Electrifying Microchips

~ Electrifiers ~

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The first microchip was invented in the 1950s, but today they can be smaller than a fingernail and cost less than a dollar ("FIRST MICROCHIP INVENTED IN 1950S"). Microchips have been integrated all throughout society today. Microchips have had a short but complex history. Throughout the years the process of making microchips has been refined and how they work has been improved. Their memory has expanded exponentially as have their applications. The future applications of the microchip is limitless. Microchips are the most important part of computer technology today.

The history of microchips started a while back in the early 1950s when Geoffery W. A. Dummer introduced a new type of software, ''microchips." Microchips, also called "chips," can hold immeasurable amounts of information and carry out various tasks, like today with Ipods, computers, and even the microchips installed under pets' skin so people know where they are if they get lost. Geoffery's idea was to create a circuit with wires that could hold information and carry out actions. He went to a man named Jack Kilby who fashioned it as a microchip in 1958. After 1958, researchers have started making further advancements with all sorts of sizes for the microchip. In present day society, there have been microchips that are barely spotted by the human eye (Mercedes)! In 1961, the first commercially available chips came from the Fairchild Semiconductor Incorporation. All computers began to be made with chips instead of individual transistors and their accompanying parts (Bellis). Microchips allow for millions of advanced gadgets in society today, like the calculator. Jack Kilby, who invented the calculator in 1967, has won many awards and has patents over his 60 inventions. He was awarded National Medal of Science. Robert Noyce, with 16 patents to his name, founded Intel, the company responsible for the invention known as the "microprocessor" in 1968 (Mercedes). This beginning helps

people understand the technology of the chip and where people have come from in the past to where society is today.

Furthermore, it is important to know how microchips are made. The beginning process of how microchips, also known as integrated circuits, are made, starts with growing a single crystal of silicon or another semiconducting material. After the silicon is melted, it is spun and a seed crystal is put into it. When the silicon begins to cool, the seed crystal gets withdrawn very slowly. The single crystal then gets cut into figures shaped like discs. Each figure is about four to twelve inches across ("Microchip"). One side of each wafer is then polished and processed to make lots of identical microchips ("Microchip production part 1"). Then, the wafers get buffed twice andcut apart later. Next, they are ready for engraving with a circuit design at this point in the process. After that, they get packed with billions of transistors. Next, the computer chips get placed into protective packages. Finally, the microchips get joined electrically to the world by metal pins poking out of the tiny packages ("Microchip"). Knowing how to make a microchip will help people understand the importance of them.

Also, knowing how microchips work is necessary to know how important microchips are. Microchips, or integrated circuits (IC), are basically miniature circuit boards on slices of semiconductor, such as silicon or germanium ("Integrated Circuits", Explain That Stuff). These semiconductors can either conduct or insulate electricity when mixed with other elements. For example, silicon conducts electricity when it is mixed with antimony. However, when mixed with boron it will conduct electricity the other way ("Integrated Circuits", Explain That Stuff). ICs use this characteristic to create and send instructions to a receiver which will carry them out. ICs usually contain resistors, transistors, diodes, and capacitors (McComb, p.88). These components form a series of logic gates. These logic gates conduct depending on the electricity

input (McComb, p.106). There are five types of logic gates. One is AND, which conducts electricity when both inputs are one in binary. Second is OR, which becomes one when one of the two inputs are one. The third, NOT, converts zero to one and one to zero. Fourth is NAND, which is basically AND and NOT together. So, if both inputs to AND are one, the NOT will change the one to zero after it goes through AND. The fifth and final gate is NOR. Similar to NAND, NOR is OR and NOT together (McComb, p.107-109). By using the logic gates to process inputs, an IC can string together an instruction and send it to the receiver to be followed ("Integrated Circuits", Explain That Stuff). An IC does not necessarily need to perform this job, though. A circuitry board with transistors, resistors, and the other components can be used to build instructions. However, ICs can fit the whole circuit into a small space, which can be fitted into small gadgets such as iPods, cell phones, or portable devices ("Integrated Circuits", Explain That Stuff). Without microchips, portable devices would not be possible.

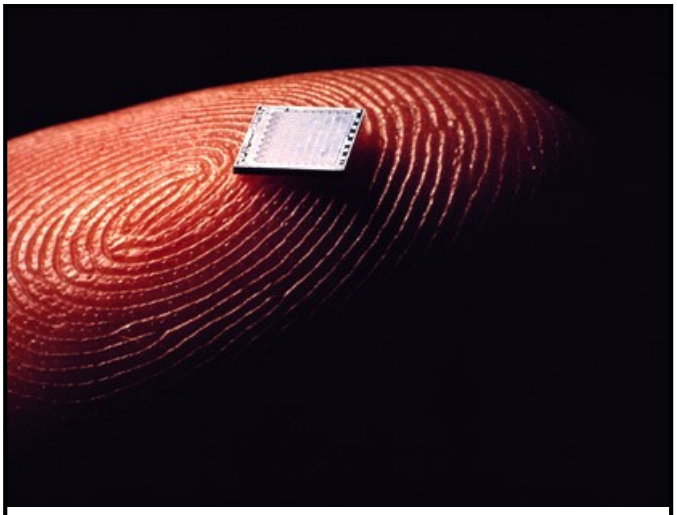
The circuitry of microchips determine what they can be used for. Some microchips can be used to store memory on computers. There are two kinds of microchips: microprocessors and memory chips (Stone). A single chip can hold millions of bits; bits are usually grouped into packs of eight called bytes. A letter or symbol can take from one to ten bytes of memory. Memory chips are used for primary storage that can be accessed immediately by the microprocessors. On the other hand, secondary memory storage is not able to be accessed immediately but is stored on a hard disk, DVD, or flash drive (Verts. "Memory Chip"). Memory chips are mostly used in computers.

There are two main types of memory chips: random-access memory (RAM) and read-only memory (ROM) (Stone). RAM is also known as internal memory or main memory (Verts. "Computer"). RAM can be easily changed, but it only stores memory as long as the computer is

on. There are two different kinds of RAM: static RAM (SRAM) and dynamic RAM (DRAM). DRAM is the majority of a personal computer's (PC) memory, but DRAM only holds memory for a few thousandths of a second and must be refreshed to hold any information. To refresh DRAM, the computer removes information from a group of cells and then puts the same information back. Cells are memory storage units. DRAM may appear wasteful, but it is cheap to make and it stores a lot of information in a small space. The other type of RAM, SRAM holds memory until a microprocessor changes it.

The other type of memory chip, ROM, retains stored memory even when the computer is off. The user cannot usually change the stored memory (Stone). Flash memory, erasable ROM, is ROM that can be reprogrammed, but does not lose information when the computer is turned off (Verts. "Memory Chip"). Electrically Erasable and Programmable ROM (EEPROM) can be erased with an electric pulse. Computer programmers can erase and reprogram parts of the microchip (Stone). Memory chips are important to microchips because they store the information of the world.

Namely, microchips are used in many things such as iPods, cellphones, computers, pets, and cameras, however man more uses are emerging. Microchips are inserted into electronics when they are first made. They are connected to the electronic by little, tiny wires from the microchip to the computer, cell phone, iPods, etcetera ("How Microchips are made part 1"). Microchips are a more useful way to



A Microchip on a Human Finger

(image from http://vivirlatino.com/)

identify pets. Microchips are inserted into pets with a needle, like a shot. Tags can get lost, microchip are more advanced because they are inside the cat or dog forever. A rather unusual application are trees in the Amazon! The microchips are inserted into the trees to help track deforestation ("Brazil eyes microchips for forest management"). But, one of the most interesting applications found is that microchips are going to be able to go into humans. The chips are currently the size of a large grain of rice and can fit onto the tip of a finger (Microchip)! Scientists are trying to make microchips smaller so they can insert them into people to track health, heart rate, and temperature. This would be a tremendous jump in preventing sickness. Microchips may also be inserted into humans to identify who they are (Djeljosevic). All these applications and many, many more would not even exist without microchips.

Furthermore, what would it be like to have a six or seven inch laptop? For Just one of the future applications of microchips include making them smaller. To people who make microchips, smaller is key to a better performing chip. Currently the chips are using a 5 atom thick layer of silicon-based material, which is why a lot of energy leaks out of the transistors. In the future, the number of transistors will increase. The new technology of these chips include the new metal for the transistors, the metal is called hafnium, and it will help make the development of circuitry reduce to 45 nanometers, 1:2000 the width of an average human hair. A transistor is a semiconductor device with three connections, and an amplification cable that is that adds to rectification. Right now many people are trying to make a new, smaller, and faster chip. Today silicon, a semiconductor, is doped with impurities to help it conduct electricity, a semiconductor means that it is unable to conduct any electrical charge at lower temperatures, then they dope it, which means they put impurities that are in a high viscosity lubricant so it can conduct a charge. But in the future, the metals and plasticy silicon may change. In conclusion, the future of

microchips could change the electrical/technilogical world by making them quicker, but smaller at the same time, which also will make people want to make a purchase on a smaller product. All in all, it will be a huge change for technology.

Without microchips technology today would not be same. Understanding where microchips have come from, how they are made, and how they work will help people appreciate the improvements to them today. Without memory computers would be obsolete. All the uses of microchips today extend the possibilities of human society. The future capabilities of microchips will be limitless. Who knew something so small could impact society so greatly?

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