Module 6 - 15 % Marks

3 Hours Lecture

Modular design; Design optimization; Intelligent and autonomous products; User interfaces; communication between products; autonomous products; internet of things; human psychology and the advanced products. Design as a marketing tool; Intellectual Property rights – Trade secret; patent; copy-right; trademarks; product liability.

6 Hours Project

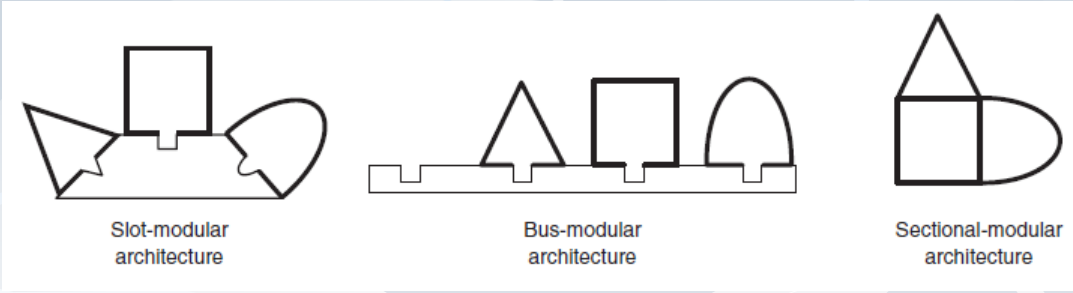
Group presentation of any such products covering all aspects that could make or market it.

MODULAR DESIGNS

Modules are physical building blocks of a product.

- **Each module is made up of a collection of components that carry out functions.**
- **The architecture of the product is given by the relationships among the components in the product and the functions the product performs.**
- **There are two entirely opposite styles of product architecture : *modular & integral***
- **Products are usually a mixture of standard modules and customized components.**
- **Helps in customization of a product.**

TYPES OF MODULAR DESIGNS



Slot Modular :

Each of the interfaces between modules is of a different type from the others.

Bus Modular:

The modules can be assembled along a common interface, or bus. Therefore, interchange of modules can be done readily.

Sectional Modular:

All interfaces are of the common type, but there is no single element to which the other chunks attach.

Hydraulic power unit modular design

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Modular Design of Aircraft Items

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Modular Offsite Design MEP

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INTELLIGENT PRODUCT DESIGN

Intelligent products are the ones that are capable of dynamic interaction from a user angle.

In addition to meaningful interaction, they can store and process user-specific information which can be used to enhance user performance and the quality of interaction.

IT and Information based control strategy gives the main thrust in this direction.

To make a system subservient to the user and at the same time interact intelligently is a tough task.

Autonomous products

Can manage well without constant user interaction- a robot

Intelligent Products

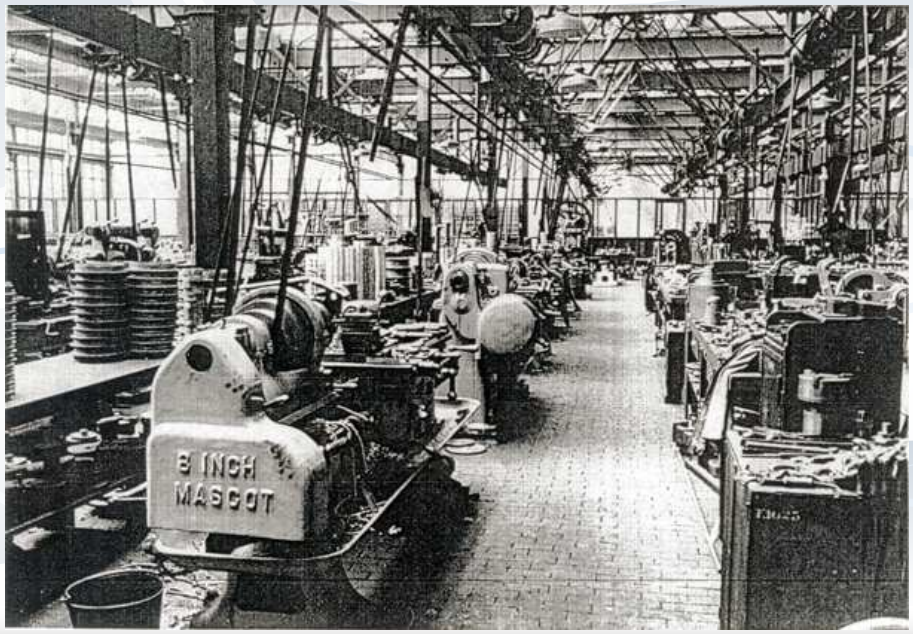
Interact intelligently with the user.

An intelligent product could recognize who the user is and be aware of user preferences.

The system should be able to monitor the user's behavior, learn, and make suggestions towards creating a more satisfying user experience.

Evolution of an Intelligent Product

In the forties and fifties, many lathes were connected to a single motor drive through belt drives.

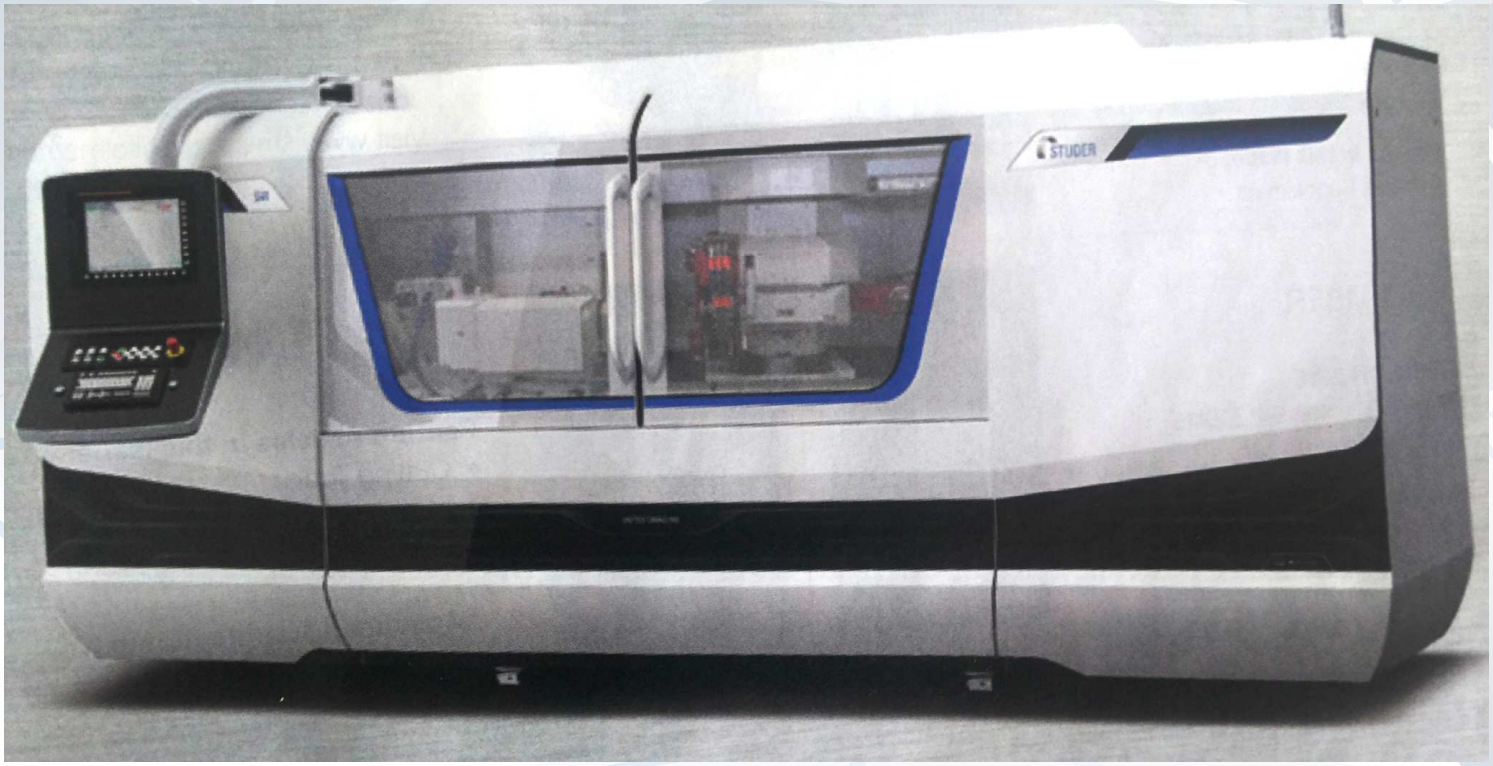


EVOLUTION OF AN INTELLIGENT PRODUCT

- **By early sixties designs were changed and a motor for each lathe became the norm and all drives and controls were coupled to this single motor drive unit through belts, gears, clutches, screws etc.**

CNC MACHINE

AN ELEGANT CNC MACHINE



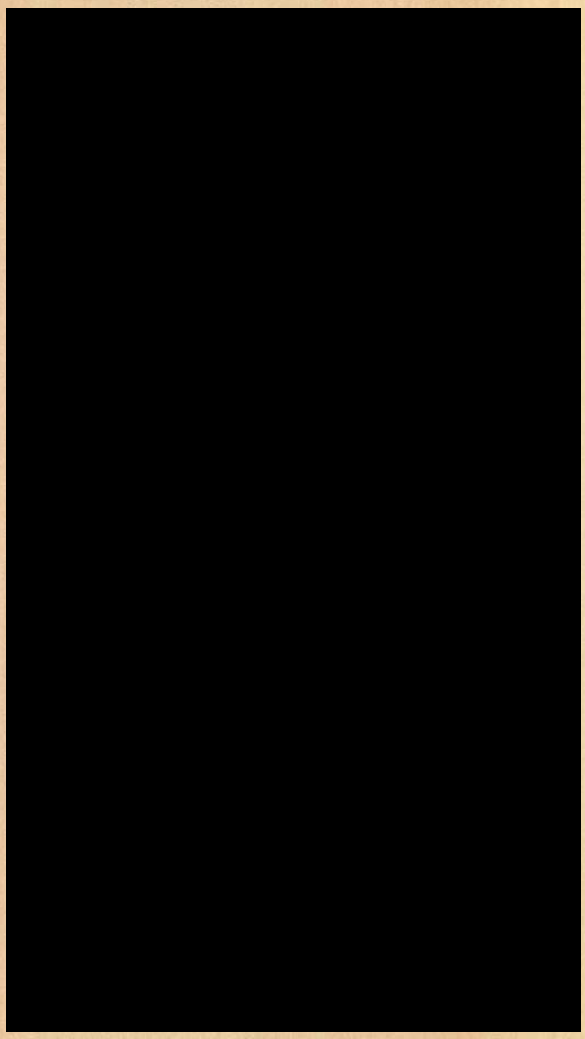
Intelligent & autonomous products

The ability to learn or understand things or to deal with new or difficult situations

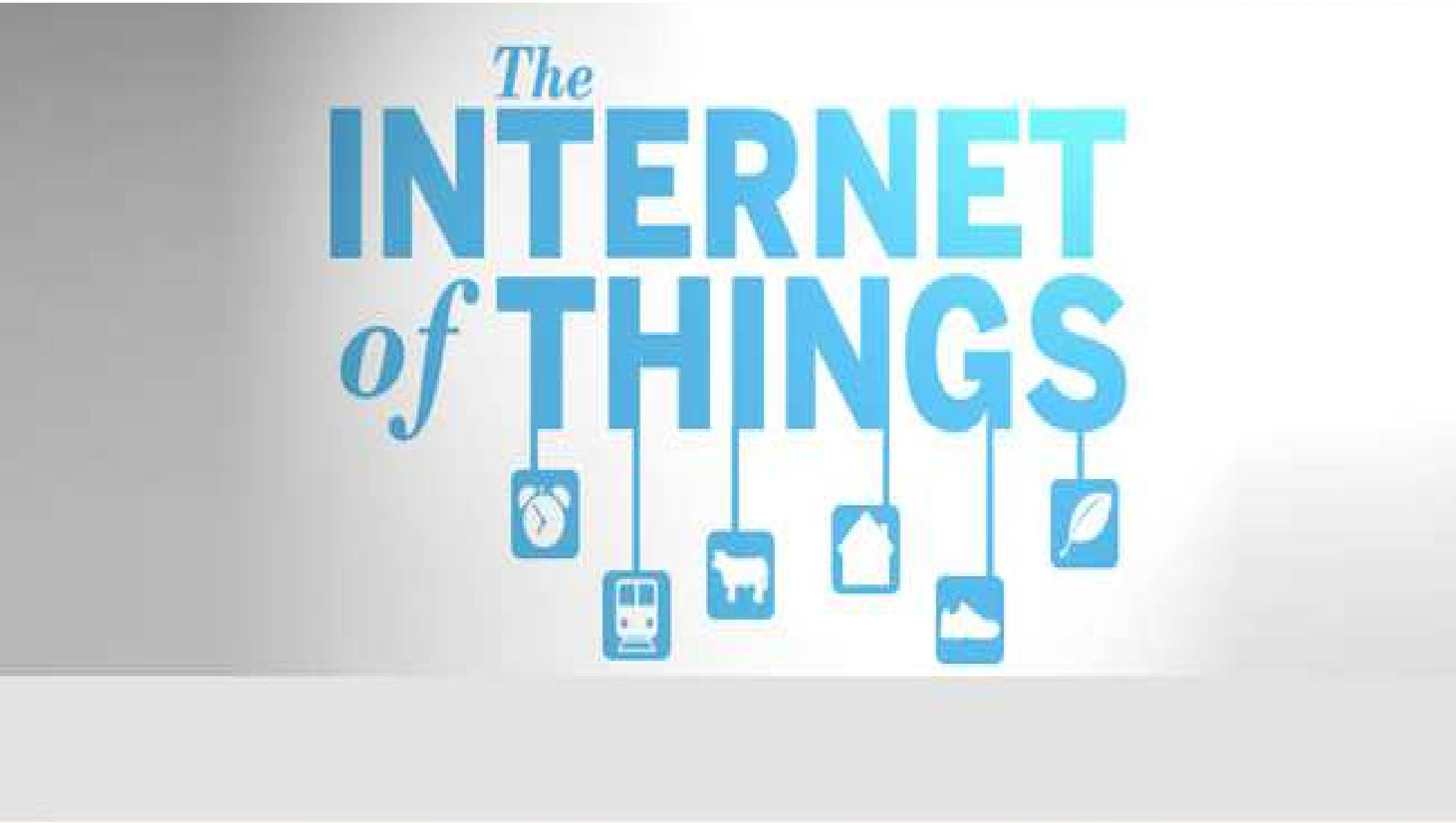
Intelligence has been defined in many different ways including one's capacity for logic, abstract thought, understanding, self-awareness, communication, learning, emotional knowledge, memory, planning, creativity and problem solving. It can be more generally described as the ability to perceive information, and retain it as knowledge to be applied towards adaptive behaviors within an environment

Artificial intelligence (AI) is the intelligence exhibited by machines or software


BostonDynamics
Boston Dynamics




EXIT 25
84 Woodside Rd
3/4 MILE


The
INTERNET
of THINGS

Definition

internet of things (iot) is an integrated part of future internet and could be defined as a dynamic global network infrastructure with self configuring capabilities based on standard and interoperable communication protocols where physical and virtual ‘things’ have identities, physical attributes, and virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network.

CISCO'S PREVISION

In 2008 the number of things connected to the Internet was greater than the people living on Earth.

Within 2020 the number of things connected to the Internet will be about **50 billion**.

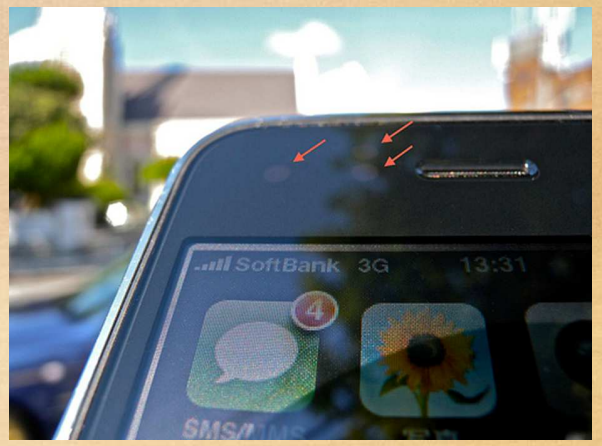
Features

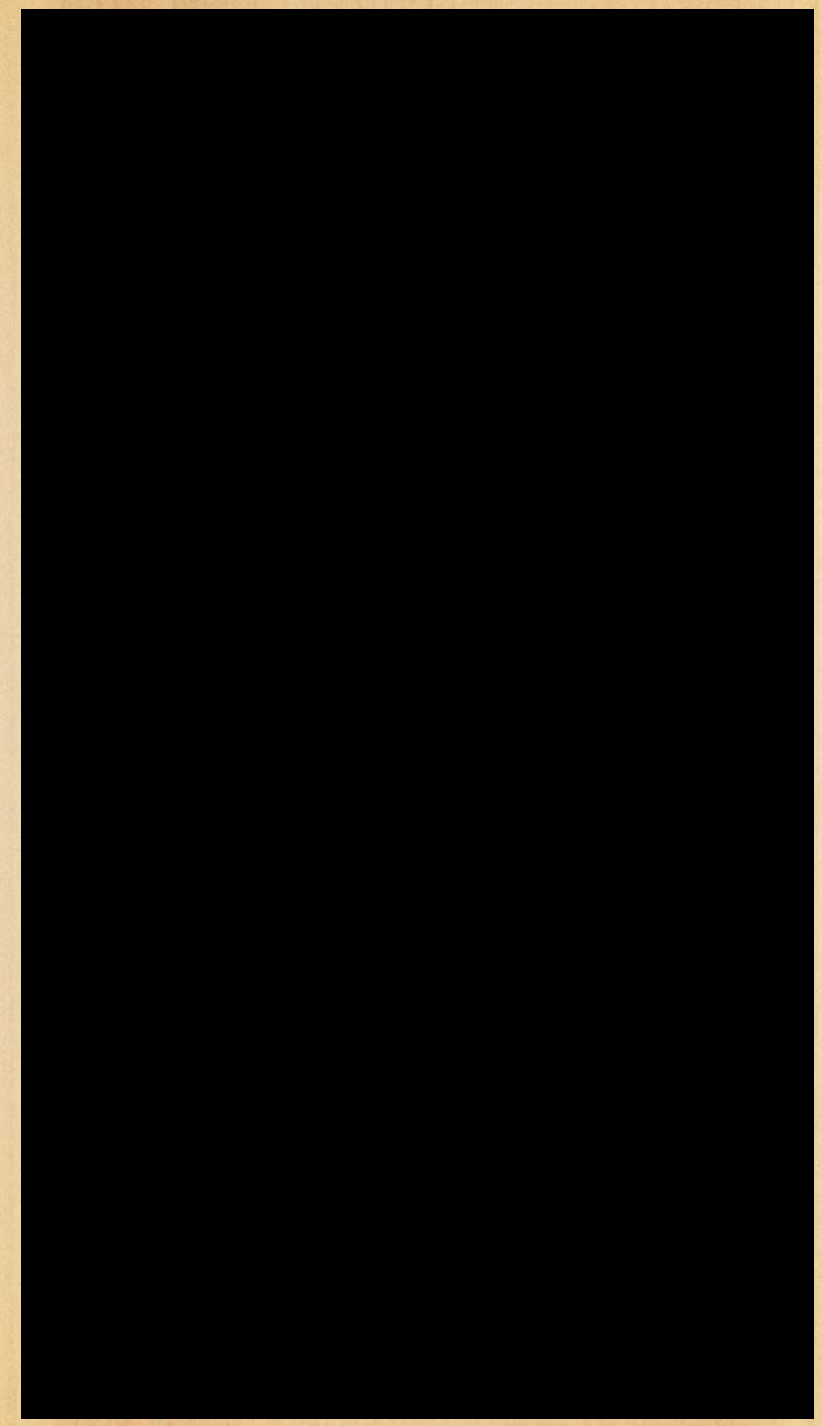
- **Univocally identifiable and addressable objects**
- **Artificial Intelligence**
- **Architecture**
- **Geo-Localization**
- **Size Considerations**

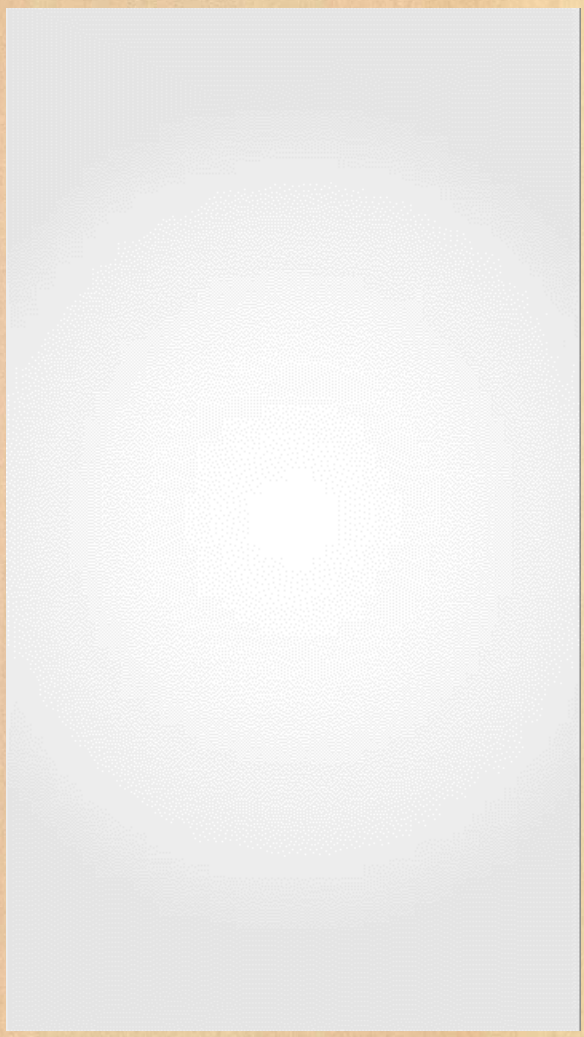
Tecnologies

- RFID
- WiFi IEEE 802.11
- Barcode e QR Code
- ZigBee IEEE 802.15.4
- Sensors and smartphones

ZigBee®
Control your world

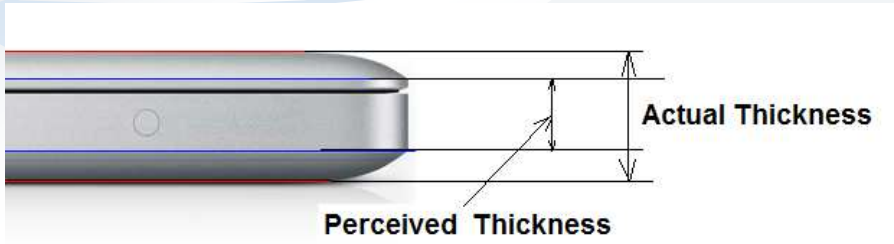






DECEPTIVE DESIGNS

- These designs trick you into thinking the product has something it doesn't.
- It's a smart way to design products (from a business perspective) as it will make your products seem better than they actually are.
- all done artificially through appearance rather than function



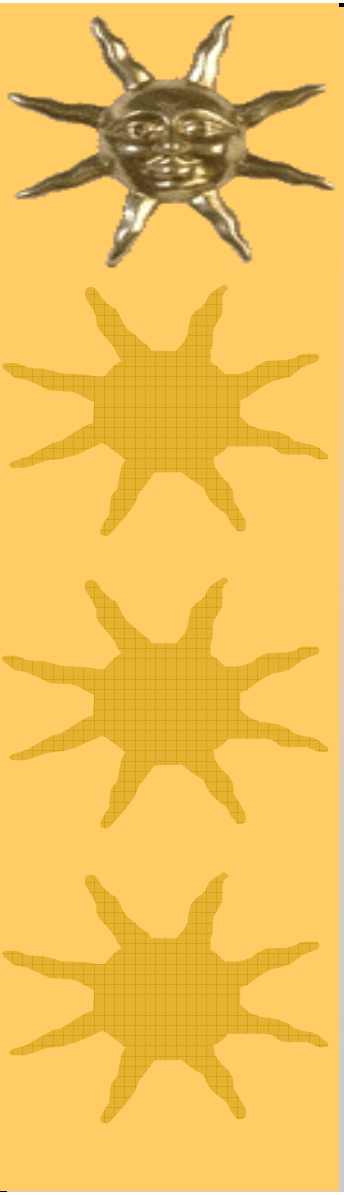
- Glasses of different shapes.

DECEPTIVE DESIGNS

DECEPTIVE DESIGNS

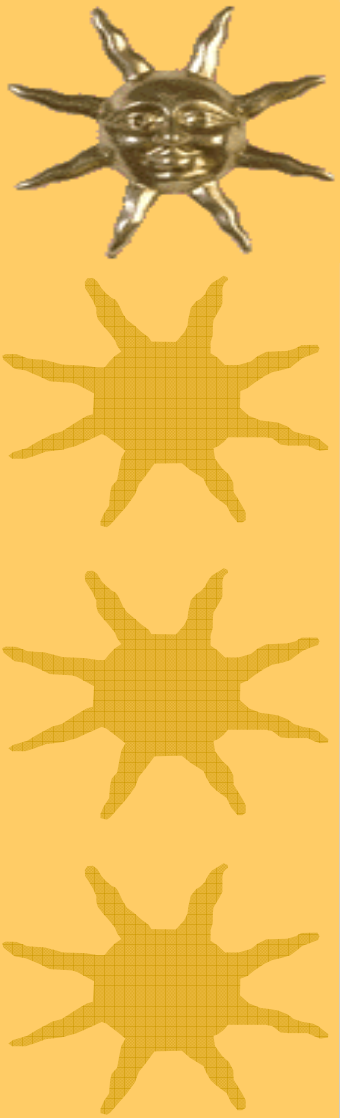
DESIGN OPTIMIZATION

- **Optimization should have only a single objective to be dealt with.**
- **Multi objective optimization approaches are basically trying to cover more than one important factors.**
- **These could be quality, cost, time, weight etc.**
- **Analytical tools are used for such optimization.**



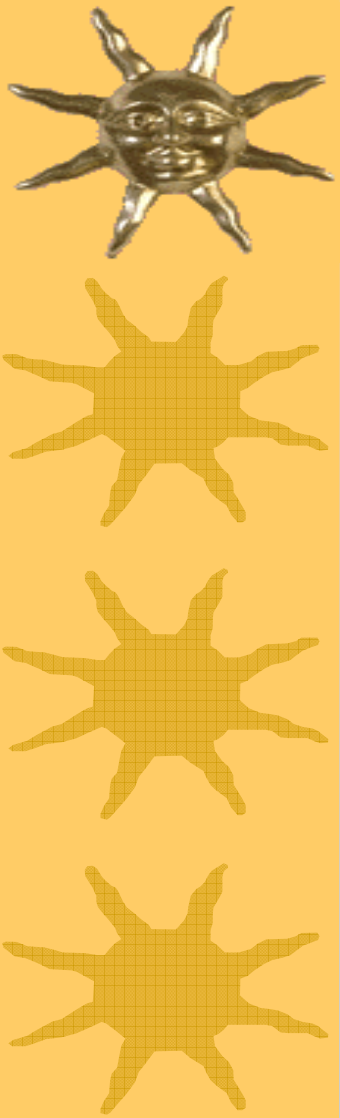
Goal of Optimization

Find values of the variables that minimize or maximize the objective function while satisfying the constraints.



Component of Optimization Problem

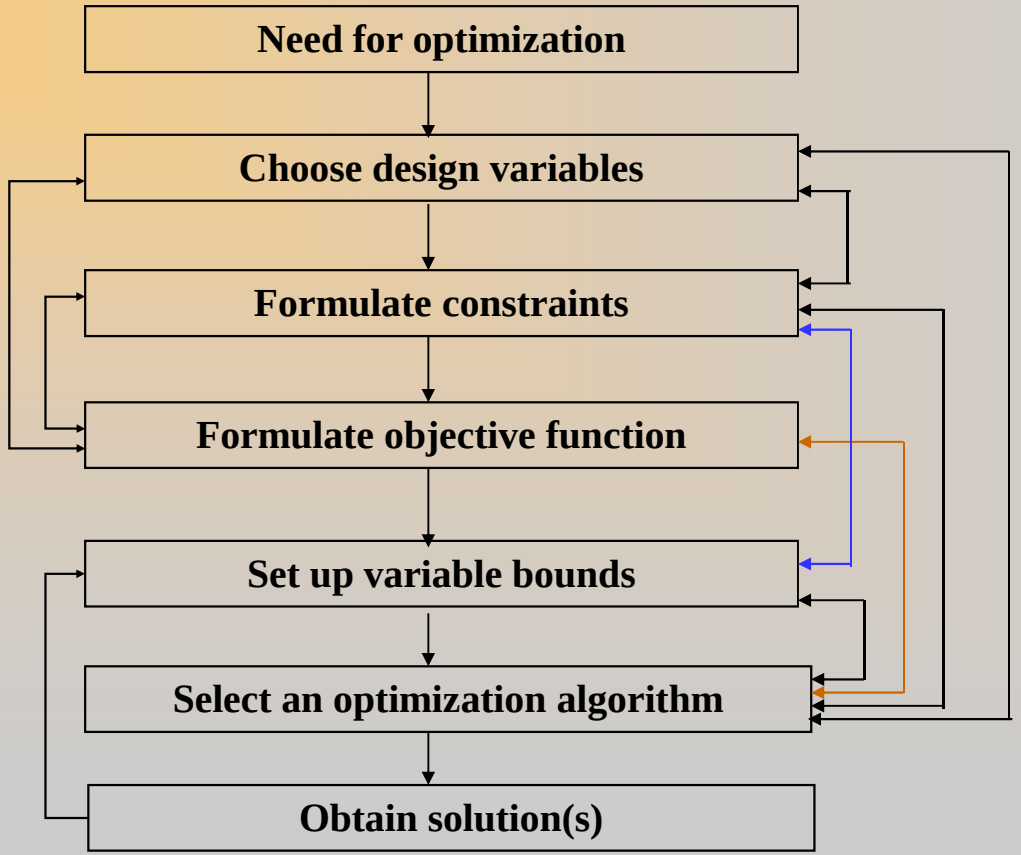
- Objective Function: **An *objective function* which we want to *minimize* or *maximize*.**
- For example, in a manufacturing process, we might want to *maximize the profit* or *minimize the cost.*
- In fitting experimental data to a user-defined model, we might *minimize the total deviation* of observed data from predictions based on the model.
- In designing an inductor, we might want to *maximize the Quality Factor* and *minimize the area.*



Component of Optimization Problem

- Design Variables: **A set of *unknowns* or *variables* which affect the value of the objective function.**
- In the manufacturing problem, the variables might include the *amounts of different resources used* or the *time spent on each activity.*
- In fitting-the-data problem, the unknowns are the *parameters* that define the model.
- In the inductor design problem, the variables used define the *layout geometry* of the panel.

Flowchart of Optimal Design Procedure



DESIGN OPTIMIZATION OF A PART

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STUDY AND OPTIMIZATION IN SOLIDWORKS FEA BY INTERCAD

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PRODUCT LIABILITY

Product liability is the area of law in which manufacturers, distributors, suppliers, retailers, and others who make products available to the public are held responsible for the injuries those products cause.

Types of Liability:

- **Design defect,**
- **Manufacturing defect,**
- **Failure to warn (also known as marketing defects).**

Good Practices – Producing a Safe Product – Three Goals

- ✓ Design a product for which there is no reasonable safer alternative design.
- Manufacture the product as it was designed and without manufacturing defects.
- Incorporate appropriate warnings and instructions to avoid risks that could not be eliminated through reasonable alternative design.

Intellectual Property rights (IPR)

Intellectual property (IP) is a term referring to creations of the intellect for which a monopoly is assigned to designated owners by law.

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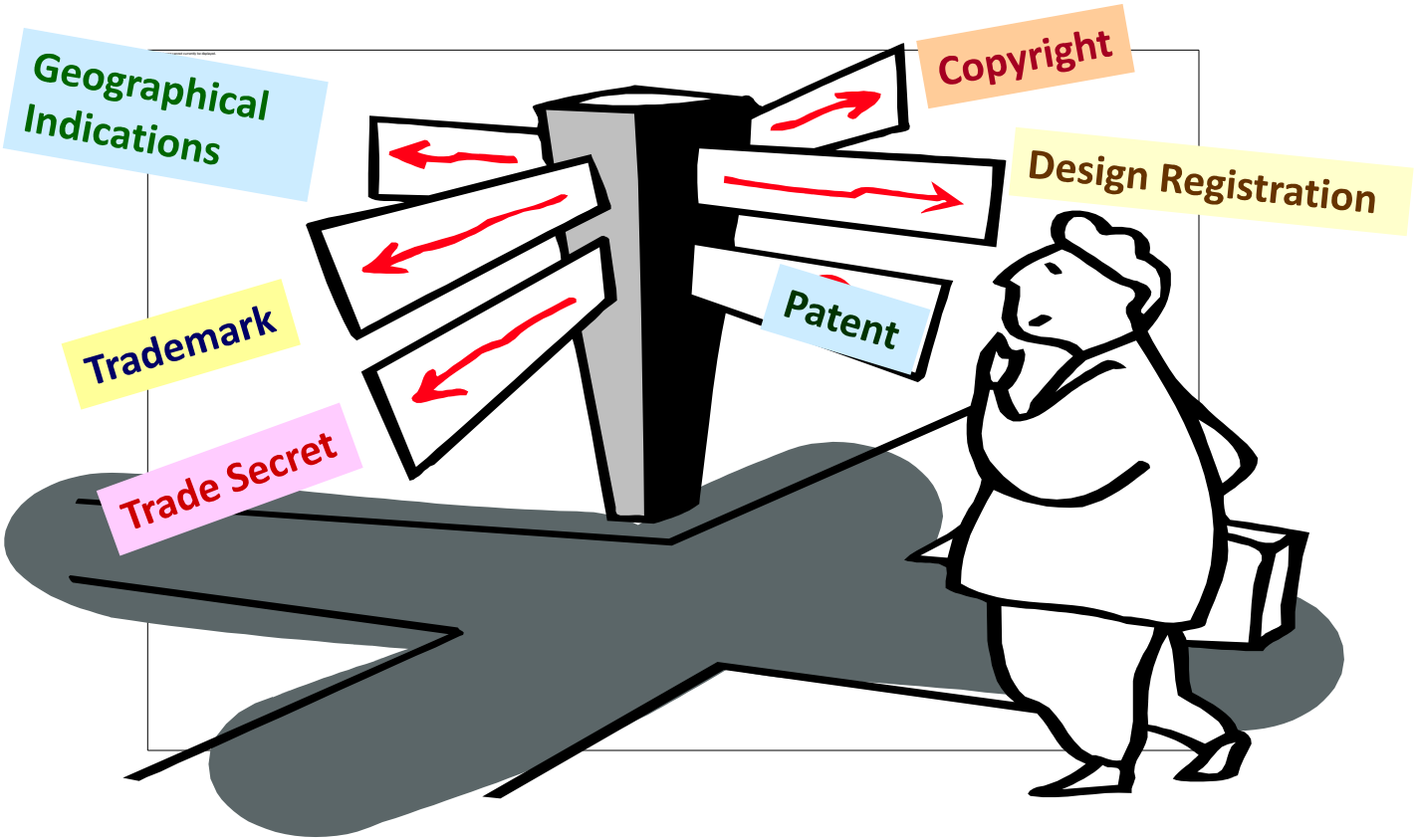
Intellectual Property Rights (IPR) gives them this protection, as well as helping them exploit and control their IP.

“The exclusive right granted by State, to prevent others from using, manufacturing, distributing - inventions, processes, applications, new and original designs, trademarks, new plant varieties, data bases and artistic and literary works”. Such a person is known as ‘rights owner’ or ‘rights holder’

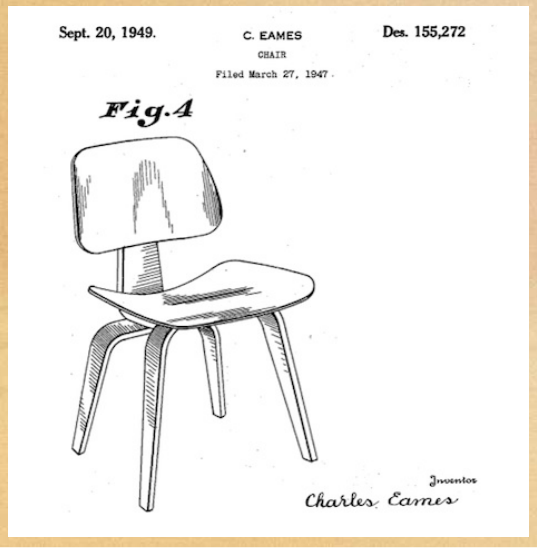
Common types of IPR

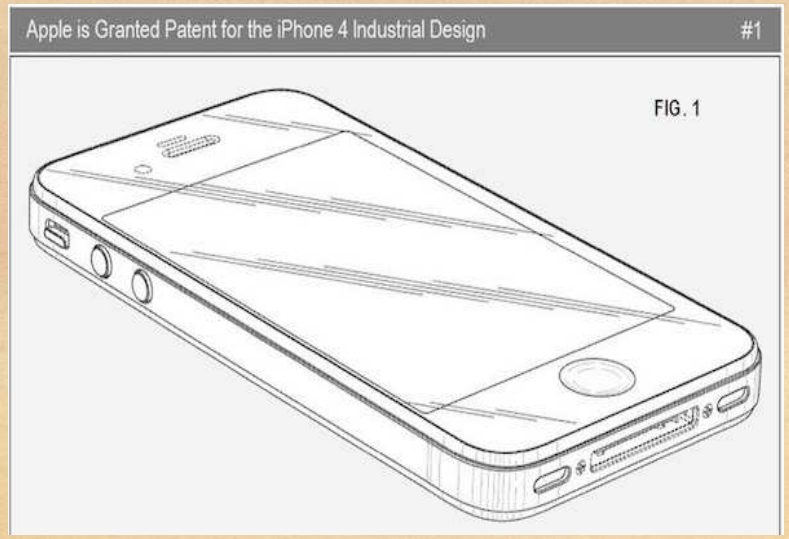


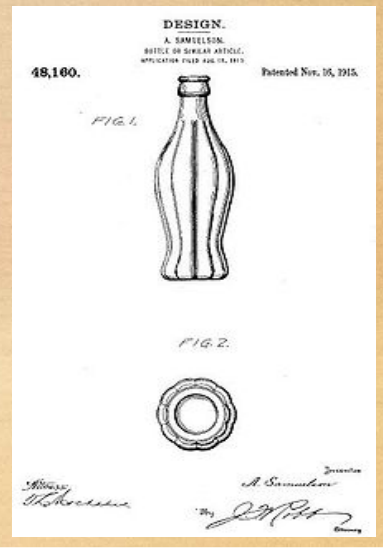
Industrial Design

Industrial Designs: Design deals with features, shapes, patterns, etc., applied to an article by an industrial process, manual or mechanical.

Eg., chair is a utility item. However, chair itself does not qualify for IPR, but its special carvings, embossing etc., is done which increases the value of chair though it's utility remains same, it becomes eligible for IPR under Designs Act. Designs can be registered based on its originality, henceforth they can use ® or registered, with registration number.







Industrial Design

Creation and development of concepts and specifications aimed at

optimizing the functions,

value,

and appearance

of products, structures, and systems.

Read more: http://www.businessdictionary.com/definition/industrial-design.html

What is industrial design-1

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INDUSTRIAL DESIGN-2

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Patents

Patents: Is a monopoly right granted to a person, who invented a new product or process of making an article, for **20years** under the **Indian Patens Act, 1970**, and can be renewed after expiration of period.

The inventor has to file for patent first, and then make his/ her invention to public. A patent has to be applied in each country by the inventor, to claim his rights in that country

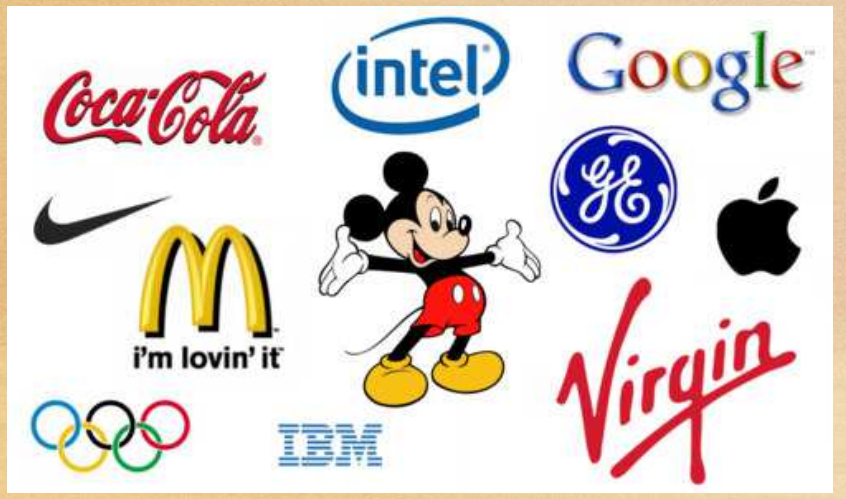
Fig 3. Apple's U.S. Patent No. 635,123 ("the '123 patent"), also entitled "Electronic Device," shows how the exterior appearance of a familiar device can be reengineered to provide a new "look." The design patent provides exclusive rights to the new appearance.

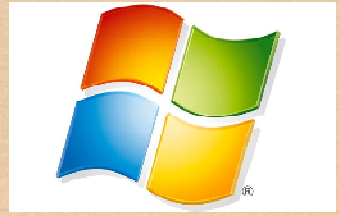
Design Patent Figure	Accused Product	Infringement?
		No. *Richardson v. Stanley Works, Inc.*, 597 F.3d 1288 (Fed. Cir. 2010).

Trademarks

Trademarks: Trademark can be a word, name, brand, symbol, label etc., used by a company to create a unique identity for their product. Trademark can be registered, and then use ™ ®.

The registration validity is for 7 years and renewable after expiry. In India, it is governed by the **Trade and Merchandise Marks Act, 1958**, which came into force on 25th Nov., 1959.





Trade Marks

Name

Logotype

Symbol

Slogan

Shape

Color

Trade Secrets

A trade secret is a formula, practice, process, design, instrument, pattern, commercial method, or compilation of information which is not generally known or reasonably ascertainable by others, and by which a business can obtain an economic advantage over competitors or customers.

- a formula for a sports drink
- survey methods used by professional pollsters
- recipes
- a new invention for which a patent application has not yet been filed
- marketing strategies
- manufacturing techniques
- computer algorithms

Microsoft

Copyrights 

Copyright is a legal right created by the law of a country that grants the creator of an original work exclusive rights for its use and distribution.

It prevents the appropriation of the fruits of man's work, labour or skill by another person.

- Types of work that can be Copyrighted:
  - Architecture
  - Art
  - Audiovisual works
  - Choreography
  - Drama
  - Graphics
  - Literature
  - Motion pictures
  - Music
  - Pantomimes
  - Pictures
  - Sculptures
  - Sound recordings
  - Other intellectual works
    - As described in Title 17 of U.S. Code

Geographical Indication

This is an indication, that originates from a definite geographical area, which is used to identify natural or manufactured product. In order to function as a GI, a sign must identify a product as originating in a given place.

Types of IPRs

Intellectual Property

Industrial Property

Copyrights and related rights

Industrial Designs

Patents

Trademarks

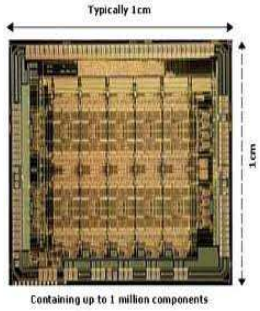
Service marks

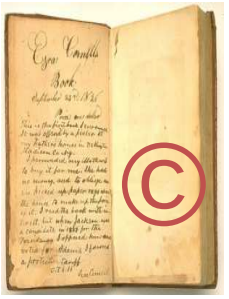
Trade Secrets

Geographical Indications

Layout Designs of Semi Conductor ICs

Plant varieties & Farmer's rights





Product Liability

Product liability is the area of law in which manufacturers, distributors, suppliers, retailers, and others who make products available to the public are held **responsible for the injuries those products cause**. Although the word "product" has broad connotations, product liability as an area of law is traditionally limited to products in the form of tangible personal property.

Design Defects - Present in a product from the beginning, even before it is manufactured, in that something in the design of the product is inherently unsafe.

Manufacturing Defects - Those that occur in the course of a product's manufacture or assembly.

Marketing Defects - Flaws in the way a product is marketed, such as improper labelling, insufficient instructions, or inadequate safety warnings