

## Examples of Mechatronic Systems Dr. Lutfi Al-Sharif (2012)

The following are further examples of mechatronic systems:

1. Home appliances (e.g. washing machines): Many of the home appliances that are in use today are mechatronic systems. They are manufactured in large numbers en masse and typically require small controllers to be “embedded” within them.
2. ABS (anti-lock braking system) and many areas in automotive engineering: An anti-lock braking system on a vehicle is a system that prevents the wheels from ceasing up or stopping to rotate when the brakes are suddenly pressed. Another good example of a mechatronic system from automotive engineering is the engine control unit (ECU).
3. Elevators and escalators: Elevators present good examples of mechatronic systems. They have many sensors to detect the position and speed of the elevator car, as well as any calls registered by the passengers. It has many actuators, the most important of which is the main hoist motor. Safety is also paramount in these systems as they carry human beings.
4. Mobile robots and manipulator arms: Robots are widely used today in all spheres of life. Robots are generally used for applications that are inaccessible (difficult locations to get to due to height or space), dull (repetitive and tedious tasks), or dangerous (hazardous environments).
5. Sorting and packaging systems in production lines: Mechatronic systems are effectively the basis for modern factory automation.
6. Computer Numerically Control (CNC) production machines: CNC machines are critical in modern manufacturing systems. They allow the user to produce a product directly from a computer model of the piece.
7. Aeroplanes and helicopters: These are complex examples of mechatronic systems that incorporate hundreds or even thousands of smaller sub-mechatronic systems.
8. Tank fluid level and temperature control systems: An example is the process used to produce bio-fuels from vegetable oil.
9. Temperature control system in an industrial oven: Many industrial processes require close control of the temperature of the process in order to achieve the exact required outcome. These systems have very long lag times; thus, they take a long time to heat up and cool down.

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Attributed to: [Dr. Lufti Al-Sharif]



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10. Heat-seeking missiles: Heat seeking missiles are complex systems that require extremely fast responses. A poor or slow controller could easily lead to the destruction of the missile. The orientation of the missile will be controlled based on the heat signal received from the target.

11. Packing machines. Please see the YouTube video linked in this subunit for more information.

12. Using robots for painting windows and doors. Please see the YouTube video linked in this subunit for more information.

13. Coordinate Measuring Machines (CMM): CMM's are machines that are used in manufacturing in order to scan the surface of an object to produce a computer aided design (CAD) model of the object. This can be done by direct contact (e.g. by the use of probes) or by the use of contactless methods (e.g. laser range detection). CMM are critical in the areas of reverse engineering and quality control.

**Activity:** Try to identify the four components of the mechatronic systems for items 1, 2, 3, 8, 9, 10, 11, 12, and 13, listed above.