

MECHATRONICS SYSTEMS

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Abstract: Mechatronics is an **integration** of mechanical and electronics engineering. It is the **multidisciplinary department** which refers to product and manufacturing system design. This paper clearly jots down the importance of mechatronics and its greatest impact on humans life. Here it details the applications of Mechatronics in various fields like **robotics, medicine, automation, defense etc.**

Mechatronics-Introduction:

This term is the mixture of hardware and software components. It was first coined by **Mr.Tetsuramori**, a senior engineer of Japanese company **Yaskawa**, in **1969**.

There are two main components in these systems:

1. Controlling system

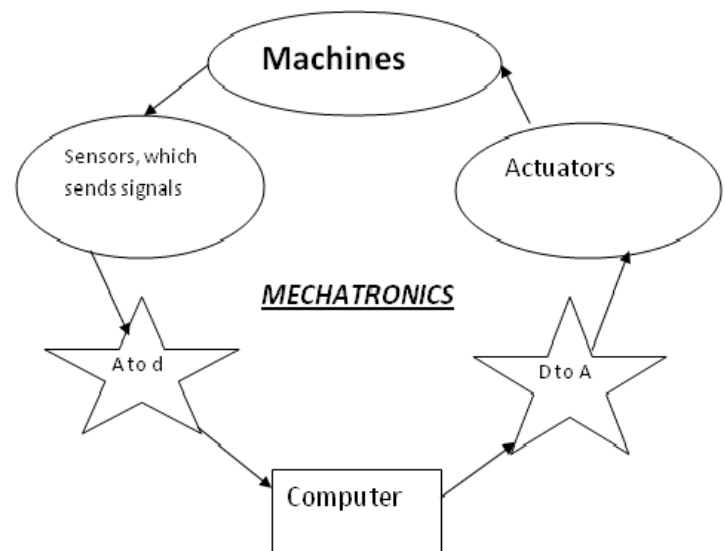
- (i) Knowledge Representation (from monitor)
- (ii) Perception
- (iii) Planning /control

2. Controlled system

- (i) Sensors
- (ii) Actuators
- (iii) Mechanical Process

This system has a good **robust stability** and **nominal performance** .This system also give the

performance evaluations for soft measures on fuzzy systems.



It has an ability to perform complicated and precise movements with **good reliability, durability and noise immunity**

Applications Under various departments:

Micro factory:

It is the Desktop sized Factory which actually built small parts within the single system as a small factory and this helps in **reducing thespace, energy and materials.**



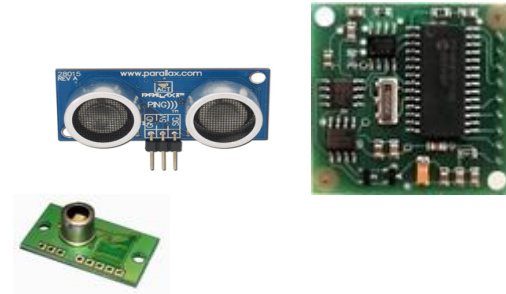
CNC Bending:

In CNC bending it is **fully automated** and the fine output of bent parts comes out and it will be with the definite shapes.



ROBOTICS:

Sensors used in Robots:



The sensors like **ultrasonic sensor, gesture recognition sensor, pressure sensors.** According the applications required various types of sensor can be connected and this reduces the work of the human and it becomes more beneficial

It has a drastic and an emerging development under robotics. It is mainly used in defense. Here these robots can carry 300lb and run 4mph .It can climb run and walk and even it can move over rough terrain. Robot with **rough-terrain mobility** could carry equipment to remote location.Robots can vacuum floors and clean gutters



BigDog

These types of robots which makes use of these mechtronics technology completely helpful in cleaning the floors and gutters.



Space Exploration Application:

These types of robots can collect the specimens and it has been **automated** on board lab for **testing specimens** directly from the space. These robots can travel to other planets and take **measurements accurately**.



NASA Mars Rover

Transportation Applications

It is mainly used to **speed up the trains**. In this system the position and the velocity of the train is **monitored regularly** from the main command center. Then the error margin is being scheduling no more than 30 seconds. These types of fastest trains use the **magnetic elevation theory**.

Using this technology there is an existing system in **German** with the top speed of **550km/h**



(340mph)

In **Japan** there is another train with the top speed of **574km/h (357 mph)** named as JR-Maglev.



Also in **Formula 1 Cars** this mechatronics plays a vital role and it provides **active suspension, anti-lock breaking** and also in **traction control**.

Medical Applications:

It is used in the field of **Prosthetics**, where the **artificial arms, legs** and other body parts can be replaced with this mechatronics systems.



It is used as a **Pace Maker**. This system is very useful for the heart patients. When there is a **fluctuations in the patient heart rate** this machine automatically set the normal rate on seeing these changes.



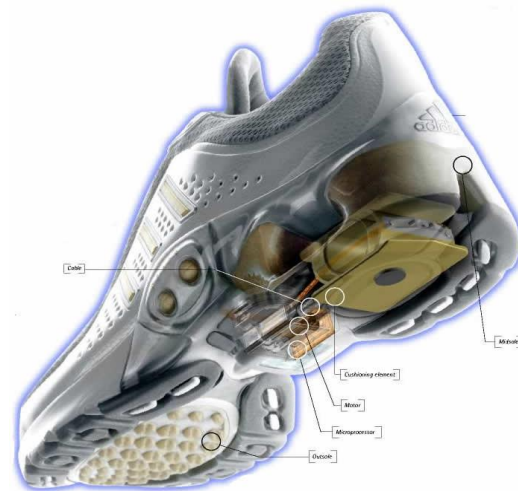
Similar to this pacemaker we also use this technology in **Implantable Defibrillation**. Here the machine automatically monitors the heart and when it fibrillates or stops completely it will **shock the heart at high voltage** to restore a normal heart rhythm.

Innovative idea under mechatronics:

Whenever we go for **jogging**, we used to have a form type of shoes which makes us **comfortable**, but in this fast moving world we face a lot of problems in **obesity**. We are not having enough time to work with the **fitness**.

This shoe would be very beneficial because this updates about the calories burnt and helps you to be **updated with your health**.

Automatically changes cushioning in shoe for different running styles and conditions for improved comfort



In this shoe we use both the mechanical and electronics systems, like **pressure sensors, microprocessor, motor, and a GSM module** within which the **application can be created in the smart phone**. So the information will be automatically updated to the mobile simultaneously. This would be the **user friendly** one and the best way for gym fitness.

Conclusion:

This emerging technology in the mechatronics has a greatest impact on the future generations. This can make the **specially challenged people** to prove themselves and in various fields we are able to get more **accurate results**. Thus this wonderful technology can be implemented and it would be globalised so that the people all over the world will be **benefited more**.

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