**Evolution Of Microprocessor Technology**

**During The COVID-19 Pandemic**

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**DEDICATION**

This research is dedicated to the ones who've been struggling ever since the COVID-19 pandemic has taken and controlled our lives. Through our work, school, finances, health, everything was affected and had to face major adjustments because of this coronavirus outbreak. Everyone went through difficult times and our health was tested — physically, mentally, socially, and spiritually. To the ones who are having a hard time coping up everyday, everything will be fine. You’ll get through this.

To our parents who still continue to work hard amidst this pandemic, we are so blessed to have you and thank you for being our inspiration to study harder.

To everyone who’s enrolled in this class and to our professor Sir Ruiz, the semester is over. Thank you all for being present in spite of this current home quarantine and at the same time dealing with problems with our own personal lives. Thank you Sir Ruiz for being so patient to us and we thank you for all of your hard work. Let us all enjoy our break and keep safe everyone.

**ABSTRACT**

This study represents how COVID-19 affected our lives and how helpful and advanced technologies are at difficult times like this. The research will tackle the brief history of computers and microprocessors and how it was all developed during the pandemic. The research will also be answering questions on how the manufacturers were affected economically and on what ends do the manufacturers have to take in order to further develop computers in a situation mostly unknown to them. The researchers will seek information in articles, news or video documentaries, and other research papers that are seen on the internet to help them conduct this research project.

Same as the CPE355 syllabus, the course was able to introduce and expound computer technology - its functions, its structural components, key performance issues in computer designs, and the difference of computer organization and its architecture. The evolution of computer technology was also discussed but in this study, the researchers will compare and contrast the development of computers now that we are in the middle of a pandemic crisis. Here we will see how advanced and sophisticated manufacturers are in this modern generation that they needed to have sudden majority changes and adjustments in their acquired industry because of COVID-19.

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**INTRODUCTION**

The development of microprocessors and its subsequent products has always been about further advancing the capabilities of the products, no matter how small it may seem. Small changes such as the first generation’s 4-bits upgrade to the 2nd generation’s 8-bits word size. Changes that would later accumulate to the current generation of microprocessors that are capable of running 64-bits Personal Computers with Intel’s more modern variant having a memory size of 128 GB. This is a steady rate of constant developments for microprocessors not just for one company but for the whole industry, having an expected market size value of USD 85.48 Billion in one report for 2020. This seems to be an endless path of development with an optimistic outlook for the future but all changes during the start of the new decade.

The first known infections of the Corona Virus Disease 2019 (Covid-19) were in Wuhan. China with the earliest reported date of symptoms is in December of 2019. With the most prevalent way of infection is through human-to-human transmission by March of 2020, the World Health Organization (WHO) declared it as a global pandemic. As 0f 2021, there are already 155 Million confirmed cases. This global pandemic affected all types of activities and businesses. This doesn’t exempt the microprocessor industry.

With how Covid-19 is affecting all industries, it is not surprising that it also has a negative impact on the development of the microprocessor industry. This research will tackle both the effects of the global pandemic on the industry and on how it is faring right now with all the changes that have happened.

**EXPERIMENTATION**

**Effect of COVID-19 to the Global Manufacturing Industry**

During The 21st Century, the world has already encountered a lot of Economic Crisis throughout. Best example of this was the Global Financial Crisis (GFC) during 2007 to early 2009 wherein a downturn in the US housing market caused a financial crisis throughout the world. Many banks experienced large losses and others declared bankruptcy. This became on par with the recession during the Great Depression of the 1930s. This time however, it is not a falling stock price or any downturns in any business that causes the biggest Economic downfall but an unseen and deadly virus instead.

The Coronavirus Diseases 2019 (Covid-19) is a type of virus first identified in Wuhan, China and was declared as a Global pandemic by the World Health Organization (WHO). It already had more than 3.28 Million deaths attributed to it making it one of the deadliest viruses in History and with how lethal it is, it became easy to see the effects of the virus on Agriculture, Politics and the Economy. With most of the early effects of the Pandemic being focused on China, this means that the electrical industry is significantly more affected since the country contributes to 85% of the total value of components utilized on Smartphones. All critical electrical components such as printed circuit boards, mobile displays, LEDs and capacitors are imported from China. The pandemic causes a lot of their factories to shut down and causes vendors to increase their prices by 2 - 3%.

**Effect of COVID-19 to the manufacturing of microprocessors.**

The global microprocessors market is expected to grow from $42.61billion in 2020 to $45.32 billion in 2021. The growth is mainly due to the companies reorganizing their operations and adjusting from the COVID-19 impact, which had earlier led to restrictions involving social distancing, remote working, and the closure of commercial activities that resulted in operational challenges. The sales of smartphones and tablets is rapidly increasing which is driving the microprocessor market. Also the rise in disposable income, a result of economic growth, in developed and developing economies had a positive impact on demand for mobile gadgets. The rise in costs associated with chips and microprocessors is expected to act as a major prudence on the microprocessor market. Although the prices of chips and communications hardware components are decreasing, software costs are increasing. According to Business Research Company, a rapid increase in energy consumption of microprocessors in wireless networks has been recognized as a major threat for environmental protection and sustainable development. Due to access to the high-speed internet provided by the next generation wireless networks and increased smartphone usage, the requirement for global access to data has risen sharply, triggering a dramatic expansion of network infrastructures and escalating energy demand.

**Effect of COVID-19 to the evolution of microprocessors.**

Years 1971-1972, the era of the first generation of microprocessors introduced INTEL 4004 Rockwell International PPS-4 INTEL 8008. The second generation marked the development of 8 bit microprocessors from 1973-1978. Processors like INTEL 8085 Motorola 6800 and 6801 came into existence. The third generation brought forward the 16 bit processors like INTEL 8086/80186/80286 Motorola 68000 68010. From 1979-1980, this generation used the HMOS technology. The fourth generation happened during 1981-1995. The 32 bit processors using HMOS fabrication came into existence. INTEL 80386 and Mororola 68020 are some of the popular processors of this generation. The last generation starting from 1995 until today is the fifth generation. 64 bit processors like PENTIUM, celeron, dual, quad and octa core processors were introduced.

According to an article posted by Business Research Company, the countries covered in the global microprocessors market are Brazil, China, France, Germany, India, Indonesia, Japan, South Korea, Russia, UK, USA, Australia. The regions covered in the global microprocessors market are Asia-Pacific, Western Europe, Eastern Europe, North America, South America, Middle East, Africa. The global microprocessors market is segmented:

* By Type: ARM-Based MPUs, x86-Based MPUs
* By Application: PCs, Servers, Mainframes, Tablet, Cellphone, Embedded MPUs
* By End-User Industries: Communication, Consumer Electronics, Automotive, Manufacturing

Today’s microprocessors are almost 100,000 times faster than the 1950s. This just explains why computing plays a huge role in today’s generation. Microprocessor performance will easily keep doubling every 18 months through the turn of the century.

No matter what your status is - student, worker, non-worker. Everyone has to undergo adjustments and changes in their own daily lifestyles because of the deadly virus, COVID-19, that was first discovered in the year 2020. Millions of people were affected and also corporations and businesses that had just started. Some outcomes were a blessing to other businesses that it increased their sales and became a new and permanent way of doing business. According to the news that was provided by Cision PR Newswire, despite of the COVID-19 crisis, the global market for embedded processors estimated at $4.1 billion in the year 2020, is projected to reach a revised size of $4.7 billion by 2027, growing at a CAGR of 1.9% over the analysis period 2020-2027.

**Analysis and Results**

The study discussed how COVID-19 affected our lives and how advanced technologies can be despite the deadly virus the world is experiencing. The history of microprocessors and its development were also indicated. The research concluded that the market for microprocessors has increased since the COVID-19 started. Many people utilized the usage of technologies during the pandemic. The study was able to distinguish the difference of the development of microprocessors prior to the past and the present. The researchers perceived how advanced and sophisticated manufacturers are in this modern generation that they needed to have sudden majority changes and adjustments in their acquired industry because of COVID-19. The researchers seeked information in articles, news or video documentaries, and other research papers that were seen on the internet that helped them conduct this research project.

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