive as possible too. To answer a call, he simply looked at the photograph of the caller and spoke his greeting. Like everything else in the system, the simplicity of the interaction hid the complexity of the technology. Not only was the computer system showing all the information it had about the caller, it was waiting for him to speak to determine whether he wanted to take the call or not. He'd programmed the system to not only recognize the content of his speech but also his tone of voice. An enthusiastic *Hi* would instruct the computer to connect the call and relay the words to the caller. To ignore a call he simply had to say



something like *not now* or *take a message* and the computer system would take care of things.

~~‘Hi babe, I thought you’d be asleep,’ he said. He waited the split second for his speech to be~~  
interpreted as a command to accept the call, and for a recording of the phrase to be played to his wife.

‘I was,’ she said. ‘I woke up. I miss you. How’s it going?’ She sounded tired, like she’d only just woken. He thought of her lying in bed and felt foolish.

*What the hell am I doing here when I could be at home in bed with you?*

‘Fine,’ he said, ‘I was going to come home tonight but it’s really late now, I thought I’d just crash here on the sofa. Sorry honey.’

‘That’s OK, I understand. You’ve got a big day ahead. You need to impress the guys with the bank account so you can keep on playing with your expensive toys. Do you want me to drop by with some fresh clothes for you later?’

‘That would be great. You’re an angel.’

‘I know,’ she said. Chris could hear the smile in her voice. She sounded happy but sleepy. ‘I tried to call your cell phone, but there was no answer. Is everything OK?’

‘Sure, everything’s fine. I must have left it in the locker at the club. Thanks for the heads-up.’

‘Try to get some sleep Chris.’

She was right of course. If he worked through, his caffeine-induced energy would not get him through the big day ahead.

He saw he had unread email, but that could wait for tomorrow—or later today. He dropped his glasses on the desk and made his way over to the leather sofa. He grabbed a blanket and tried to get comfy, his head was still buzzing from the work, but he was tired. The worst thing about augmented reality, he thought, was that in comparison, *reality* was just a little disappointing. There were no icons or images zooming around his vision now, just him, and his thoughts. He closed his eyes and before long he was in a deep sleep.



# THREE

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Chris woke to the feeling of being kissed. He opened his eyes and saw Michelle's beautiful face.

'I think I'm dreaming,' he said. 'What time is it?'

'Don't worry', she said, 'you've still got plenty of time. I brought breakfast.'

Chris sat up and felt his back muscles aching from his night on the sofa. He felt rough, but a hot shower and coffee would soon fix that. He looked at his watch; it was just past seven thirty. Michelle was right, there was plenty of time. His visitors were not due until after nine and that gave him time to get cleaned up and maybe put some finishing touches to his presentation. He watched Michelle as she unpacked muffins and fruit from a bag. Maybe he was missing her from the long hours he'd been working, but Chris thought she looked really good this morning. She had a way of making the simplest of clothes look great; it shouldn't be possible to look so good this early. He stood and let the blanket fall to the floor, stretching his back. He walked up to Michelle as she laid out the food on his meeting table. He put his arms around her waist and nibbled at the back of her neck and ear. He let his hands slide up to her breasts and she chided him, but didn't move his hands away.

'You don't have time for that,' she said. She turned and kissed him on the lips. 'Come on, let's eat.'

Chris ate the berries and muffins Michelle had brought. Not his first choice in breakfast, but better than nothing. The coffee was strong and black and definitely helped. Chris talked about his work while they ate and Michelle listened attentively and nodded in all the right places, but it was a game they both played. Michelle pretended to understand what he was talking about and he pretended not to notice the glazed expression on her face. It helped to talk things through. After finishing the breakfast they kissed and Chris took the bag of things Michelle had brought and went to use the showers in the changing rooms.

'I'm cooking dinner tonight,' called Michelle from the hallway. 'You'd better be thinking of coming home.'

Chris grinned and blew her a kiss and she shook her head in mock disgust. He knew he'd been putting in way too many late nights at work over the past few months and Michelle had been amazing—she was so understanding, he knew that deep-down she wanted him to succeed in this project just as much as he did.

The shower helped and Chris started to feel human again. As the hot water soothed his aching muscles he thought of the remaining tasks for his presentation later on. He found he did his best thinking in the shower. Someone had once told him that the water molecules acted as an air purifier which allowed more oxygen to reach the brain. He didn't know what the trick was; maybe it was because there was nothing to really do but the most basic act of cleaning, which allowed the mind to wander. He'd had the idea for the augmented reality system in the shower. He figured that instead of trying to pack powerful portable computers into smaller and smaller devices, he would focus on streaming massive amounts of data at very high speeds to a place where it could be processed by super-computers. He'd flipped the problem on its head and used powerful computers in the cloud to do the intensive calculations. He had a massively parallel processing array of state-of-the-art hardware handling the feeds and generating the three dimensional image that was to be displayed on his glasses using a technology similar to the heads up display used by fighter pilots. After getting the idea, he ran through the house to find Michelle and share his eureka moment, and had simply forgotten he was

naked. She'd thought he was crazy, but had listened patiently as he'd explained how the images from the computer system would generate would be layered on top of the real world giving the illusion that the computer generated images were part of reality, hence the term *augmented reality*.

Chris didn't want to leave the shower. The hot water soothed his tired body and aching neck, but even though he knew he had things to get on with, he stayed, and thought about work. He knew the system was going to be big. In commercial terms it was more than a consumer electronics device, he had invented the first real improvement to humankind for hundreds of years. It wasn't just about enhancing a user's experience, but also about keeping those experiences, so that they need never forget things again. There was potential to keep the experiences being recorded by his headset indefinitely and he imagined a world where people could bequeath their recordings to their loved ones and they could know their life, but not their thoughts—maybe that was the last hurdle he needed to clear. To cut out the need for glasses, to get inside someone's head, now *that* was a goal worth pursuing. Reluctantly, Chris turned the faucet and stepped from the warmth of the shower into the cold changing room.

Back in his office Michelle had tidied away the breakfast things and he started to get ready for his meeting. He made a final run-through of his presentation and checked that his spare glasses were charged and working correctly. It was all looking good. He was actually feeling quite excited. In showing off his work, he knew his backers were going to be blown away—everyone was.

Nine thirty arrived and there was a knock at his office door. Chris thought about the arrival time. Being on time showed they respected and valued his time and weren't playing power games, not showing up early meant they didn't want to catch him unprepared. Chris had met Joshua before but with him was a new guy, early thirties at a guess, six-one with black hair. Joshua held out his hand and shook Chris's with an enthusiasm reserved for those in senior positions.

'Chris, I'd like you to meet Maynard du Preer, he's our technical expert assigned to your project and he's here to understand all of the things I'm sure will be over my head.'

They laughed at the half-joke, but from Chris's previous experience, he knew that Joshua had a limited grasp of technical things. Chris shook hands with Maynard. It was important to make him feel welcome, even though he was probably here to start the process of taking his baby away from him.

Maynard spoke with a South African accent. 'I've heard a lot about you Mr. Sanders,' he said. 'I must tell you I'm pretty excited about the work you've been doing here and I'm looking forward to your demonstration.'

'So what's your background?' Chris asked.

'MIT, computing science and engineering, then five years at NSA working in code-breaking before moving to Protech with Joshua.'

'Code-breaking? Really?' Chris turned to look at Joshua and smiled in a conspiratorial manner. 'Joshua, have you been spying on me?'

Joshua laughed, 'Oh come now Chris, you don't really think you have any secrets from me?'

'Don't worry,' said Maynard, 'I'm not a spy. Code-breaking is more about applying algorithms to massively large datasets than playing at James Bond. At the end of the day I'm a programmer, just like you. Besides, that was a long time ago, now I concentrate on explaining complex things in simple terms.' He smiled at Joshua who didn't respond to his teasing.

Chris showed the men to their seats and started with an overview of the project's objectives and a summary of his progress since his last meeting with Joshua. He could see that Maynard was itching to get his hands on the toys and noticed he kept glancing at the glasses on the desk, but he continued with his presentation, explaining the details behind the technology.

'You said there are four video feeds being broadcast from the headset,' said Joshua. 'Why four? Surely two are enough?'

‘There are four feeds so that we can provide a stereo image of what the user is looking at, coupled with a lower resolution real-time image of each eye which can be used to track what the user is focusing on.’ Maynard seemed transfixed and Chris continued with his explanation. ‘The entire feed is stored for later processing in something I call “dream time”. Computer storage space is cheap, and we use this stored data to refine the analytical routines. This gives me an enormous amount of test data to run the new changes over.’

Maynard still appeared desperate to get his hands on the equipment, but he was attentive and seemed to understand the concepts well. ‘I thought the processing of the images would need to be done in real-time?’ he asked.

*This guy is smart*, thought Chris. He walked over to a whiteboard and started to sketch a diagram that would help him explain. ‘The data that needs to be extracted in real-time is very different to the data that is interesting for later analysis. In real-time, we are interested in the object that is the focus of attention and interpreting voice commands. For longer term analysis, we want to build facial recognition profiles of the people we have met throughout the day. This is why I call it dream time – it’s as though your brain is sorting through all of the data you have collected throughout the day.’

‘What are the facial-recognition profiles used for?’ asked Maynard.

‘We use them to help the system recognize people in the future. Have you ever met someone and even though you recognized the face, you couldn’t remember the name? My system will make that a thing of the past. The details of an individual will pop-up beside them. When you see the face, the computer system starts matching against the profiles in your database.’

‘That’s great, but does that mean you need to go through the data and match the profiles to people’s names?’

‘That’s a good question,’ said Chris. ‘The system is smart enough to analyze the audio feed and use that to determine people’s names. Where we haven’t identified them through conversation, we attempt to match them through other databases and social networking. I use the system as an extension of my memory. I no longer struggle to remember people’s names, and I have instant recall of any topic I have previously discussed.’

He could tell Joshua and Maynard were suitably impressed. ‘Imagine the potential,’ he continued. ‘I can replay conversations or view a transcript that the system has created for me. The transcript is indexed and searchable. I can ask the system questions like “*Who was I discussing the facial recognition system with last week?*” and the system would offer a list of possible matches. I can replay the conversations in a picture-in-picture type display whilst continuing a conversation with someone else.’

Chris walked back to the desk and picked up the three pairs of glasses. They looked like ordinary glasses, two with clear lenses and one with dark lenses like sunglasses. ‘I suppose you’d like to have a play?’ he said. He handed the glasses to his guests and they put them on. Maynard spent some time examining the frame first.

‘I’ve read the specifications,’ said Maynard, ‘but I can’t see how you can fit so much into these frames. You’ve done a remarkable job. They look to be completely sealed, how do you charge them?’

‘You’re right,’ said Chris. ‘They’re totally waterproof, and weigh only slightly more than a regular pair of glasses. The camera lenses are almost undetectable except under bright light. To answer your question, they use inductive charging. I place them on this surface here and an inductive coil creates an alternating electromagnetic field which is converted to an electric current by a secondary coil in the headset. I’ve made some refinements to reduce the heating effect and energy loss, but basically it works like your electric toothbrush.’

Joshua had already put his glasses on and he was waving his hand in front of his face.

‘What kind of coverage are you getting?’ said Maynard.

‘Do you mean how far can we stray from the campus?’ asked Chris, Maynard nodded. ‘The glasses transmit to a repeater that is about the size of a cell phone.’ Chris held up his phone and it looked quite unremarkable. ‘It uses technology similar to Bluetooth, although I’ve made some modifications to that too, I got rid of the lag, upped the speed and made it less power hungry. The repeater can transmit to base stations within the tolerances of a usual cellular network, say one mile in the city about twenty miles in the open. It depends on a lot of factors: interference, obstacles, that kind of thing. In fact, this system now piggybacks the existing infrastructure using regular 3G and 4G networks where available. I use multiple antennas to increase the bandwidth.’

Joshua looked to Maynard who was nodding approvingly and examining the repeater. Joshua was looking confused. ‘Sorry,’ said Chris, ‘by bandwidth, I mean the amount of data I can transmit in a given period of time.’

Joshua waved the explanation away. ‘Don’t try to explain these things to me Chris,’ he said. ‘That’s why I brought Maynard with me. Why don’t I go and fetch coffees?’

‘Great,’ said Chris, ‘you can do some field testing for me on your way.’ He sat at a computer terminal and tapped a few keys.

Joshua stopped and held his hands out in front of him. ‘Er, Chris,’ he said. ‘I’ve got a problem, my headset has gone blank. I can’t see a thing.’

‘I know,’ said Chris. ‘I’d like you to try out something I think has real commercial potential. I call it *blind-man mode*. The computer system will guide you to your destination. I’ve told it you want to go to the cafeteria, just follow the instructions you hear and you should get there in one piece.’

Joshua set off slowly towards the doorway, his hands held in front of him.

‘Have faith,’ said Chris. ‘I won’t let you walk into any walls.’

He turned to Maynard and said, ‘The technology is a little overwhelming, but you’re going to love the experience.’ He carried on explaining about data transmission rates, error correction, cell-shifting and anything else he could think of. He didn’t pull any punches but Maynard seemed to take it all in his stride. What did he expect from an ex-NSA and MIT graduate? After twenty minutes of answering deep and probing questions, Joshua returned with three Styrofoam cups and a gait that suggested he had made it safely there and back without incident, and now had confidence that the voice he was hearing wouldn’t steer him into walls.

Chris decided it was time to let the men experience the system for themselves. He started by walking them through the book reading application. He enjoyed watching the two men, holding invisible books and turning pages. The effect was almost comical, like watching a mime in a business suit.

‘Normally your repeater is connected to your own personal data stream,’ said Chris, then he remembered Joshua, ‘I mean, the phone thingy is hooked up to your own pair of glasses.’ The visitors both laughed.

‘I’m not that bad,’ said Joshua.

‘The system learns from your experiences. If you meet someone it remembers their name from analyzing your conversation and picks up on personal details such as family members, ages, birthdays and so on. The headsets you’re using are individual to you but I took a copy of my profile so you have something to work with. Maynard, if you look at Joshua, you’ll see what I mean. Joshua, take a look at that monitor on the desk. It’s showing the real-time feed from each of our sets. You’ll be able to see what Maynard is seeing including the overlay.’

As Maynard looked at Joshua, the monitor showed a callout, slightly translucent with details: his name, wife’s name, interests, relationship to Chris, and date of their last meeting. There was even an option to show a transcription of their most recent conversation. ‘Wow,’ he said.

‘I know,’ said Chris. ‘It kind of has that effect on people.’

Joshua stood and walked into the bathroom that adjoined the office and looked in the mirror. Chris smiled to himself; he knew what he was trying to do. Instead of the personal information he had seen earlier, the system displayed a callout that simply read *'The surest cure for vanity is loneliness.'*

He called to Joshua in the bathroom, 'Please forgive the quote. The system selects something on the subject of mirrors or vanity at random from the internet. The facial recognition algorithm works with reflections. It knows you're looking in the mirror. The quote is a kind of "Easter Egg", a little message from the programmer, as it were.'

'Very nice, Mr. Sanders,' said Joshua, 'I hope there aren't too many more "Easter Eggs" in the system.'

Joshua looked a little concerned, he was still smiling but Chris realized he should probably have taken out his little joke before showing his work to the people that paid the bills. 'No, that's the only one,' he said, but inside he was kicking himself.

Maynard took off his glasses and started to examine them once more. 'How does the audio work?' he said.

'I'm pleased you asked about that. It's remarkably clear isn't it? I'm generating vibrations in the portion of the glasses that sits around the ear. The vibrations are heard directly by the inner ear bypassing the eardrums. It means you can still hear everything going on around you as well as the sound that is provided by the system. It's quite scary sometimes as it seems like the voices are inside your head. I guess in a way they are.'

'Amazing,' said Maynard. He then turned to look at Joshua who seemed to take this as a prompt.

'We're very impressed with what you've been doing Chris.' He paused as though trying to find the right words. Chris had a feeling bad news was on its way.

*Please don't pull the funding,* he thought.

'Maynard is going to be working with you from now on. He'll help with the eventual transition of your research to commercial ventures. Don't worry, he won't get in your way.'

Chris didn't know what to make of this. He knew that he would need to hand his baby over eventually but hadn't realized how close that day had come.

'There's one more thing,' said Joshua, 'we've been using some of your facial recognition and data streaming algorithms for a little project of our own. We call it "Horus". I'd like you to work with Maynard to fully integrate Horus with your system.'

'What is this Horus?' asked Chris.

Maynard looked to Joshua before answering. 'We believe your system would benefit from being able to see more than the first-person perspective and have been working on a third-person view. Horus is a small drone device that will provide an aerial view of the scene surrounding the target. So of like a video game. We think that this will add huge benefits.'

'Surrounding the *target* you say? That's an interesting choice of words.'

'Don't read too much into that, Chris,' said Joshua. 'You're going to love playing with Horus, it's great fun.'

The rest of the meeting went well and Chris was happy with how it turned out and he was pretty sure his guests had been too. Things were looking good but Chris was a little shocked that the commercial application of his work was being considered so soon. He guessed it was inevitable. Joshua and Maynard left Chris and were in high spirits. Chris tried to continue working but as the day wore on, he started to feel the effects of his long night working. He decided he would surprise Michelle and get home early, he wasn't getting much done and his work would benefit more from a good night's sleep and a fresh perspective.





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