



**Course Title: INTRODUCTION TO ICT**

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**Total Marks: 30**

**Note: Attempt all Questions.**

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**Q 1. Watch animated movie “Incredible 1” and discuss the technologies used by characters of the movie. Further, take note of the technologies used in making of this movie.**

After tackling the sheer scale and intricacy of production design for "The Incredible 1" the filmmakers took on their most difficult task, animating the characters so that they appeared alive throughout the broadest possible span of human-like movements and expressions.

This would take the film's crew into a "forbidden zone": It was widely believed that computer animation wasn't equipped to generate subtle human qualities. For instance, it was considered impossible to animate muscles that would flex and ripple, hair that would flip and bounce, skin that would pucker and stretch, and clothing that would move independently of the body. Because of this, computer animators had long avoided human-like characters. Director Brad Bird, however, was convinced the technology could be invented to allow his characters far more "life."

The Technologies used in incredible 1:

**Skeletons and Muscles:**

**Listening to the interview of Mr. Bill Wise: The characters supervisor**

The skeleton and its surrounding musculature is where all human motion begins, so this, obviously, was where the Pixar team started. It began with the body of Bob Parr, Mr. Incredible, and literally created him from the inside out.

The 'Incredible 1' technical team used a fantastic new technology called 'GOO,' which allows the skin to react to the muscles sliding and sticking underneath in a very true fashion."

This changed the entire animating process. Animators are not so much technicians as they are artists -- actors or puppeteers who creatively choreograph the characters' movements and expressions through specially programmed computer controls. Now the animators had more control of the characters than ever before.

Once Bob was completely modeled, he served as a template for the skeletons of the other characters. "With Bob, we really concentrated on achieving a high level of complexity in body motion". "Once we were able to rig his movements, we were able to use that same articulating skeleton for the other characters -- with some changes, of course. A female character, for

example, isn't going to have as defined a musculature, but she's still got a deltoid that pulls down over the top of the humerus. There's still a collarbone there. And so you could reshape that same rig to fit any character."

One character in particular proved to be especially challenging in her muscular movements: Helen Parr, alias Elastigirl, who had to be able to stretch, bend, and fold into a vast array of pretzel shapes that would flummox even the finest Yogi. Elastigirl pushed the animators one step further, and so they wrote a program called a "deformer" that would allow her to twist and turn as needed. It was the most complex rig they had ever made. The animators could actually pull her body into a parachute shape or stretch her arm out into a long ribbon of flesh and bone.

### **Skin and Hair:**

The qualities that truly create realism in a character are the appearance of skin and hair. This is where Pixar made its most important breakthroughs, with new approaches to lighting and shading the skin and sculpting hairstyles. Pixar came up with a new technology called "subsurface scattering," which gave more translucency to the skin and made the characters seem alive. With hairstyles ranging from Helen's short, well-manicured coif to Violet's long, free-flowing locks, new programs and approaches were also required to sculpt the tops of the characters' heads.

### **While listening Mark Henne, the film's hair and cloth simulation supervisor:**

"The characters came into our department bald and naked, and they left with wardrobes and hair that would move in a realistic way," says Mark Henne,

The most difficult character to animate from a hair standpoint was Violet. She remained an "unsolved research project" well into the production of the film, due to her long, flowing hair -- the bane of an animator's existence. In fact, no one had ever animated this kind of hair before for a CG film. Henne and his team came up with five different sculpted hairstyles for Violet for the different phases of the film. Each of these styles could then be modified to reflect the various environmental conditions she encounters, including rain, wind, and the zero gravity of her own force field. Eventually, Violet's hair became one of the film's triumphs.

### **Clothing:**

Even in regard to wardrobe, "The Incredibles" was more complicated than any animated film in history, and more akin to an epic costume drama. More than 150 garments had to be specially designed and tailored to fit the lead and background characters.

The director didn't simply want great-looking clothes for his characters -- he wanted clothes that would move like actual fabric. Pixar was already famous for its pioneering work in cloth motion, thanks to advances made with Boo's T-shirt in "Monsters, Inc." For "The Incredibles," the team found an inventive way to "bake" garments onto the characters, especially in the case of tight-fitting supersuits. Instead of simulating the clothing for each individual frame, this process analyzes the different poses and motion patterns for a character and automatically creates the appropriate movement for the clothing. For example, when Bob sits in a chair, wearing his supersuit, the suit knows what to do and where to crease because it has already been through a comprehensive training set.

## **Special Effects:**

The biggest leap from an effects standpoint is the fact that incredible special effect team have, was beautiful, amazing, 3-D volumetric clouds that you can actually fly through. Most clouds in other effects movies, or even previous CG films, are matte paintings or stock photography. In incredible film, when Helen is in the airplane flying through the clouds, it's very 3-D, and you see the clouds moving against each other. They're transparent, and if you stack them, they become opaque."

As great as the special effects are, the personalities of the characters are what really give "The Incredible 1" its human feel.

## **Q 2. Write a note on the following embedded technologies in detail.**

**(a) Machine Learning:** The intelligent systems built on machine learning algorithms have the capability to learn from past experience or historical data. machine learning facilitates computers in building models data in order to automate decision-making processes based on data inputs. Any technology user today has benefitted from machine learning.

**For example,** medical diagnosis, image processing, prediction, classification, learning association, regression etc.

### **(b) 5G Technology:**

5G technology is the next generation of wireless communications. It is expected to provide Internet connections that are least 40 times faster than 4G LTE. 5G technology may use a variety of spectrum bands, including millimeter wave (mmWave) radio spectrum, which can carry very large amounts of data a short distance. 5G will be good for your phone, but it'll be more of a revolution for other devices. ... Forget about archaic.

**examples** like "downloading a full-length movie in ... network, as the 5G wireless gear is distinct from today's 4G technology. ... Yes, 5G offers a big "speed" or bandwidth boost over 4G, but that's so ...

### **(c) Virtual reality:**

Virtual Reality (VR) is the use of computer technology to create a simulated environment. Unlike traditional user interfaces, VR places the user inside an experience. Instead of viewing a screen in front of them, users are immersed and able to interact with 3D worlds. Virtual reality is an artificial environment that is created with software and presented to the user in such a way that the user suspends belief and accepts it as a real environment. On a computer, virtual reality is primarily experienced through two of the five senses: sight and sound.

## **(d) Robotics:**

Robotics technologies consist of all processes necessary to design, build and maintain robots and other intelligent machines. Robots are sophisticated, intelligent systems used to assist pilots and maneuver spacecraft without direct human intervention.

Robotics is an interdisciplinary research area at the interface of computer science and engineering. Robotics involves design, construction, operation, and use of robots. The goal of robotics is to design intelligent machines that can help and assist humans in their day-to-day lives and keep everyone safe.

### **Q 3. Write a note on the following:**

**Write a note on prevailing generation of computers in use and discuss its characteristics in detail.**

The five generations of computers and major technology developments that have led to the computing devices that we use today. ... The use of parallel processing and superconductors is helping to make ...

#### **First Generation:**

First Generation The period of first generation: 1946-1959. Vacuum tube based Vacuum tubes were used for first generation computers for circuitry and magnetic drums for memory. The transistors invented in 1947 which was not seen as extensive use, replaced vacuum tubes. The development of the Integrated Circuit (IC) was the major turning point of the third generation computers.

#### **Characteristics of First Generation of Computers:**

- Use of vacuum tubes to make circuits.
- Use of magnetic drums.
- Use of machine language and symbols in instructions.
- Very small amount of storage space.
- Use of punch cards as I/O devices.
- Huge in size and poor in mobility.
- Very slow and less reliable output

#### **Features of first generation computers:**

Electrostatic tubes, Purer tape, punch card, magnetic tape. Punched card, printing devices were used for input/output operations and store the result. It occupies very large space, slow processing, inefficient and unreliable due to low accuracy. ... Computer used to be much expensive ...

#### **Second Generation:**

A transistor computer, now often called a second generation computer, is a computer which uses discrete transistors instead of vacuum tubes. ... A second generation of computers, through the late 1950s and 1960s featured circuit boards filled with individual transistors and magnetic core memory.

The 2nd generation was from 1959 to 1964. The second generation of computers was characterized by transistors instead of vacuum tubes and was smaller in size and weight. ... The first computers were used for the atomic energy industry. FORTRAN was introduced in this generation.

#### **Characteristics of Second Generation of Computers:**

- Use of transistors.
- Magnetic memory and magnetic storage disks.
- High speed I/O devices.
- Invention and use of high level languages such as Fortran and Cobol.
- Reduced size.
- Solution to heat generation.
- Communication by using telephone line.
- Improvement of speed and reliability.

#### **feature of second generation computers:**

The distinguishing feature of second generation computers (1956-1963) is that they used discrete transistors mounted on printed circuit cards. Examples are the IBM 1401, IBM 7090 and 7094, UNIVAC 1107, PDP-1 and 8. The IBM 7090 was a transistorized version of the vacuum tube IBM 709 machine.

#### **Third generation computer:**

Third generation computers were computers that emerged due to the development of the integrated circuit (IC). They were the first steps toward computers as we know them today. Their main feature was the use of integrated circuits, which allowed them to be shrunk down to be as small as large toasters.

#### **Characteristics of third generation computers:**

- Integrated circuits instead of individual transistors.
- Smaller, cheaper, more efficient and faster than second generation computers.
- High-level programming languages.
- Magnetic storage.

#### **Features of the third generation computers are:**

High-level languages like FORTRAN, BASIC and other are used to develop programs. Semiconductor memory like RAM and ROM were used as primary memory. Monitor and keyboard were introduced for data input and output respectively. Multiprogramming facility was developed

#### **Fourth Generation of computer:**

A computer built using Very Large Scale Integration (VLSI) integrated circuits, especially a microcomputer based on a microprocessor, or a parallel processor containing two to thousands of CPUs. was between 1971 – 1980. These computers used the VLSI technology or the Very Large Scale Integrated (VLSI) circuits technology. Therefore, they were also known as the microprocessors. Intel was the first company to develop a microprocessor.

#### **Characteristics of Fourth generation computers:**

- Much less expensive.
- More laptops.
- Much smaller size.
- Available for any type of person.
- Basic Computer Language.
- Computer Mouse and GUI make computers more enjoyable.
- More powerful and reliable than previous generations.

### **Features of the fourth generation computer are:**

Networking between the systems was developed and became of everyday use in this generation. Storage of memory and other storage devices has increased in big amount. Outputs are now more reliable and accurate. Processing power or speed has increased enormously.

### **Fifth generation computer:**

The Fifth Generation Computer Systems was an initiative by Japan's Ministry of International Trade and Industry, begun in 1982, to create computers using massively parallel computing and logic programming. It was to be the result of a massive government/industry research project in Japan during the 1980s

### **Characteristics of Fifth generation computers:**

- Multi-processor based system.
- Use of AI.
- Use of optical fiber in circuits.
- Development of the elements of programs.
- Automated audio in any language to control the workflow of the computer.
- Magnetic enabled chips.
- Huge development of storage.

### **Features of the fourth generation computer:**

- The fifth generation computers will use super large scale integrated chips.
- They will have artificial intelligence.
- They will be able to recognize image and graphs.
- Fifth generation computer aims to be able to solve highly complex problem including decision making, logical reasoning.

### **prevailing generation of computers:**

7th gen means it's the 7th official release of a new processor line, usually associated with the intel company. Typically, processors are release 1–3 times a year. It used to be a little more predictable with a system of development and release called tick-(new architecture) and -tock(improvement

(b) Multiply the given binary numbers 10001001 with 10010011.

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× (100010011)<sub>2</sub>

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(1001001100101011)<sub>2</sub>