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Nikola Tesla was a dreamer; a dreamer who gave shape to a number of his dreams. (See the partial list of Tesla US patents numbering 112 in [1]). Some of his dreams changed the world. Some were so far ahead of his time that they drew ridicule from his contemporaries and slowly froze all sources of funding for his research.

A number of his unfulfilled dreams are realities today. When Tesla was dreaming of making an automaton with implanted intelligence, modern computers and microelectronics were a far cry. Today the movements of a robot placed on Mars are being controlled from the Earth. Robots with limited intelligence have ceased to be science fictions and are routinely used in a number of industries.

Tesla's proposal to offer his automaton to the US Government was met with derisive laughter from a senior official, but who could have imagined at that time the revolutionary ideas that Tesla nurtured? Who could have fathomed his brains?

The passages that follow describe Tesla's dreams of an automaton. These are quoted from reference [1].

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### **Excerpts from *Prodigal Genius: The Life of Nikola Tesla***

*John J O'Neill*

The "race of robots" was another of Tesla's original and important contributions to human welfare. It was one of the items of his colossal project for increasing human energy and improving the efficiency of its utilization. He visualized the application of the robot idea to warfare as well as to peaceful pursuits; and out of the broad principles enunciated, he developed an accurate picture of warfare as it is being carried on today with the use of giant machines as weapons – the robots he described.

"This evolution," he stated in an article in the *Century Magazine* of June, 1900, "will bring more and more into prominence a machine or mechanism with the fewest individuals as an element of warfare ... . Greatest possible speed and maximum rate of energy

[1] John J O'Neill, *Prodigal Genius: The Life of Nikola Tesla*, Chapter 'Fortune and Fame', pp.167–172, 1944.



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delivery by the war apparatus will be the main object. The loss of life will become smaller... .”

Outlining the experiences that led him to design the robots, or automatons, as he called them, Tesla stated:

I have by every thought and act of mine, demonstrated, and do so daily, to my absolute satisfaction that I am an automaton endowed with power of movement, which merely responds to external stimuli beating upon my sense organs, and thinks and moves accordingly ... .

With these experiences it was only natural that, long ago, I conceived the idea of constructing an automaton which would mechanically represent me, and which would respond, as I do myself, but, of course, in a much more primitive manner, to external influences. Such an automaton evidently had to have motive power, organs for locomotion, directive organs, and one or more sensitive organs so adapted as to be excited by external stimuli.

This machine would, I reasoned, perform its movements in the manner of a living being, for it would have all of the chief elements of the same. There was still the capacity for growth, propagation, and, above all, the mind which would be wanting to make the model complete. But growth was not necessary in this case since a machine could be manufactured full-grown, so to speak. As to capacity for propagation, it could likewise be left out of consideration, for in the mechanical model it merely signified a process of manufacture.

Whether the automaton be of flesh and bone, or of wood and steel, mattered little, provided it could perform all the duties required of it like an intelligent being. To do so it would have to have an element corresponding to the mind, which would effect the control of its movements and operations, and cause it to act, in any unforeseen case that might present itself, with knowledge, reason, judgement and experience. But this element I could easily embody in it by conveying to it my own intelligence, my own understanding. So this invention was evolved, and so a new art came into existence, for which the name “telautomatics” has been suggested, which means the art of controlling the movements and operations of distant automatons.



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In order to give the automaton an individual identity it would be provided with a particular electrical tuning, Tesla explained, to which it alone would respond when waves of that particular frequency were sent from a control transmitting station; and other automatons would remain inactive until their frequency was transmitted. This was Tesla's fundamental radio tuning invention, the need for which other radio inventors had not yet glimpsed although Tesla had described it publicly a half-dozen years earlier.

Tesla not only used in the control of his automaton the long waves now used in broadcasting – which are very different from the short waves used by Marconi and all others; for those could be interfered with by the imposition of an intervening object – but he was explaining the use, through his system of tuning, of the spectrum of allocations for individual stations that now appears on the dials of radio receiving sets. He continued:

By the simple means described the knowledge, experience, judgement – the mind, so to speak – of the distant operator were embodied in that machine, which was thus enabled to move and perform all of its operations with reason and intelligence. It behaved just like a blindfolded person obeying directions received through the ear.

The automatons so far constructed had “borrowed minds,” so to speak, as each formed merely part of the distant operator who conveyed to it his intelligent orders; but this art is only in the beginning.

I purpose to show that, however impossible it may now seem, an automaton may be contrived which will have its “own mind,” and by this I mean that it will be able, independently of any operator, left entirely to itself, to perform, in response to external influences affecting its sensitive organs, a great variety of acts and operations as if it had intelligence.

It will be able to follow a course laid out or to obey orders given far in advance; it will be capable of distinguishing between what it ought and ought not to do, and of making experiences or, otherwise stated, of recording impressions which will definitely affect its subsequent actions. In fact I have already conceived such a plan.

Although I evolved this invention many years ago and explained it to my visitors very frequently in my laboratory demonstrations, it was not until much later, long



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after I had perfected it, that it became known, when, naturally enough, it gave rise to much discussion and to sensational reports.

But the true significance of this new art was not grasped by the majority, nor was the great force of the underlying principle recognized. As nearly as I could judge from the numerous comments which then appeared, the results I had obtained were considered as entirely impossible. Even the few who were disposed to admit the practicability of the invention saw in it merely an automobile torpedo, which was to be used for the purpose of blowing up battleships, with doubtful success. ...

But the art I have evolved does not contemplate merely the change of direction of a moving vessel; it affords means of absolutely controlling in every respect, all the innumerable translatory movements, as well as the operations of all the internal organs, no matter how many, of an individualized automaton.

Tesla, in an unpublished statement, prepared fifteen years later, recorded his experience in developing automata, and his unsuccessful effort to interest the War Department, and like-wise commercial concerns, in his wirelessly controlled devices.

The idea of constructing an automaton, to bear out my theory, presented itself to me early but I did not begin active work until 1893, when I started my wireless investigations. During the succeeding two or three years, a number of automatic mechanisms, actuated from a distance by wireless control, were constructed by me and exhibited to visitors in my laboratory.

In 1896, however, I designed a complete machine capable of a multitude of operations, but the consummation of my labors was delayed until later in 1897. This machine was illustrated and described in my article in the Century Magazine of June 1900, and other periodicals of that time and, when first shown in the beginning of 1898, it created a sensation such as no other invention of mine has ever produced.

In November 1898, a basic patent on the novel art was granted to me, but only after the Examiner-in-Chief had come to New York and witnessed the performance, for what I claimed seemed unbelievable. I remember that when later I called on an official in Washington, with a view of offering the invention to the Government, he burst out in laughter upon my telling him what I had accomplished. Nobody



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thought then that there was the faintest prospect of perfecting such a device.

It is unfortunate that in this patent, following the advice of my attorneys, I indicated the control as being effected through the medium of a single circuit and a well-known form of detector, for the reason that I had not yet secured protection on my methods and apparatus for individualization. As a matter of fact, my boats were controlled through the joint action of several circuits and interference of every kind was excluded. Most generally I employed receiving circuits in the form of loops, including condensers, because the discharges of my high tension transmitter ionized the air in the hall so that even a very small aerial would draw electricity from the surrounding atmosphere for hours.

Just to give an idea, I found, for instance, that a bulb 12'' in diameter, highly exhausted, and with one single terminal to which a short wire was attached, would deliver well on to one thousand successive flashes before all charge of the air in the laboratory was neutralized. The loop form of receiver was not sensitive to such a disturbance and it is curious to note that it is becoming popular at this late date. In reality it collects much less energy than the aerials or a long grounded wire, but it so happens that it does away with a number of defects inherent to the present wireless devices.

In demonstrating my invention before audiences, the visitors were requested to ask any questions, however involved, and the automaton would answer them by signs. This was considered magic at that time but was extremely simple, for it was myself who gave the replies by means of the device.

At the same period another larger telautomatic boat was constructed. It was controlled by loops having several turns placed in the hull, which was made entirely water tight and capable of submergence. The apparatus was similar to that used in the first with the exception of certain special features I introduced as, for example, incandescent lamps which afforded a visible evidence of the proper functioning of the machine and served for other purposes.

These automata, controlled within the range of vision of the operator, were, however, the first and rather crude steps in the evolution of the Art of Telautomatics as I had conceived it. The next logical improvement was its application to automatic mechanisms beyond the limits of vision and at great distances from the



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center of control, and I have ever since advocated their employments as instruments of warfare in preference to guns. The importance of this now seems to be recognized, if I am to judge from casual announcements through the press of achievements which are said to be extraordinary but contain no merit of novelty whatever.

In an imperfect manner it is practicable, with the existing wireless plants, to launch an aeroplane, have it follow a certain approximate course, and perform some operation at a distance of many hundreds of miles. A machine of this kind can also be mechanically controlled in several ways and I have no doubt that it may prove of some usefulness in war. But there are, to my best knowledge, no instrumentalities in existence today with which such an object could be accomplished in a precise manner. I have devoted years of study to this matter and have evolved means, making such and greater wonders easily realizable.

As stated on a previous occasion, when I was a student at college I conceived a flying machine quite unlike the present ones. The underlying principle was sound but could not be carried into practice for want of a prime-mover of sufficiently great activity. In recent years I have successfully solved this problem and am now planning aerial machines devoid of sustaining planes, ailerons, propellers and other external attachments, which will be capable of immense speeds and are very likely to furnish powerful arguments for peace in the near future. Such a machine, sustained and propelled entirely by reaction, can be controlled either mechanically or by wireless energy. By installing proper plants it will be practicable to project a missile of this kind into the air and drop it almost on the very spot designated which may be thousands of miles away. But we are not going to stop at this.

Tesla is here describing – nearly fifty years ago – the radio-controlled rocket, which is still a confidential development of World War II, and the rocket bombs used by the Germans to attack England. The rocket-type airship is a secret which probably died with Tesla, unless it is contained in his papers sealed by the Government at the time of his death. This, however, is unlikely, as Tesla, in order to protect his secrets, did not commit his major inventions to paper, but depended on an almost infallible memory for their preservation.

