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Da Vinci and the Mechanical Lion: Where Anatomy Meets Invention

Leonardo da Vinci, famed inventor, artist, and engineer, best known for his Last Supper painting and multiple flying machines, also created one of the most inventive and complicated designs for someone of his generation—the mechanical lion. One of the earliest attempts at creating a working robot, da Vinci’s lion is recognized to this day as one of the most innovative and inventive creations in the world. While in modern society, we continue to fantasize of a day where robots will do work for us, da Vinci was thinking of this in the 1500s. This amazing feat only adds to the genius and innovation of da Vinci’s work. Modeled after an actual lion, da Vinci’s creation resembles somewhat a statue, with the system of pulleys and levers hidden in the lion’s abdomen. What is one of the most fascinating things about da Vinci’s work is his apparent attention to detail. An accomplished anatomist, da Vinci’s lion reflects his background of studying the contours and design of the body.

After centuries of being hidden from the public view, da Vinci’s famed mechanical lion has finally been found among da Vinci’s lost manuscripts and notebooks. In a report from *The Independent*, a UK-based newspaper, the search had been a long one:

After almost five centuries, a legendary, artificial monster, which has intrigued scientists and art historians for decades, cranked back into life in central France this week. The monster in question is a friendly-looking, curly-maned, almost life-sized, mechanical lion, which can walk, and move its head and shake its tail and open its jaws. The original was designed in 1517 by a 16th-century special effects man, who later achieved fame as a painter (but was also musician, philosopher, engineer, architect, scientist, mathematician, anatomist, inventor, architect and botanist). (Lichfield 1-2)

The report goes on to say that da Vinci had only left bits and pieces of detailed sketches and one large-scale sketch of the lion, but from those drawings, Renato Boaretto, a designer of automatons, was able to create a model of the robotic design. Lichfield reports that “[u]sing contemporary accounts and the other mechanical sketches left by the great artist, the 66-year-old [Boaretto] has built a spectacular clockwork toy over 6ft long and four feet high, which can walk and wag its tail and simulate roaring movements of its head” (3). What is truly remarkable about the mechanical lion is its innovation, even in today’s fast-paced technology market. Lichfield discusses this and how we may marvel over da Vinci’s creations now, but how astounded the people of da Vinci’s time must have been. While we look at his designs as a remarkable feat for inventions and design, people living in the 1400s and 1500s saw them as an advancement of the human race. For today’s engineers, da Vinci is just as much a leader in the field as Santiago Calatrava (famed structural engineer) and John Bradfield (designer of Sydney Harbour Bridge). His inventions show keen and precise attention to detail and challenge the limits of the imagination. Instead of finding an immediate solution to a problem, engineers must find a way to rectify a situation for long-term sustainability, an idea that comes through most evidently in da Vinci’s work. The mechanical lion, while being made mainly for entertainment purposes, shows the depth and body of da Vinci’s work, ranging from the strictly methodical to the wildly creative. While some only remember Leonardo da Vinci as a great artist, his work goes so far beyond just artistic appeal (although those works are exemplary in their own right). Lichfield reports that “The French king François I – great rival of England's Henry VIII – brought Leonardo to France in 1516 as court painter, philosopher and architect but also as court *mécanicien* or engineer” (9). While many of his projects were started as a form of entertainment, da Vinci made machines that continue to amaze audiences to this day, both as entertainment and as mathematical and physical innovations.



da Vinci’s Mechanical Lion on display at *The Leonardo da Vinci and France* exhibition at Clos Lucé (slats open on sides to display mechanics underneath)

In a similar report done by *Reuters*, a UK-based global news agency, writer Estelle Shirbon discusses the mechanical lion display and how da Vinci contributed to the advancement of modern design and engineering. President of the Clos Lucé stated that “‘He [da Vinci] knew how to satisfy an audience with amazing creations. He was the George Lucas [famous director of the *Star Wars* movies] of his time’” (Shirbon 4). Like Lucas, da Vinci had the uncanny ability to create something out of nothing, so to speak. His inventions and sketches were things of many peoples’ imaginations. While the mechanical lion may have not reached its full potential during da Vinci’s lifetime, his sketches and detailed thought process shine through in his notebooks and reveal his true genius. As we look back on da Vinci’s work from a modern perspective, we cannot help but be amazed. In a time when the theories of gravity were still being debated, da Vinci was at the forefront of the development of modern science. In Shirbon’s article, she goes on to interview fellow guests at the Clos Lucé. The report states that: “‘[i]t's grandiose that as far back as that, he [Da Vinci] managed to make exceptional objects like this one, fully automatic. It's really amazing,’ said French tourist Benedicte after seeing the lion in action with her husband and children” (Shirbon 13). Benedicte’s observation is analogous of many of those who visit the mechanical lion display. Da Vinci’s thirst for knowledge and unwillingness to let obstacles stop his design process from continuing are both qualities that characterize an exceptional engineer.

As a first-year engineering student, da Vinci’s works are particularly inspiring. My fellow classmates and I have the distinct opportunity to come up with world-changing and revolutionary designs with our studies in the disciplines of engineering. Much like da Vinci, we are pioneers in our field of study; we are living in an age where possibilities are endless and the products and designs we create can change the world. While we have three years of education ahead of us, the influences of da Vinci will continue to help us in our process of designing and drafting.



A Rear View of da Vinci’s Mechanical Lion on Display at *The Leonardo da Vinci and France* exhibition at Clos Lucé

While da Vinci’s lion sounds spectacular, you are probably wondering what exactly it can do. The lion, standing roughly 10 feet tall, is able to walk on its own, moving all four legs in a slow, forward motion. While this may sound very easy to us today, da Vinci had very limited resources during his time and was at the forefront of figuring out the study of modern mechanics. In addition to walking, the lion also has the ability to move its tail, shake its head back and forth, and open its mouth. From this description, one could even say da Vinci created the first automated children’s toy. Originally made for a French king’s entertainment, the mechanical lion showed how competitive the fields of science and mathematics were at this time between different countries. All nations wanted to claim they were at the forefront of creating a new and exciting invention, and with the help of Leonardo da Vinci, France caught the attention of the world. With this creation, da Vinci knew he could wow audiences around Europe, and quite possibly the world. Francois Saint Bris, president of the Clos Lucé, once again expressed his appreciation and admiration for the work of da Vinci by stating “‘[w]e loved the idea that Leonardo was not only an artist and an engineer but also a fabulous stage director, a master of special effects’” (Shirbon 3). As we look back on the inventions, paintings, sketches, and extensive notes of Leonardo da Vinci, it is quite obvious that he was a genius who went beyond the constraints of his time period, and continued to challenge the ideas set by society at the time. By enticing people with his fun and interactive inventions, like the mechanical lion, he proved that science and mathematics were changing, and that he was the one who was going to change it.

Looking back on our da Vinci field trip and this entire semester, my approach towards engineering has greatly changed. Before, I saw my major as a way for me to apply mathematics and physics into building something. With the help of da Vinci, however, I have learned that the majority of engineering comes from a specific thought process, challenging the limits of what people expect, and being open to what is unknown and undiscovered. While many engineering projects have flaws in their initial stages, as my group learned from our Rube Goldberg, what matters is the trial and error process you use to fix problems and create a good product. This lesson will be helpful as I continue my education and beyond, in my career and in working on projects.

Works Cited

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