

### Nikola Tesla Visits the 21<sup>st</sup> Century

While working late in NuTesla's lab one night, experimenting with scalar waves using low electromagnetic frequencies, a stranger appeared seemingly from nowhere. He was tall, dark haired with a mischievous smile under a well trimmed moustache. He looked both confident and business-like, yet I could feel his sincerity and curiosity as he looked around. He kept his hands at his side, and then a sly grin appeared as he spoke.

"Good evening, sir. Let me introduce myself. My name is Dr. Nikola Tesla."

I was stunned, the famous Nikola Tesla, here, in my humble laboratory. How could this be? He continued.

"I see by the look on your face you're wondering how is this possible, but you know who I am, true?"

I nodded a slow confirmation. He continued to speak.

"Let me see if I can explain. But before I do so, can you tell me what year this is?"

"Two thousand eleven." I replied.

"Ah, wonderful! And you are working with electricity in your lab, true?"

Again I nodded a confirmation then spoke, "Yes, but how is possible?" I asked.

"Perhaps some background would be helpful. The world was very different in the late 1870's and electricity was the new wonder. I attended the Austrian Polytechnic University in Graz, where I studied electrical engineering. During my time there I would often have these moments of clarity and inspiration. Sometimes a detailed drawing would appear in my mind and wouldn't go away. Writing them down didn't help, it simply made them more real and incessant. They just kept filling up my head and I had to do something besides listen to professors dryly lecture for hours on theories they didn't even understand. The university barely had a grasp of electricity's possibilities and after three years I felt compelled to leave.

"I left the Polytechnic and started working as an assistant engineer in what I believe is now called Slovenia, hoping I could make a difference. That was a mistake. The industrial world had even less of an idea of what electricity could do and I nearly went mad trying to get my supervisor to listen to my ideas. I again felt lost in a sea of thoughts and ideas and my friends and family worried for me.

"My father, who was a Serbian Orthodox Priest, persuaded me to return to school and I was enrolled in the Charles-Ferdinand University in Prague in the summer of 1880. During that summer my father died and I left the University, but not until I had met Ernst Mach, an experimental physicist who worked with shockwaves that traveled faster than the speed of sound. He taught me one of my most important lessons, that scientific theories were only provisional and had no lasting place in physics. He also taught me about the nature of waves and frequencies, which at the time seemed inconsistent with my understanding of direct current electricity, but it laid the foundation for my insights

into alternating current. I was beginning to see that anything was possible and I wanted to prove it. And it looks like my presence here with you tonight may go a long way towards that.” He said with a sly smile.

Nikola Tesla was standing in the middle of my lab, almost glowing, as though light and energy were being emitted from his body. I offered him a chair, which he rejected, preferring to stand with his arms now folded and stating that besides electricity, time was another fascinating topic and he wasn’t sure how much of it we would have tonight. I asked if he would like something to drink. He again refused my offer but told me to make myself comfortable as he proceeded. Realizing time was of the essence I poured a cup of water and placed it in the microwave oven to heat it and Tesla’s eyes lit up.

“What’s that?” He asked.

I smiled at my guest and began to explain, “It’s a microwave oven. It uses your coil to step up the voltage and excite a magnetron tube you helped inspire with your X-Ray experiments. The magnetron tube emits microwaves that ionize water molecules and heats the water.”

The microwave oven beeped its completion. I opened the door, removed the cup of steaming water, placed a tea bag in it and set it aside to cool. My wide-eyed guest who now looked rather pleased with himself continued.

“Please know that while I stopped attending school, my education never stopped. I loved to read. The pages seemed to stick in my head and I could recall them at will. After reading something new my mind would work endlessly trying to assimilate this with my previous studies. I couldn’t rest until I could see how it all fit together.

“I moved to Budapest in the fall of 1880 and began working for the National Telephone Company, creating a twin turbine power generator to provide uninterruptible power for phone service. Finally, some relief came to my head full of ideas. But it didn’t stop there. There were so many improvements I wanted to make for the phone company, like creating an amplifier for long distance calls and a loudspeaker so you could use the phone without holding on to it. I was promoted to the lead electrician and later the engineer for the entire country’s phone system. But there was still so much more I wanted to do, and I was already twenty-four years old.”

My cell phone rang at that moment, my wife was calling and I pressed the ignore key and sent her a short text. This caught Tesla’s attention and he immediately knew I held some kind of communication device. He spoke up.

“A wireless telephone, now why didn’t I think of that?”

To which I quickly replied, “But you did, Dr. Tesla. This mobile phone is filled with your ideas and patents. You invented the radio, everyone knows that. Even though Marconi claimed he did and was granted a patent for it, the US Supreme Court upheld your original radio patent recognizing you for inventing the radio. That was in 1943, just months after your, oh, ah, er, death.”

“Ah yes, the mysteries of life. Well, let’s not dwell on that particular event. So, why didn’t you answer the call?”

“It was my wife and I just texted her, I mean I used my phone to send her a short message, kind of like a wireless telegraph, to tell her I was busy and would call her later. Which, by the way, is also possible because of your patents on logical gates, the foundation of all the microcomputers that surround us.”

Tesla responded, “You know I never married, not that I didn’t want to, or that there weren’t opportunities, I was just so consumed by my work. I was never sure where my next funding might come from, and I fretted over my work so much. I just couldn’t subject a companion to that kind of a frenzied lifestyle. But you also said we’re surrounded by micro what?”

“Micro computers; miniaturized electrical devices that can store information like words in a book, but as electrical impulses and then operate upon that information. Our world abounds with them and your work on logical gates became the building block of integrated circuits that make up these computers. Now we use them for almost everything.”

Tesla smiled and said, “Well, I am glad I could help. Sometimes I felt like I just needed to do so much to help everyone. My parents instilled a deep sense of responsibility in me towards my fellowman, except for those that would steal another’s work and take the credit for themselves. I seemed to run into those characters too often. But I digress; let’s see, now where was I? Oh yes, Paris.

“I moved to Paris in 1882 to work for the Continental Edison Company that was importing and implementing new electrical devices from America. Finally it appeared that someone was seeing what could be done with electricity. I quickly began working on improvements to Edison’s equipment and began working on my own induction motor, an electric motor based on rotating magnetic fields that ran from alternating current instead of Edison’s direct current.

“Not long after this I awoke one night from a dream, for dread had seized my breast as I realized my dear mother had died, and it was so. I fell ill, left my job and wandered aimlessly in my apartment and in the streets of Paris. In my depressed state a new idea caught hold. I had nothing to keep me in Europe, so go to America! I contacted my former employer and he wrote a letter of recommendation to Thomas Edison, proclaiming me as one of the two great men he knew, the other one being Edison himself.

“I arrived in New York on June 6<sup>th</sup> of 1884 and sought out Mr. Edison. He hired me almost immediately and I began working on simple tasks. As soon as my worth became evident he asked me to head the redesign of the entire Edison Company’s direct current generators, promising to pay me an incredible \$50,000, to which I quickly accepted.

“I worked what seemed like endless days and nights over the next year to complete the project and when I was done I asked Thomas Edison about my payment to which he replied that I didn’t understand American humor. He never paid me more than my hourly

wages and so I quit and found myself digging ditches, which was more rewarding than working for an arrogant Edison.

“Soon I discovered that American businessmen were much alike, they wanted profits over innovation and efficiencies. I worked at odd jobs, saving money to pursue my own inventions and to start my own company. Even that was plagued with failures due to greed and dishonesty of others.”

I stopped him and asked, “Dr. Tesla, so how and why are you here tonight?”

“Yes, time is of the essence. Let me hurry through a bit, because this next part is central to those questions.

“Edison couldn’t grasp that power needed to be transmitted over long distances and direct current, the kind that is in batteries, is not suited for that. If Edison had gotten his way there would need to be power generating plants in every home in America. And his light bulbs, now there was something that made both power companies and light bulb suppliers happy. Those filaments would burn out like clock work and required constant replacement and they were incredibly inefficient. My ionizing and single element incandescent bulb never needed replacing and used energy much more efficiently.”

I interrupted him. “That’s right. And now people are realizing how wasteful we’ve been and we’re starting to use these compact fluorescent lamps” I showed him one I was experimenting with and continued, “These are also based upon your ideas, much more efficient than Edison’s, but they do not last as long as yours did.”

Tesla replied, “Now we’re getting to why I am here. But I’m never going to get to answer your questions if we don’t get back on track, which is exactly what happened to me after my fallout with Edison. I couldn’t seem to stay focused. There were so many new ideas and inventions and finding funding was difficult because no one wanted theoretical products, they wanted something that could be made and sold at a high profit.

“During this time I pushed for moving from direct to alternating current. I worked with George Westinghouse to help transition factories from inefficient direct current to the new alternating current and invented the first alternating current electric motors to do so. Westinghouse built the motors and I held the patents to them. I later relinquished the patent royalties to Westinghouse to enable his company to stay profitable.”

I interrupted, “Your AC motor design is still used in all the appliances in my home and is also turning the ceiling fan overhead.”

Tesla glanced up and then gave me the, I better be quiet look, and continued.

“With the AC electric motors for running the equipment in factories there were no more roadblocks to using alternating current. Edison eventually had to concede to AC, although we never became friendly again.

“In 1891 I became a naturalized American citizen and continued working on the wireless transmission of electricity and demonstrated this at the 1893 World’s Fair in Chicago in

conjunction with George Westinghouse. We lighted and powered the entire exposition. While it was amazing for those that saw it first hand, most people were uncomfortable with sending electricity through the air to light a fluorescent lamp they held in their hands. It takes time to educate people, but it looks like you have embraced alternating current with all I see around me in your lab.”

I replied, “That’s true, but we have a long way to go. Alternating current has had some serious setbacks with health concerns and costs to produce it and transmit it.”

Tesla replied, “I warned them in the 1890’s that while AC power was cheaper and better than DC in many ways, there were some basic safety precautions the power companies and factories, which were filling up with AC motors, needed to take to safeguard anyone who worked or lived around them. But they just ignored me because it added fractions more to the cost to distribute the power.

“That’s why wireless electricity transmission makes so much more sense. It’s completely safe, has a lower cost to implement and it lets us tap into other energy sources as well. In order to pursue this research I moved my laboratory from New York to Colorado Springs in 1899 where I could experiment with very high voltages and high frequencies without prying eyes, and this lays the groundwork for understanding the ‘how’ portion of your question.”

I was astounded by his reply. “Wait a minute, you just said a mouthful. First, what do you mean it lets us tap into ‘other’ energy sources? And how could it be safer?” I asked, trying to understand.

Tesla smiled and asked for a cup of tea and said, “I guess it’s going to be a longer night than I expected.”

End of Part 1 of this multipart series.