**Jack Hudson 19278594 Draft 1**   
  
Commercially IoT has a wide variety of applications whether it’s through V2X communications, Home Internet or the Healthcare sector. V2X involves “new generation of information and communication technologies that connect vehicles to everything” (Wang, J., 2019). Specifically, it combines the smaller niche types of communications under one umbrella, V2I, V2N, V2V, V2P, V2D, V2G. These systems rely on two underlying technologies wireless local area networks known as WLAN, and cellular networks.   
  
Using WLAN, it communicates vehicles with vehicles and between vehicles and the Infrastructure, V2I and V2V respectively. Its low latency makes it ideal, the technology is part of ITS-G5, as a subset in the WLAN IEEE 802.11 family of standards (ETSI, 2020). Whereas cellular networks boast to be a better choice as it is scalable, future proof and provides a clear path from LTE to 5G, using conventional mobile network to enable the vehicle to receive information about road conditions and traffic in the area.  
  
Cellular networks continue to evolve and offer far more than V2X, it’s used to connect all machines to machines. With 2G phased out prioritizing 3G, LTE and the development of 5G, network speeds are becoming faster and faster, one key use of these networks in Ireland is to provide Internet access to remote regions of the country ignored by fiber optic technology. With 5G speeds estimations of up to and over 2 Gbit/s, it’s an exciting development on the peak capacity of 4G, 400Mbps. High-band 5G uses frequencies of 25 - 39 GHz, near the bottom of the millimeter wave band, while 4G uses a frequency between 2 - 8 GHz. (Simkó and Mattsson, 2019).

**Industry**  
Two industries currently being shaped by IOT are manufacturing and agriculture, used to connect equipment with equipment, locations and people. As industry scales up IOT makes everything more efficient and economical. In manufacturing, the integration of many different devices on a production line is vital to keep the process moving. It’s estimated that Industrial IOT could generate so much business that it will eventually lead to the Fourth Industrial Revolution, potential growth generating twelve trillion dollars of global GDP by 2030 (Holwerda, 2015). Examples include Digital Control Systems, predictive maintenance, statistical evaluation, and smart grids.   
  
In farming IOT technology to collect, sort and store and types of data is a huge benefit. Data collection on temperature, rainfall, humidity, wind speed, pest infestation, soil pH, and livestock quantity, as a huge industry in Ireland, IOT has a huge possibility to change the industry into a more efficient and competitive market to compete in Europe. Fish Farming also benefits, A partnership between Toyota Tsusho and Microsoft was created in 2018 with the plan to develop water management technologies using the Microsoft Azure application suite fir IoT technologies. A water pump mechanic that uses artificial intelligence that counts the number of fish on a conveyor belt, analyses the quantity of fish and deduces the effective water flow from the data the fish provide. The project lead specified, “If we can use AI to automate and mechanize simple judgment tasks, we can reduce the number of workers needed from three to two, which will allow that third person to do other work or make it easier for the workers to take breaks and improve work efficiency.” (Spencer, 2018)  
  
  
**Security and Military:**  
 IOT and its security misgivings are important topics to discuss when you see how far reaching it’s become. With it so involved in a wide range of sectors from the commercial to the agricultural, impact on society is great and with that serious damage, disruption and disarray will follow. The damage is far from hypothetical, for example, a Stuxnet worm has done great damage to control systems. A Stuxnet targets supervisory control and data acquisition systems and is believed to be responsible for causing damage to the Iranian nuclear program. One study found that “70% of the most commonly used IoT devices contain security vulnerabilities and there is an average of 25 security concerns per device." Further security risks include Lack of transport encryption, Insecure software/firmware and Poor physical security. (Tankard, 2015)  
  
Even though it has security issues, as a technology it can still provide a sense of security. Like most technology developed throughout history it found success through it being applicable in the military. The Internet of Military Things is focused on applying technology with the idea that future military conflicts and wars will be dominated by Artificial Intelligence and cyber warfare. Serval military programs have been developed but the most interesting is dubbed “Ocean of Things”, announced by DARPA in 2017, plans to apply these technologies on a scale literally the size of oceans. Thousands on interconnected floats spanning hundreds of kilometers to measure ocean temperature, boat activity and even aircraft. A system not just for defense but for rescue, providing real time analysis to detect, track, and identify both military, commercial, and civilian vessels.   
  
With such scoping plans IoMT technology is aware and adapting to security risks, a compromised system would cause catastrophic damage, in the form of leaks, disinformation and infrastructure damage of hardware. Subverting these issues requires developing measures at the same rate of scale the technology grows, creating impenetrable defense's or employing counterintelligence ploys such as honey potting. (A. Kott, et. 2016)

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