**Innovation Studies**

**Bicycle:**

It all began in late 15th century with some simple drawings of Italian mastermind Leonardo da Vinci. His two-wheeled design perfectly described one-person velocipede (without pedals or chain transmission), that could have easily been made from then accessible materials. With working prototype never produced, bicycle remained unknown all up too early 19th century.

The Baron Karl von Drais made the basis for today’s bicycle in 1817 with his “Draisine” velocipede. After several years with moderate success in Europe, his designs received an upgrade in England with “Dandy Horse” design. That model caught the attention of French blacksmith Pierre Michaux and his partner Pierre Lallement in the early 1860s. Together with Michaux’s son Ernest, they managed to produce the first model of a bicycle with pedals. This marked the pivotal moment in bicycle history. From that point, all bicycle started spreading itself across Europe countries and across the Pacific to the United States. Bicycle soon received many improvements during the next few years – metal frames, pneumatic tires, safety brakes, ball bearings, chain transmission and coaster brakes. The most popular bicycle design of late 19th century was certainly “Rover”, which was made in England by inventor James Starley.

Around the time when bicycles first surfaced, there was already a well-developed steam engine industry. Scientist naturally wanted to combine these two technologies into a machine that would alone generate the power needed for its transportation. First, known motorcycle was made in a factory that also gave birth to the first bicycle. Son of Pierre Michaux, Ernest, combined one of their early velocipede models with a small steam engine. Since that breakthrough, many other scientists tried to attach various steam engine models to bicycles, but true revolution happened in 1885. Two German inventors Gottlieb Daimler and Wilhelm Maybach managed to attach gasoline internal combustion engine to the iron bicycle frame. After that discovery, motorcycle’s fate was sealed, and its worldwide production was very influential for developing other transport devices with internal combustion engine.

Today over half a billion bicycles and motorcycles are in use, mostly in Asian countries of China and India.

**Sewing machine:**

The first attempts at a mechanical sewing machine imitated the hook stitch. Inventors from France, England, and the U.S. all had a hand in creating the mechanical sewing machine, beginning with Charles Weisenthal in the U.K. He acquired a British patent in 1755 for the first needle designed specifically for a machine. It was double pointed with a single eye, meant to pass completely through the fabric, sparking the birth of mechanical sewing.

Some years later, there was Thomas Saint, an English cabinet maker, who was issued the first patent in 1790 for drawing a complete machine that included both a notched needle and an awl for sewing. Saint’s machine was designed specifically for puncturing holes through leather. Several failed attempts led up to the great year of 1830.

In 1830, Barthelemy Thimmonier made the first functional machine that used a chain stitch (like the stitch often used for embroidery) and one thread. He made about 80 machines, which he placed in a factory to make military jackets until it was burnt down by French tailors who feared they would lose their jobs to the sewing machine. Unfortunately, the fire caused Thimmonier to go bankrupt. In 1834, Walter Hunt made the first successful machine; although it only made straight lines, they were created by a brand new stitch that came to be known as a lockstitch. His machine didn’t work very well, so he eventually gave up and didn’t patent his invention.

In 1846 Elias Howe adapted Hunt’s ideas and developed a needle with an eye at its tip, like machine needles we see today, earning the credit for creating the first modern sewing machine and needle, which processed thread from two different sources to produce a lockstitch.

Isaac Singer was the first to sell sewing machines commercially in the 1850s, to which he added an overhanging arm that positioned the needle over a flat table so that fabric could be passed through the bar from any direction. It came equipped with a needle that moved up and down.

Sewing machines are still widely used and purchased by home sewists and companies to produce and construct textiles, which has tremendously impacted the industry and the speed at which garments can be made. The evolution of the machine has taken home sewing to new and efficient levels so that both the beginning sewist and the advanced sewing magician can be successful. We have an exclusive Mood Brand sewing machine that can create nearly 100 different stitch types (talk about advancement in technology), and to go along with it you’ll want to grab some durable all-purpose cotton thread for your sewing endeavours. Technology changes every day but it’s important to take a moment to think about the great inventors that paved the way for the sewing machine and its important components and helped to make its way to success.

**Cameras:**

Going back to the 1500s, it was “Alhazen” or Ibn Al-Haytham who created the first pinhole camera or the “Camera Obscura” by following a description of a principle by Han Chinese Philosopher Mozi. The first partially successful image of the camera was taken by Nicéphore Niépce. Using a small camera and piece of paper coated with silver chloride, Niépce captured a temporary image. In the mid-1820s, Niépce used a wooden sliding box to experiment more with photography by lightly coating surfaces with Bitumen of Judea.

Inspired by Ibn Al-haytham’s creation, many scientists and philosophers did contribute to the making of the camera. But the most notable achievements that gave us a look into the future of the camera were that of the Daguerreotype Camera.The Daguerreotype camera was invented by Louis-Jaques-Mandé Daguerre, Niépce’s partner.

At this point, people were mostly using collodion dry plates for their photographs thanks to Désiré van Monckhoven’s contribution. But it wasn’t until Richard Leach Maddox invented the gelatin dry plate in 1871 that the process began to improve in terms of quality and speed.

It was also during this time that mechanical shutters were added to the overall camera design. The use of photographic film was pioneered by George Eastman, who started manufacturing paper film before switching his process to celluloid in 1888-1889. In this time, he started selling his first camera, which is known as Kodak.

During this 1890s-1928, we saw the invention of the 35mm film for still photography, the innovation of the movie camera from a toy to a commercial tool and the use of plate cameras for higher quality print. In 1928, the first practical reflex camera came into light. Because the single and twin-lens reflex cameras were too bulky to gain significant popularity, the medium-format TLR design managed to achieve widespread acclaim as a high end and low end camera.

In 1933, the SLR design began to make rounds with the introduction of the Ihagee Exakta, a compact SLR that used 127 roll film. After WWII, newer models and features in the 35mm SLR quickly exploded in the market. And although there were a few 35mm TLRs at the time, they couldn’t complete with the SLR version. As conventional cameras started becoming sleeker and sophisticated, a newer version of the camera started appearing in the market, mainly the Polaroid Model 95, the world’s first instant-picture camera. Invented by Edwin Land, the camera came with a hefty price tag. Yet, it remains as one of the top-selling cameras of all time.

The true introduction of digital camera to the widespread market began to saturate in the masses by the late 1980s. With companies like Casio, Kodak and Nikon competing for the top spot, photography lovers saw a new and improved style and a lot of high and low-end options. Digital camera sales continued to flourish. And with the help of various technological advances such as the development of the CMOS sensors, phone companies were able to adopt the camera for their models.

**Spark plug:**

In 1860 Étienne Lenoir used an electric spark plug in his gas engine, the first internal combustion piston engine. Lenoir is generally credited with the invention of the spark plug.

Early patents for spark plugs included those by Nikola Tesla, Frederick Richard Simms and Robert Bosch. Only the invention of the first commercially viable high-voltage spark plug as part of a magneto-based ignition system by Robert Bosch's engineer Gottlob Honold in 1902 made possible the development of the spark-ignition engine. Subsequent manufacturing improvements can be credited to Albert Champion, to the Lodge brothers, sons of Sir Oliver Lodge, who developed and manufactured their father's idea and also to Kenelm Lee Guinness, of the Guinness brewing family, who developed the KLG brand. Helen Blair Bartlett played a vital role in making the insulator in 1930.

Early version spark plugs, used in low-speed, low-compression petrol engines, had a life of just 600 miles as compared to the modern copper-nickel spark plug, which lasts up to 18,000 miles.  The spark plug is a key engine system component, playing a major role in fuel economy, clean, efficient combustion and the reliable operation of engines and catalytic converters.  A typical spark plug will spark up to 100 times per second or more than 20 million sparks over its useful life.