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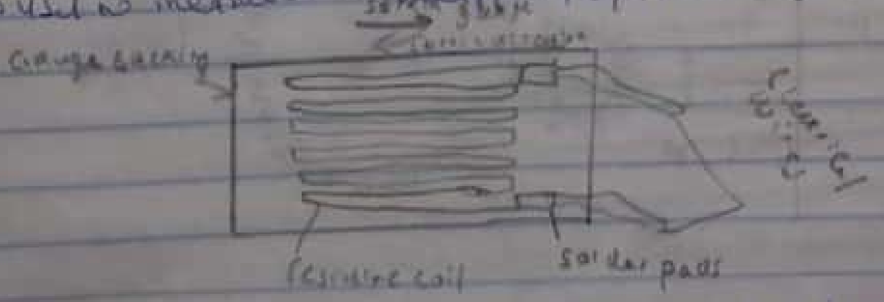
18/ENG08/024
BIOMedical Eng
BME 311

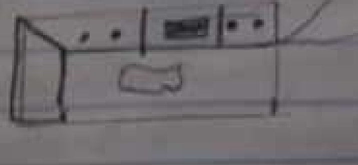
① Sensors is a device module or machine whose purpose is to detect events or changes in its environment and send the information to other electronics. it is usually used in electronics
e.g. (i) pressure sensors
(ii) ventilator image sensors
(iii) Temperature sensors

② Actuators : is a device that converts an electric signal into a physical output placed at the outer part it operates in reverse direction of a sensor e.g. it requires a sensor to give the cis input from the sensor it then reacts and produces a response
e.g. Displays (i) electroactive polymer (ii) alarms

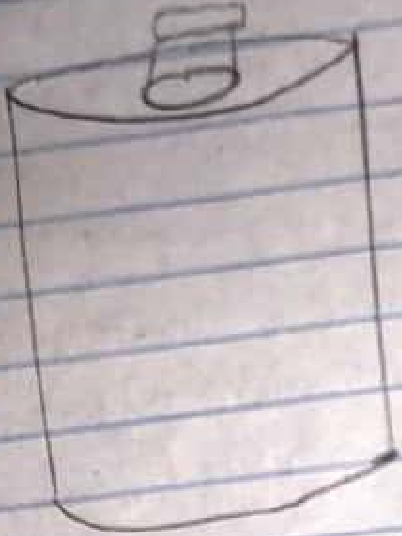
2(a) strain gage : is a device used to measure strain on an object
it is used to measure torque applied by a motor engine force



(b) Force sensors : it uses load cells to weigh object and prevent machinery from overloading. it transduces converts force into measurable electrical output

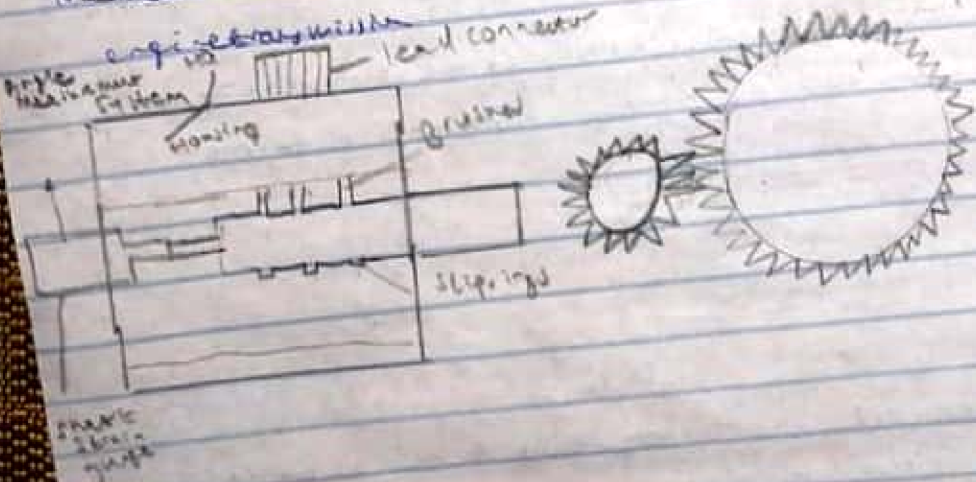


c Load cell : is essentially a device transducer or force sensor. it can be used to measure or detect forces and outputs this force as electric signals.

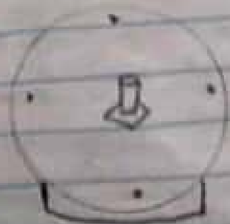


): pressure sensor: a device for pressure measurement of gases or liquids

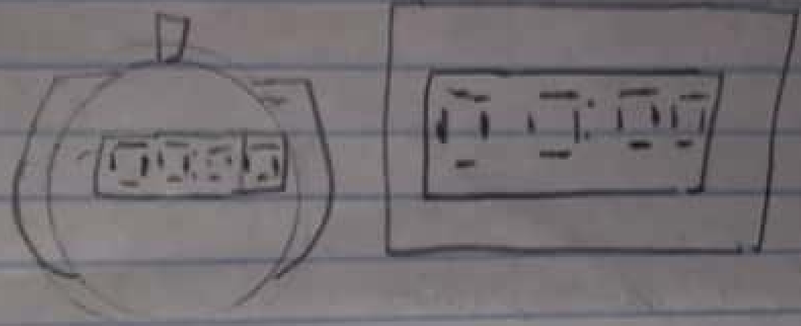
e) Torque transducer: it changes as it increases or decreases speed it measures the twist with a strain guage in various driving parts like engine transmission



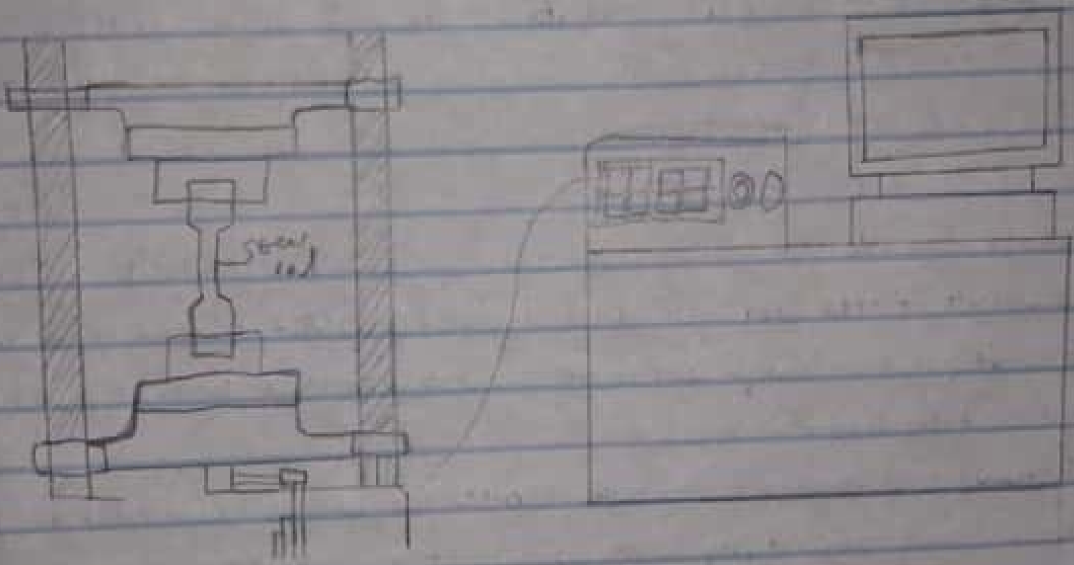
f) Vector sensor it is a device used to detect sound in water and convert acoustic energy into electrical energy.



(4) Digital indicator: allows user to view temperature, humidity and other various signals. it is used in load cells, transducers and various measuring components.



* Tensile and compression testing machines: used to measure the amount of stretch and contraction of devices.



3 Nebulizer: is a drug delivery device used to administer medication in the form of a mist inhaled into the lungs. it is used commonly for the treatment of asthma, cystic fibrosis and other respiratory disease or disorder. They use oxygen or ultrasonic power to break up solutions and suspensions into small aerosol droplets that are inhaled from the mouthpiece of the device.
• A modern jet nebulizer & atomizers: they are connected by tubing to a supply of compressed gas usually compressed air or oxygen to flow at high velocity through a liquid medicine to turn it into an aerosol that is inhaled by the patient.
(i) Vibrating mesh technology
(ii) Electrical ultrasonic wave nebulizer

Use

- Nebulizer accept their medicine in the form of a liquid solution, which is often loaded into the device upon use
- Used for inhaled anesthesia for case of use with young children or the elderly.

(2) Oxygen mask and tubes

(3) Stethoscope: is an acoustic medical device for auscultation or listening to internal sounds of animal or human body. It typically has a small disc-shaped resonator that is placed against the skin and two tubes connected earpieces. It is used to listen to the sounds made by the heart, lungs or intestines as well as blood flow in arteries and veins. A stethoscope that intensifies auscultatory sound is called phonendoscope

Types

(i) Acoustic stethoscopes: it operates on the transmission of sound from the chest piece via air-filled hollow tubes to the listener's ears. The chest piece usually consists of two sides that can be placed against the patient for sensing sound.

(ii) Electronic stethoscopes: overcomes the low sound levels by electronically amplifying body sounds. It requires conversion of acoustic sound waves to electrical signals which can then be amplified and processed for optimal listening.

(iii) Fetal stethoscope or fetoscope is an acoustic stethoscope shaped like a listening trumpet. It is placed against the abdomen of a pregnant woman to listen to the heart sounds of the fetus.

(4) Doppler: is an electronic device that measures the Doppler effect of ultrasound waves reflected from organs within the body. Motion is detected by the change in frequency. The Doppler stethoscope is particularly suited to deal with moving objects such as heart beat.