Servomechanisms Encyclopedia Article

Servomechanisms

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Servomechanisms

A servomechanism is a device that automatically controls an object by means of feedback.

A simple example is the driver of a car. His eyes tell him where he is on the road, and compare it to where he should be, and this information makes its way to his brain. The brain decides what action should be taken in order to move the car from where it is to where it should be, and sends a signal to the muscles in the arm, turning the steering wheel to realign the car.

Servomechanisms are generally more mechanical than this example, but the principle remains the same. All servomechanisms have the following parts: (1) a way to measure what is desired and what is being accomplished, (2) a way to transport this information, (3) a way to determine the difference between the actual condition and the desired condition, and (4) a means to amplify this difference (which is often small) and use it to move the actual condition towards the desired condition. In the example of the car, 1 are eyes, 2 is the optic nerve and pathways to the brain, 3 is the brain, and 4 are the arms and steering wheel. A small turn of the wheel translates into a major turn for the car.

Servomechanisms are useful to control motion without human attendants, or to maintain the accuracy of an environment like a power plant, and to control action from a remote isolated station. The controller typically uses (and has) much less power than that of what is being controlled. Almost always it is the position or velocity which is being controlled.

Servomechanisms were first used in military applications, such as an antiaircraft gun that tracks a plane via radar. As the plane moves the radar gives the plane's position information to the gun, which computes the new position of the plane and realigns. This process can go indefinitely. Some other applications are satellite tracking and satellite antenna alignment systems, automatic machine tools, star-tracking systems on telescopes (since the stars' position changes as the earth rotates), and navigation systems.