By the late 1880's there was no doubt that America's bicycle craze was in full swing. Bicycles revolutionized personal transport and introduced an unimaginable amount of freedom and mobility to Americans, especially women. New technological advances during that time such as equal-sized wheels, a chain drive, and pneumatic tires, enabled a much safer and comfortable ride further fueling the bicycle's popularity. Through innovation and its broad accessibility, the bicycle craze created a generation of gear heads who would soon after go on to revolutionize automobiles, motorcycles, and even airplanes. Since then, however, the U.S. has steadily lost much of its manufacturing capacity which has many wondering if we still have what it takes to compete in today's globalized world.
For 19th century bicycle fanatics like Henry Ford and the Wright brothers, the bicycle represented a collection of technical knowledge that they were able to mold into revolutionary mechanical systems for land and air travel. By comparison, today’s most advanced bicycles come equipped with lightweight carbon fiber materials, electric motors, electronic sensors, built-in computers, regenerative brakes, lithium-ion batteries, and even an iPhone charger. These electric bikes, or E-bikes, represent a collection of 21st century components and, more importantly, are readily accessible to the average garage tinkerer. However, arguably the most important change over the last century is that most of these components are not made domestically but are part of global supply chain centered predominately in China. In fact, China’s early investments in the E-bike sector has enabled it to single handedly create a $15.7 billion electric bicycle industry (https://www.statista.com/statistics/674381/size-global-market-electric-bicycles/) and claim nearly 95% of all E-bike sales (https://www.statista.com/statistics/255658/worldwide-sales-of-electric-bicycles-by-region/).

What many modern day consumers may not know is that the U.S. led the way in E-bike innovations as far back as the 1890s with numerous patents on electric bicycles, batteries, and motor configurations. The first patent for what we would today recognize as an E-bike was issued in 1895 to Ogden Bolton Jr. (https://www.electricbike.com/e-bike-patents-from-the-1800s/) The Bolton bike hung a large battery onto the bike frame and used an electric motor built into the rear wheel hub. Whether it’s the 122 years old Bolton design or any of today’s models, the concept is the same—use electric power to assist the rider up hills and reduce effort. Unfortunately, our fascination with E-bikes did not last long as our attention quickly shifted to the gasoline-powered automobile—something and we never looked back from until now.

One trend fueling American interest in electric bikes is the increased rate of urbanization. Currently over 80% of the U.S. population lives in urban areas (including city center and suburban areas). Not only are Americans (mostly Millennials) moving into cities, they also tend to share similar sentiments and experiences like greater environmental consciousness, higher amounts of debt, and delayed rates of car ownership, that have all contributed to a greater interest in biking and the development of bike friendly infrastructure. Monuments to this migration can be seen in the tenfold increase in dedicated bike lanes over the last decade across the U.S. and a handful of E-bike startups like D.C. based Riide (http://www.riide.com/). More than just bikes, the rising rates of urbanization has a profound impact on the state of innovation as well. In fact, according to a 2010 Nature report (http://www.nature.com/nature/journal/v467/n7318/abs/467912a.html), a doubling a of a city’s population can lead to an average increase of 130% in economic productivity.

Further fueling the interest in electric bikes is the resurgence of U.S. manufacturing in everything from electronics to industrial components. The U.S. bike industry not only saw a leading bike manufacturer reshore its assembly plant to South Carolina (https://www.cbsnews.com/news/automation-allows-manufacturer-to-leave-china-for-us-production/) but also experienced a doubling in production (http://www.ibike.org/library/statistics-data.htm) between 2015 and 2016. And it’s not just legacy manufacturing sectors that are reshoring. Projects like Tesla’s Gigafactory in Nevada, which will produce the company's lithium-ion batteries, are also bringing advanced electronics manufacturing back to the U.S. With increased battery production from factories like Tesla’s Gigafactory, there is wide-spread speculation that battery prices could see a 35-40% reduction (https://www.forbes.com/sites/bertelschmitt/2017/01/19/40-price-drop-on-chinese-ev-batteries-spells-trouble-for-tesla/#2c1547e86189) within the year which would be great news for aspiring E-bike entrepreneurs.

These trends have been part of a growing wave of factors that have energized a new generation of
U.S.-based inventors and tinkerers. Moreover, this generation is not just interested in improving bicycle transportation but also robotic food delivery (https://www.starship.xyz/), rapid prototyping (https://www.protolabs.com/), better health outcomes (http://www.makerhealth.co/), and countless other things that can be improved with technology. In other words, this generation is redefining manufacturing as a process that creates systems and experiences, not widgets. This wave is perhaps best seen in the rise of the maker movement which, according the Atmel corporation, represents over 135 million tinkerers and is associated with nearly 500 makerspaces (community workshops) in the U.S.

America's early technological success was exemplified by innovators who could seamlessly move ideas from the garage to the factory floor. However, as with the E-bike, it is not enough to just come up an idea, there must also be a robust manufacturing infrastructure to breathe life into those ideas.

Image: Ogden Bolton Jr., Patent No. US552271, 1895