Field Report of Electronic Engineering

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Table of Contents

Abstract........................................................................................................................................... 3

Overview......................................................................................................................................... 4

Areas of Specialization................................................................................................................ 5-6

Job Prospects, Education, and IEEE............................................................................................... 7

Interview...................................................................................................................................... 8-9

Works Cited.......................... .................................................................................................. 10-11

Abstract

This report is a field report about a specific field of engineering, electronics engineering. This report will take an in-depth look at what an electronic engineer does, what knowledge they use to do that job, and what sort of applications can use an engineer of this field. This report will also include a summary of the education needed to get into this field, using a few schools and businesses to show what the industry requires and what schools offer programs in that field. Also included in this report, is an interview with an engineer from this field of engineering. This particular interview will feature someone who is retired from the field, but has many years of experience in different applications of electronic engineering and knows about the education needed to be successful in the field. Lastly, the report will show statistics relating to this field, including number of jobs, median wages, and projected job growth so that a hopeful engineer may fully grasp what this field has to offer and what type of life to expect as a result of choosing it.

Field Report of Electronic Engineering

The field of electronics engineering is diverse in job prospects and applications. Electronics engineers use their knowledge of electronic principles and basics from many other fields of science to develop, design, and test new electronics systems for a number of devices. The list of devices that electronic engineers develop and work on is almost endless, from working with motors to radar and navigation systems. The increase in technology in more aspects of our lives has also led to an increase of applications for an electronic engineer. The first of several duties of an electronic engineer is to research, involving specialized positions to find new problems and new ways possibilities of solutions to those problems. These positions are similar in nature to scientists in terms of overall responsibility. The next major component to this field is design and development, the largest and most complex part of the electronic engineering process. This part of the field has the most job prospects and is the most creative part of this field. In this stage, an actual solution to a problem is thought up and put into drawings, reports, and even prototypes of the new systems. Next is production and manufacturing, using engineers that focus on transforming the plans and prototypes of a system into the actual physical device. Finally, one of the most crucial to the assurance of quality in this field is the responsibility of testing. Engineers focusing in this area will specialize in putting the new device or system through as many tests as possible to ensure that it has been designed and manufactured properly. These engineers are extremely important, because they are the first to know if the system actually works and can be trusted to possibly protect or preserve human lives, they may be able to find any flaws in design or manufacturing. Again, the list of what electronic engineers do is seemingly endless and growing, but these basic duties are at the core of what these and most engineers do.

An example of a product coming from this field of engineering is mobile phones, or nearly any mobile device. These devices contain hundreds or even thousands of small components organized in a very specific way to perform the tasks required by our mobile devices. They take into account how their device will interface with microcontrollers to control the screen and other functions, as well as the antenna and how the device uses the signals coming in. Engineers of this field may also develop automated systems for use in manufacturing, working with software engineers to create robotic assembly lines and equipment.

With the ever-growing list of applications for an electronics engineer, there are several distinct areas of specialization, these include but are not limited to:

**Communications** - The design of information transmission systems, such as radio, television, telephone systems, computer networks, GPS satellite systems, and microwave transmission.

**Computer Hardware** - Most systems include some degree of computer control, as such, specialized hardware may need to be developed. This area of specialization can also be shared by computer engineers.

**Computer Software** - While there are specific software engineers, many systems designed by an electronics engineer will require software for their control. An electronic engineer may need to be proficient in software development to properly develop a system that incorporates micro controllers or computers in general.

**Control Systems** - Electronic control systems can be found in almost every aspect of modern life, such as the control in your thermostat, to automated assembly lines using combinations of analog and digital sensors and control systems to accomplish a task. This can lead to other sub-categories, like robotics or signal processing.

**Electromagnetics** - Engineers in this specialization often work with antennas and microwave communication.

**Electronic Design** - Perhaps one of the more obvious specializations, this specialization includes the assembly of electronic components to create a system that does some basic task. Almost every electronic engineer will use fundamental electronics at some point, whether it is compiling a series of transistors and resistors, or designing custom integrated circuit chips and semi-conductors.

**Optics** - Optical systems are a form of communication using optical principles. An engineer in this specialization may design fiber-optic information transmission systems, or even electro-optical devices, such as LCD displays.

**Power Systems** - These systems deal with the creation and transmission of power on small and large scales. This deals with how power is generated from mechanical form and how it translates back when being used. Engineers may design power grids or transformers in this sub-field.

**Semiconductor Devices** - Practically all electronic devices use some sort of semiconductor component or possibly thousands of them. As such, it is of course necessary to have engineers that specialize in the design of better and more efficient semiconductors to keep up with evolving and more demanding electronic systems.

**Signal and Image Processing** - All signals, like visual and audio, represent information. This sub-field deals with interpreting this information and finding efficient ways to transmit it. This is a programming-heavy specialization that deals with designing new and more efficient algorithms to perform these tasks.

Job prospects for this field of engineering are quite positive, due to the fact that almost every company has some use for electronic engineers. In 2012 the number of jobs in the USA for Electrical and Electronics engineers was estimated at 306,100. The job outlook, unfortunately is predicted to grow slower than average. It is estimated that the job outlook will grow only four percent between now and 2022, with an employment change of roughly 12,600. According to the Bureau of Labor Statistics, as of May 2014, the median annual wage for an Electrical Engineer was $91,410. The wage bracket, however, ranges from $59,140 per year to $143,200 per year.

Since this type of engineer deals with very complex systems, there is a great deal of schooling that does need to take place, especially for the areas of specialization this type of engineer may hope to get into. Most entry-level positions in this field will require a Bachelor's degree in Electronic Engineering. Cal Poly Pomona offers a Bachelor's program for this field that takes a minimum 194 units to complete. The degree is in Electrical and Computer Engineering, so there are many courses in electronics as well as basic and advances programming courses, such as object oriented programming. Students can also expect several support courses, like higher levels of calculus and physics, as with most fields of engineering.

Also for engineers in this field there is a chance to be a member of the IEEE, the Institute of Electrical and Electronics Engineers, the world's largest professional association dedicated to advancing technological innovation and excellence for the benefit of humanity, per the IEEE mission statement. The IEEE offers a wealth of publications, conferences, and professionals to help others in the field advance. Students looking to be a part of this field of engineering would benefit greatly from membership with this organization that has endless resources for learning and being successful in the field.

The interview I conducted was with a professor named Glen Graham from the Norco campus of the Riverside Community College District. He Teaches most of the electronics courses as well as courses dealing with automation and supply chain technologies. While he is actually retired from his field, he has a wealth of knowledge and experience for those looking to get into fields relating to electronics. This interview was conducted in person and will be paraphrased, using SN as the interviewer(Scott Nevin) and GG for the interviewee(Glen Graham).

SN: How did you decide to become an engineer in the field of electronics?

GG: Mainly from high school classes in electronics and general interest from those subjects.

SN: What is your educational background?

GG: Two associates degrees and ten professional certifications.

SN: What was your career background in this field?

GG: I started with Dataweight which dealt with weights and measures, then was scouted by Sunkist where I worked designing automation systems for 6 1/2 years, then was scouted to work at General Dynamics, where I worked for 13 years as an engineering specialist.

SN: If you were to do it again, would you choose the same field of engineering and why?

GG: Yes, I would have gone into industrial automation, there are much more options and a wider career path for that field.

SN: Were there obstacles to getting your education?

GG: Well there are always obstacles, but mainly I wish I would have gotten my education before having a family. Getting it while having a family made it much more difficult to complete.

SN: How well did college prepare you for your career?

GG: Very well, I learned most everything I needed for those jobs from the classes I took at RCC.

SN: What did you dislike about your career?

GG: It's vulnerability to recession.

SN: What advice do you have for possible new engineers going into this field?

GG: Follow your passion. If you're just in it for the money, it won't be nearly as beneficial as if you had done something you were passionate about.

SN: Do you think it would be beneficial to have an internship in this field while going to school?

GG: Absolutely, it would be very helpful to get experience before even leaving school.

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