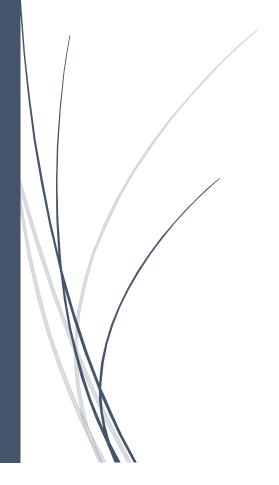3/10/2016

Professional Practice

Successful EE and CE Engineers

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The term entrepreneur is used to describe individuals who identify a communal need for something and invent a new way to satisfy that communal need. Entrepreneurs are relentless in their determination to seek out and solve these communal needs and problems in their communities. By doing this, they are fundamentally changing and impacting the world. (Nelson page1) According to Webster's Dictionary, an entrepreneur is one who organizes, manages, and assumes the risks of a business or enterprise. In the Electrical and Computer Engineering world, there exists hundreds of entrepreneurs who changed the world. I believe that three of these engineers stand out above the rest. They have invented and perfected technologies that have drastically changed the world in major ways. The three inventors/entrepreneurs that changed the world in which we live are Jack Kilby, Amar Gopal Bose and Steve Jobs.

The first of these inventors/entrepreneurs was Jack Kilby, who was born on November 8, 1923, and died on June 20, 2005. Jack Kilby invented integrated circuits which are also known as microchips. Kilby's invention fundamentally changed the electronic age by allowing computers to go from the size of an entire room to the size of a small desktop device. ("Jack Kilby" page 1) The next two inventors both utilized the work of Jack Kilby and expanded his work far beyond anything that was thought to be possible before Kilby's creation.

The second of these inventors/entrepreneurs is Amar Gopal Bose, who lived from November 2, 1929 to July 12, 2013. Bose revolutionized the sound industry by adding and perfecting speakers in cars as well as extensive work with aviation headsets and noise canceling technology. ("Our Story" page 1)

The final inventor/entrepreneur that will be examined is Steve Jobs. Steve Jobs was born February 24, 1955 and lost his battle with pancreatic cancer on October 5, 2011. Jobs is said to have dictated the modern era of technology with Apple's various products including IPods,

IPhones, and IPads. ("Steve Jobs Biography page 1")   These three entrepreneurs successfully shaped and revolutionized the modern technology age as we know it today.

The modern era of electrical engineering is heavily dependent on the use of integrated circuits, which are also known as microchips. Integrated circuits are tiny electronic circuits built to perform a particular function made of various components such as transistors and resistors. Integrated circuits are typically used as amplifiers and receivers in the analog domain. In the digital domain they are used as sensors, counters, timers, logic gates, and even microcontrollers. The need for these various technologies came about in the early 20th century. In the early 20th century computers were being manufactured and were very useful. The downside of the first computers were their size. The first computers produced were the size of entire rooms. With the use of integrated circuits, one was able to drastically reduce the size of the computer to the current minicomputer and personal computer standards. Today's current handheld computing devices show the direct result of the drastic decrease in size when using microchips. Laptops, tablet, mobile smart phones, and microcontrollers are all made possible by the inventions of Jack Kilby. ("Jack Kilby" page 1)

The inventor of the integrated circuits is an entrepreneur that goes by the name of Jack Kilby. Jack Kilby's influences and ideas shaped what we know as electronic computing. Kilby was born on November 8, 1923. He attended the University of Wisconsin and earned a degree in electrical engineering. Kilby started his career at Globe Union Inc. in 1947 working in the circuitry department at the company. It wasn't until 11 years later that he would start working at Texas Instruments. It was at Texas Instruments that Kilby would combine electronic components into a miniature environment. The miniaturization would go on to be known as the first microchip. ("Jack Kilby" page 1) Kilby not only saw the need to reduce the size of

electronic components, but set out to discover a solution to solve this problem like a true entrepreneur.

The advantages of the microchips are endless. The size is a major advantage but also the price, weight, and cost to build new technologies is also drastically reduced when utilizing integrated circuits. Integrated circuits are also highly reliably but in the off chance of a chip failure, one can easily replace the small chip. These advantages of integrated circuits led to their widespread usage in a wide variety of tasks including: automotive controls, televisions, computers, microwaves, laptops, phones, and even space craft's. ("Uses of integrated circuits" page 1) "The chip restructured communications, fostering a host of new ways for instant exchanges of information between people, businesses and nations. Without the chip, man could not explore space or fly to the moon. The chip helps the deaf to hear and is the heartbeat of a myriad of medical diagnostic machines. The chip has also touched education, transportation, manufacturing and entertainment." ("The Chip That Jack Built" page 1)

Kilby's invention was revolutionary for the computing and technological world. Jack's invention marks the beginning of a technological change that began the movement towards electronic equipment that has become a basic part of our lives. Being a relentless entrepreneur, Kilby did not stop there. Kilby also invented the thermal printer as well as the first integrated circuit based calculator. After this point in his life, Kilby went on to become an independent agent who worked on solar power based research as well as a professor at Texas A&M University. Over the course of his career, Jack Kilby held dozens of patents as well as starting a foundation to honor people doing innovative and progressive work in the fields of science and medicine. (Jack Kilby One)

Jack Kilby's integrated circuits did not only help to further electrical engineering and computer engineering, but also a new type of engineering known as sound engineering. Sound engineering is an audio science that deals with the recording and reproduction of sound waves through various electronic and mechanical techniques. Sound engineer is an ambiguous term which can refer to a person working in sound and music production or to an engineer with a degree who designs professional equipment for these tasks. ("Sound Engineering Technician" page 1) The next famous inventor/entrepreneurs was a designer of acoustical tools and equipment.

Amar Gopal Bose is a perfect example of what it means to be a relentless entrepreneur. Dr. Bose once said, "Never lose your imagination. Always dream of things that are better and think about ways to reach those things." Amar Gopal Bose had been following his motto ever since he was a young boy. When Bose was a young teenager, he would repair broken radios out of his parent's basement after school. After high school, Bose went on to earn a degree in electrical engineering from Massachusetts Institute of Technology (MIT). Bose went on to further his knowledge by earning a PhD for his thesis on non-linear systems. Bose was a lover of classical music and purchased a very expensive sound system on which to listen to his music. Bose was extremely disappointed in the sound quality of the technology he was buying and decided to find a solution to his acoustics problem. ("Our Story" page 1)

In 1964 Bose launched his own company, Bose Corporation which specialized in audio equipment. His company introduced new loudspeakers that were not a huge success in the market. The loudspeakers utilized a technology that was already known to the world. Although Bose made his loudspeakers better than previous producers, the product still did not sell well, because there was no communal need for the product. Bose learned that consumers wanted

products that were both innovative and practical. It was after Bose learned this lesson that his

company soon began to take off by selling internationally with some of the world's top selling

loudspeakers. ("Our Story" page 1) Stopping here was not an option for such a successful

entrepreneur as Amar Bose.

Bose was on an airplane trying to listen to music when the engine sounds were disrupting

his tunes. He saw a communal need to give people a better way to listen to music. It was here

that the inner entrepreneur in Bose emerged. Bose decided to take his company in the direction

of noise canceling devices, so that loud devices would no longer interfere with sound quality.

The time required to develop the noise canceling technology took a few years. During this time,

Bose was able to launch custom engineered sound systems for specific automotive companies

like Mercedes and Porsche. ("Our Story" page 1)

Bose continued to invent and surpass all expectations to satisfy the sound desires of the

world. He took his company in all parts of the sound industry in trying to accomplish this. In

the following years, Bose not only made aviation headsets that were smaller, lighter, and better

than ever before, but also continued testing and perfecting his previous technologies. ("Our

Story" page 1)

Amar Bose was an astonishing electrical and sound engineer who saw the communal

need of a way to hear recorded sounds clearly and without any outside interference. Amar Bose

successfully created and built new technologies to satisfy this absence in technology. Amar

Gopal Bose built his company from the ground up supplying the world with a new sound

technology. Amar Bose was such a successful entrepreneur that he was estimated to be worth

over a billion dollars at the time of his death. The Bose Corporation is privately held with over

ten thousand employees. ("Amar Bose Biography" page 1)

Society has been obsessed with videogames, communication, and music as far back as the cavemen. The next entrepreneur revolutionized the term of handheld games and communication. Steve Paul Jobs was not a college educated engineer like our previous entrepreneurs. Jobs is a self-taught engineering mind, who saw the communal need for newer technology that could be easily mobilized, so he went out and began inventing new technology.

Steve Jobs was born to two graduate students who gave him up for adoption. Jobs was adopted shortly after his birth in February of 1955. Paul Jobs, Steve's adopted father, was a machinist by trade. It was Paul that nurtured his son's fascination with electronics. Jobs became interested with electronics when he was a little boy helping his dad to fix electronics. His dad would show him how to take apart and rebuild various electronic components. It was this hobby that instilled a confidence and tenacity in Jobs that he would carry into his successful future career as an entrepreneur.

Jobs was a highly intelligent student and was very bored in school. Jobs was so smart, the school administrators wanted to him to jump grade levels. His adoptive parents did not believe this would be a good idea and refused the administration's request.

While in high school, Jobs met a man by the name of Steve Wozniak, who would later become his partner in his future company. After his high school graduation, Jobs enrolled in college; however, Jobs dropped out of college and went exploring the world. For a brief while, Jobs worked as a video game designer for Atari. ("Steve Jobs Biography page 1") In 1976, Jobs and Wozniak started the Apple Company. Jobs and Wozniak took the company into personal computers when the company first started. Apple was a very successful in its first years.

After Apple's initial success, the company began to fail. The company was delivering inferior products with design flaws. Customers lost interest in the Apple products and gravitated

toward IBM personal computers. Eventually, the company began to fail and since Jobs did not

have an official title in the company in which he co-founded, he was phased out of Apple.

("Steve Jobs Biography page 1") This is when the entrepreneur in Jobs came out.

After leaving Apple, Jobs started NeXT, Inc. which later became known as Pixar

Animations Studios which produced very successful movies such as Toy Story and Finding

Nemo. In 1996, Apple bought NeXT, Inc. and Jobs returned to Apple as CEO. ("Steve Jobs

Biography page 1")

Jobs completely revamped his company and the company started producing new and

innovative products. The new products were touch screen IPods, IPhones, and IPads. The IPods

were able to satisfy the communal need for a better way to listen to music. The IPhones satisfied

a need for an easier way to reach and connect to people all around the world. The IPads satisfied

the communal need to play videogames. This new technology was capable of a lot more than the

simple games and the ability to play games. The new technologies revolutionized the computer

industry in the way they were designed to be smaller, cheaper, faster, intuitive, and easily

accessible to everyday users. The introduction to these new technologies sent Apple's

competitors scrambling to come out with similar types of technology. ("Steve Jobs Biography

page 1")

Jobs was a very successful entrepreneur who started his company by satisfying the public

needs for personal computers. He went on to save his company by revamping the entire Apple

Company and creating a new line of products that revolutionized modern technology for years to

come. At the time of his death in 2011 at the age of 56 from pancreatic cancer, Steve Jobs' net

worth was estimated at 10.2 billion dollars. Jobs' early success as an entrepreneur made him one

of a select few who made Forbe's list of the richest people. Making this list was very impressive

because Steve Jobs was part of a select group of young individuals who was able to make the list without having previously inherited money early in their life. (Dodds page 1)

Jack Kilby, Amar Gopal Bose, and Steve Jobs were amazing individuals. Before they died, they each helped to change the lives of their generation and future generations with their various innovative products and inventions. Their inventions changed the basic world in which we live in from the phones we use every day to the technology that is in every classroom.

In the Electrical and Computer Engineering world, there exists hundreds of entrepreneurs who have changed the world. Three of these engineers stood out above the rest: Jack Kilby, Amar Gopal Bose, and Steve Jobs. They have invented and perfected technologies that have drastically changed the world in major ways.

Jack Kilby invented integrated circuits, which are also known as microchips. Kilby's invention fundamentally changed the electronic age by allowing computers to go from the size of an entire room to the size of a small hand-held device.

Amar Bose was an astonishing electrical and sound engineering entrepreneur, who saw the communal need to hear recorded sounds clearly. Amar Bose successfully created and built new technologies to satisfy this absence in technology. Amar Gopal Bose built his company from the ground up supplying the world with new advancements in sound technology.

Steve Jobs is an impressive individual who lacked a formal college education and was taught by the individuals around him. He created new innovative devices that surpassed anything that was available at the time.

The term entrepreneur does not even begin to describe these three individuals who went out and identified the communal need of their time and invented new technology to satisfy that communal need. They had a relentless determination and sought out ways to solve these

communal needs and problems. By doing this, they fundamentally changed and impacted the

world in ways they never thought possible. (Nelson page1) Their stories are an inspiration to all

of us. Will you go out and change the world?

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