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My understanding of the Engineering field that I am interested in

I have a relatively decent understanding of the engineering field that I am interested in, which is Electronics Engineering. I understand that it is as broad as it is specific, which I believe will continue to pull my interest over the years. In this essay, I will write about my understanding of Electronics Engineering.

First, I know that Electronics Engineering works with Electronics, it's in the name. However, Electronics Engineering targets a variety of applications such as the medical field, scientific applications such as astronomy, geology (for seismic events), biology (for tracking animals with gps tags), etc. What's important in these examples is in Electronics Engineering, we are given a problem and must find a way to solve it by designing a circuit to exploit electron flow to our purposes. Electronics Engineering can also target children's toys as well by adding in functionality to play sound through speakers, or start triggering lights with a variety of profiles to stimulate the children. Additionally, same can go for adults as well with various companies designing computer parts, or computers themselves such as laptops, Raspberry Pis, Televisions, etc. to stimulate the entertainment in adults.

Second, Electronics Engineering dives quite heavily into firmware development for some of the circuits that are made. For example, microcontrollers, BIOS, drivers for device (video cards, sound cards, cameras, etc) all fall under the job descriptions of Electronics Engineers. This way, the devices become 'smarter' and bring further functionality to the circuit boards so they can interface further with other electronics bringing us the Information Age we reside in today. More importantly, the processors that those computers use require Electronics Engineers to write their Instruction Set Architecture (ISA) to understand how to properly function, once the chip's circuit is designed. That way it understands its functionality and can be optimized to specific tasks.

Lastly, Electronics Engineers are capable reverse-engineers, whether it comes to reverse engineering the circuit itself on either PCB or hole-through circuits,

or the software. For the circuits, taking quality scans of the circuit allows for drawing out the schematic and taking measurements of the components. Once completed, modifications can be made to tune to the specific use case, I think a solid example of this would be reverse engineering a modern laptop motherboard so the PCB can be modified and retrofitted into a far older laptop such as the one I use (IBM ThinkPad T60). Additionally, we are phenomenal at reverse engineering software and firmware by taking a binary dump and reverse-compiling it to Assembly or C/C++, allowing it to be human-readable and modifiable. A few of the best examples I can think of off the top of my head for this would be *Nouveau*, a GPL licensed Nvidia video card driver that has been reverse-engineered and released as open source to the Linux and BSD community. Another example would be *Coreboot* and *Libreboot*, which are reverse-engineered BIOS', Libre boot being 100% open source and GPL licensed.

Electronics Engineering is an absolutely phenomenal field that can stimulate us in a wide variety of fields. I hope this short essay will be able to inspire others into it, and display some of the really interesting things we can do, as well as the importance of the career. The more we are interconnected with computers in the future as well, the more relevant our career will be.