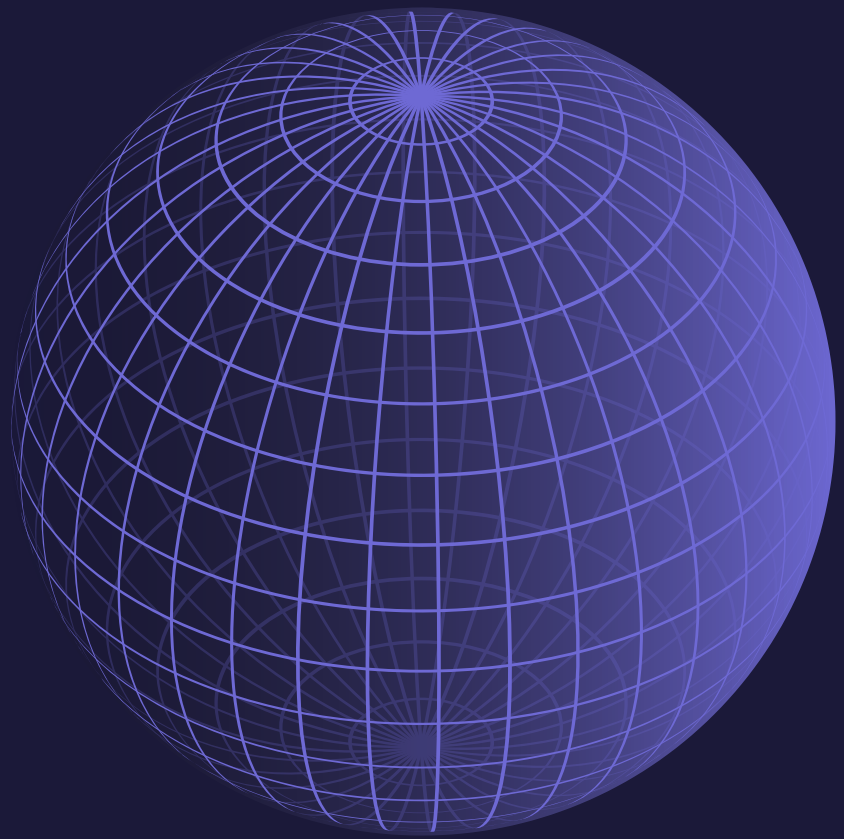
001

SENSORS

SAMG: 14TH APRIL 2023



JJAMES A TEMLETT

TOPICS

- BILOGICAL
- ELECTRONIC
- FUNCTIONS
- APLICATIONS
- NATURE

Today's Agenda

SENSORS Overall

ELECTRICAL:

Watches
Vehicles
Microelectronics
Robotics
Sporting
Games
Computers
Arduino and Pi applications

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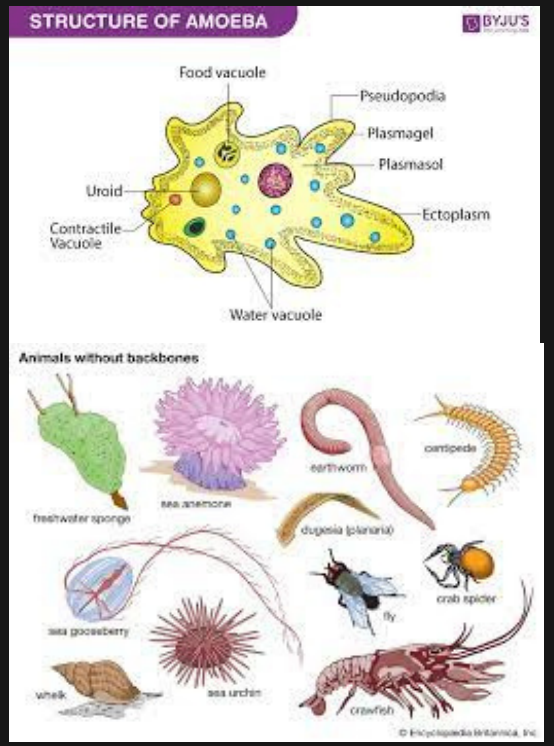
BIOLOGIC CELLS

Amoebae and Invertebrates



Even single cell invertebrates have survival guidance evolutionary protecting them and perpetuating the species for milloons of years

Darwinian Evolution vs Creation
No matter, life exists
Galapagos finches
Evolution survival of the fittest

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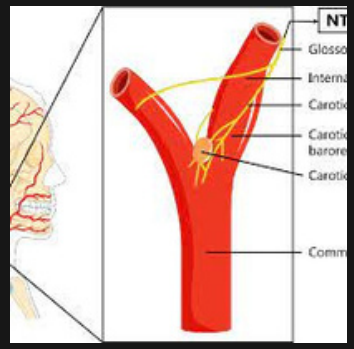
PRIMATES

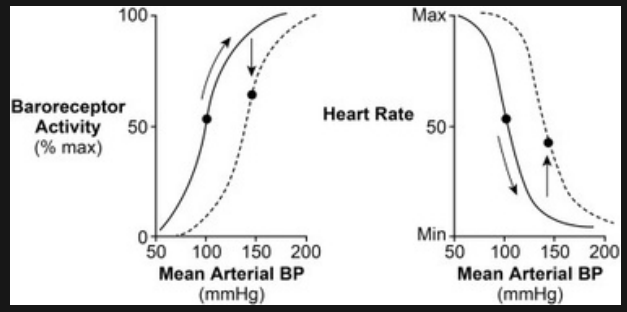
Blood Pressure

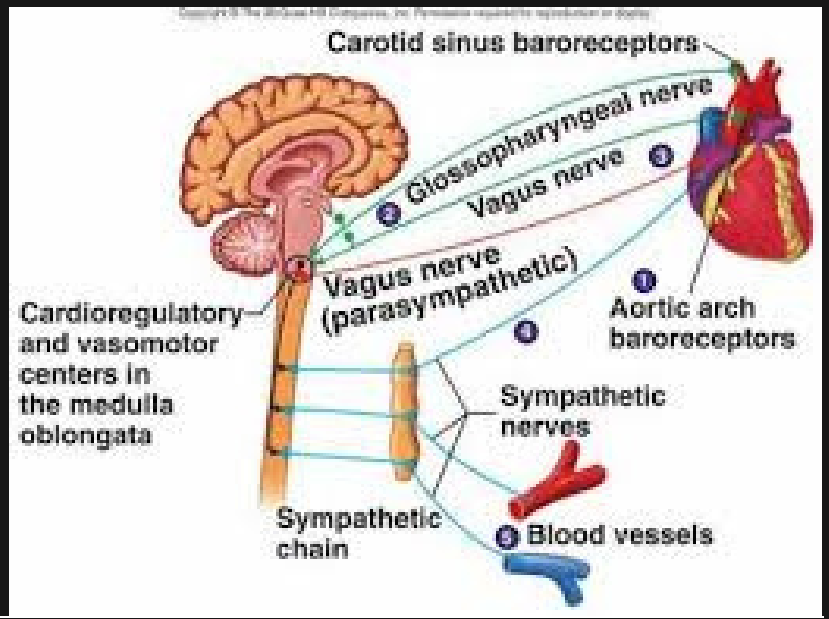
Barroreceptors sense and fall in BP, the atrium (heart chamber) autonatically regulates cardiac output BOTH rate and contractile power

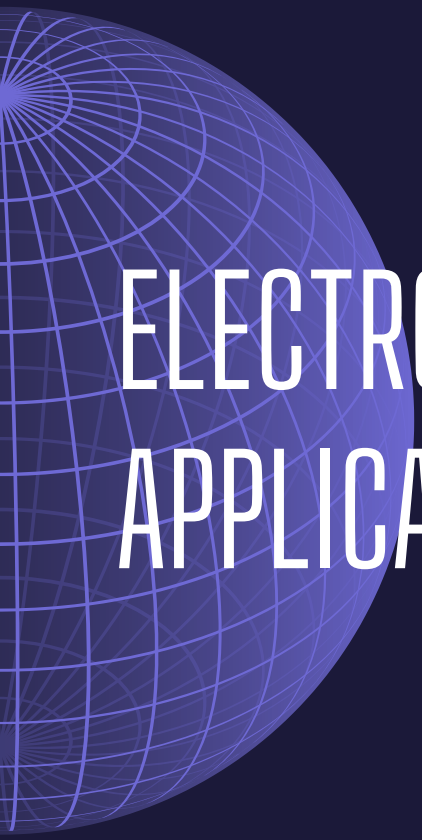
The carptid artery also regulates BP reading vascular pressure and constricting when low and dilating when BP is elevated

This is one "biologic sensor"









ELECTRONIC APPLICATIONS

CONCEPT AND DEFINITION

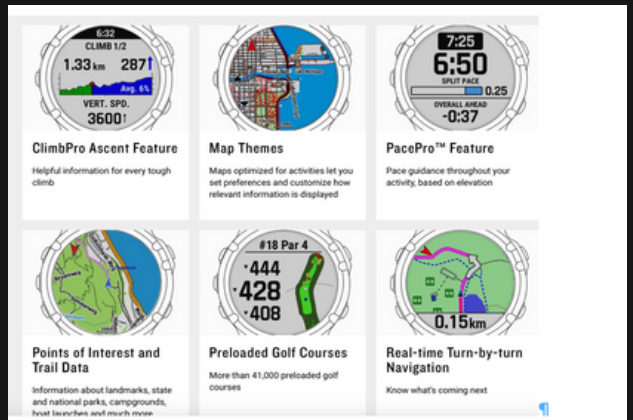
Types:

1 Ambient light sensor to tweak display brightness
2 3 axis accelerometer detects movement and tracks direction
3 Optical heart rate sensor detects heart beats per minute
4 SpO2 monitor to measure blood oxygen levels
5 Bioimpedance sensor to measure respiratory rate, sleep, etc
6 Proximity sensor saves battery and wakes the display
7 Compass helps is direction and Maps
8 ECG sensor
9 Gyroscope
10 Gesture sensors detect wrist motio
11 UV sensor measure exposure to harmful sunlight
12 Skin temperature sensor
13 GPS

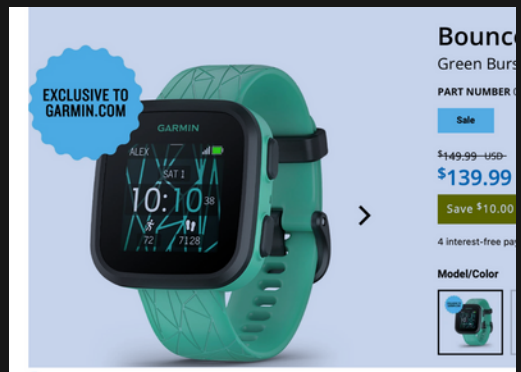
For “Kits”…$139 US

ELECTRONIC SENSORS

WATCHES



https://discover.garmin.com/en-AU/performance-data/wearable-maps/



Marine sensors

Water Speed Sensor

- Marine Heading Sensor
- GRF™ 10 - Rudder Feedback Sensor
- Garmin GST™ 43 Thru-hull Speed/Temperature Transducer

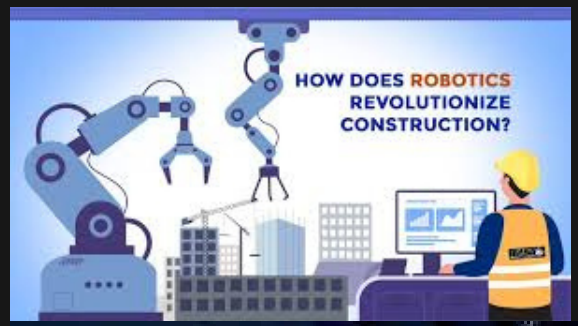
ELECTRONIC SENSORS

VEHICLES

Nuts and Bolts:
Battery
Charging device
Stering & SafteySensors
Drive 4 wheels on a Motorotors

ELECTRONIC SENSORS

ROBOTICS



ELECTRONIC SENSORS

HOME APPLIANCES

ELECTRONIC SENSORS

JAYCAR BOX

1 → Joy Stick
2 → Flame sensor
3 → RBG Unit
4 → Relay sensor
5 → Hall Sensor
6 → Big Sound sensor
7 → Touch sensor
8 → Small sound sensor
9 → Digital temperature
10 → Two colour sensor
11 → Tracking sensor
12 → Active Buzzer
13 → Passive buzzer
14 → Mini Reed sensor
15 → Sonar sensor
16 → Avoidance sensor
17 → Heart beat sensor
18 → Light Cup
19 → Hall magnetic
20 → Tilt switch
21 → Bell switch
22 → Analog temp
23 → Button modu;e
24 → Photoresistor
25 → IR emission
26 → Vibration
27 → Temp and humidity
28 → IR Reciever
29 → Rotary encoder
30 → Analog hall
31 → Knock module

Projects:

Sonar avoidance truck- success
Croquet all pressure probe- failure
Truck tracker on a line - success

ELECTRONIC SENSORS

"To measure is to know.
If you cannot measure it, you cannot improve it."

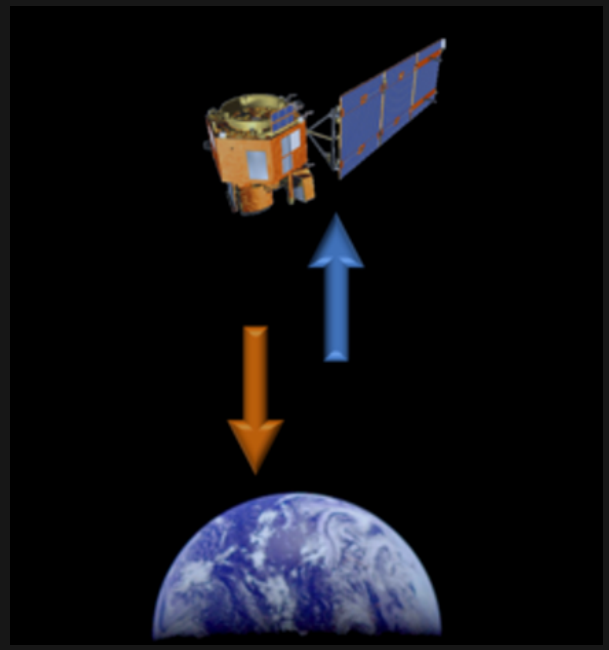
-- Lord Kelvin

ELECTRONIC SENSORS

https://www.ist-ag.com/en/production-process

Put simply, a sensor converts stimuli such as heat, light, sound and motion into electrical signals. These signals are passed through an interface that converts them into a binary code and passes this on to a computer to be processed.

Many sensors act as a switch, controlling the flow of electric charges through the circuit. Switches are an important part of electronics as they change the state of the circuit. Components of sensors such as integrated circuits (chips), transistors and diodes all contain semiconducting material and are included in the sensor circuits so that they act as switches. For example, a transistor works by using a small electrical current in one part of the circuit to switch on a large electrical current in another part of the circuit.



ACTIVE SENSOR

AN ACTIVE SENSOR IS A RADAR INSTRUMENT USED FOR MEASURING SIGNALS TRANSMITTED BY THE SENSOR THAT WERE REFLECTED, REFRACTED OR SCATTERED BY THE EARTH'S SURFACE OR ITS ATMOSPHERE. SPACEBORNE ACTIVE SENSORS HAVE A VARIETY OF APPLICATIONS RELATED TO METEOROLOGY AND OBSERVATION OF THE EARTH'S SURFACE AND ATMOSPHERE. FOR EXAMPLE, PRECIPITATION RADARS MEASURE THE RADAR ECHO FROM RAINFALL TO DETERMINE THE RAINFALL RATE OVER THE EARTH'S SURFACE; AND CLOUD PROFILE RADARS MEASURE THE RADAR ECHO RETURN FROM CLOUDS TO PROVIDE A THREE DIMENSIONAL PROFILE OF CLOUD REFLECTIVITY OVER THE EARTH'S SURFACE.

SPACEBORNE ACTIVE SENSORS OPERATE IN THE EARTH EXPLORATION-SATELLITE SERVICE OR IN THE SPACE RESEARCH SERVICE. ACTIVE SENSOR FREQUENCY ALLOCATIONS ARE OFTEN SHARED WITH OTHER RADAR SYSTEMS, AS SUCH SYSTEMS ARE NORMALLY COMPATIBLE WITH THE OPERATION OF THE SENSORS.

Catalogue Hubble Pictures.
https://www.nasa.gov/content/goddard/hubble-s-messier-catalog

SENSOR-SHOP

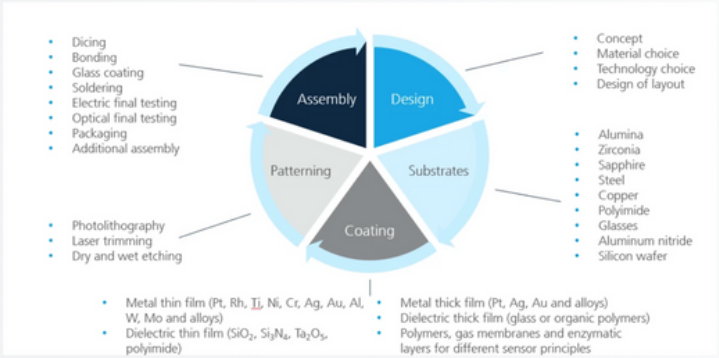
Use the filter to narrow down your search. Our sensor finder is designed to help you quickly find the standard sensor you need. If a feature you want is not available for selection, tick the Custom box. This will take you to an inquiry form where you can specify your specific requirements.

Temperature · Flow · Humidity · Conductivity · Bio

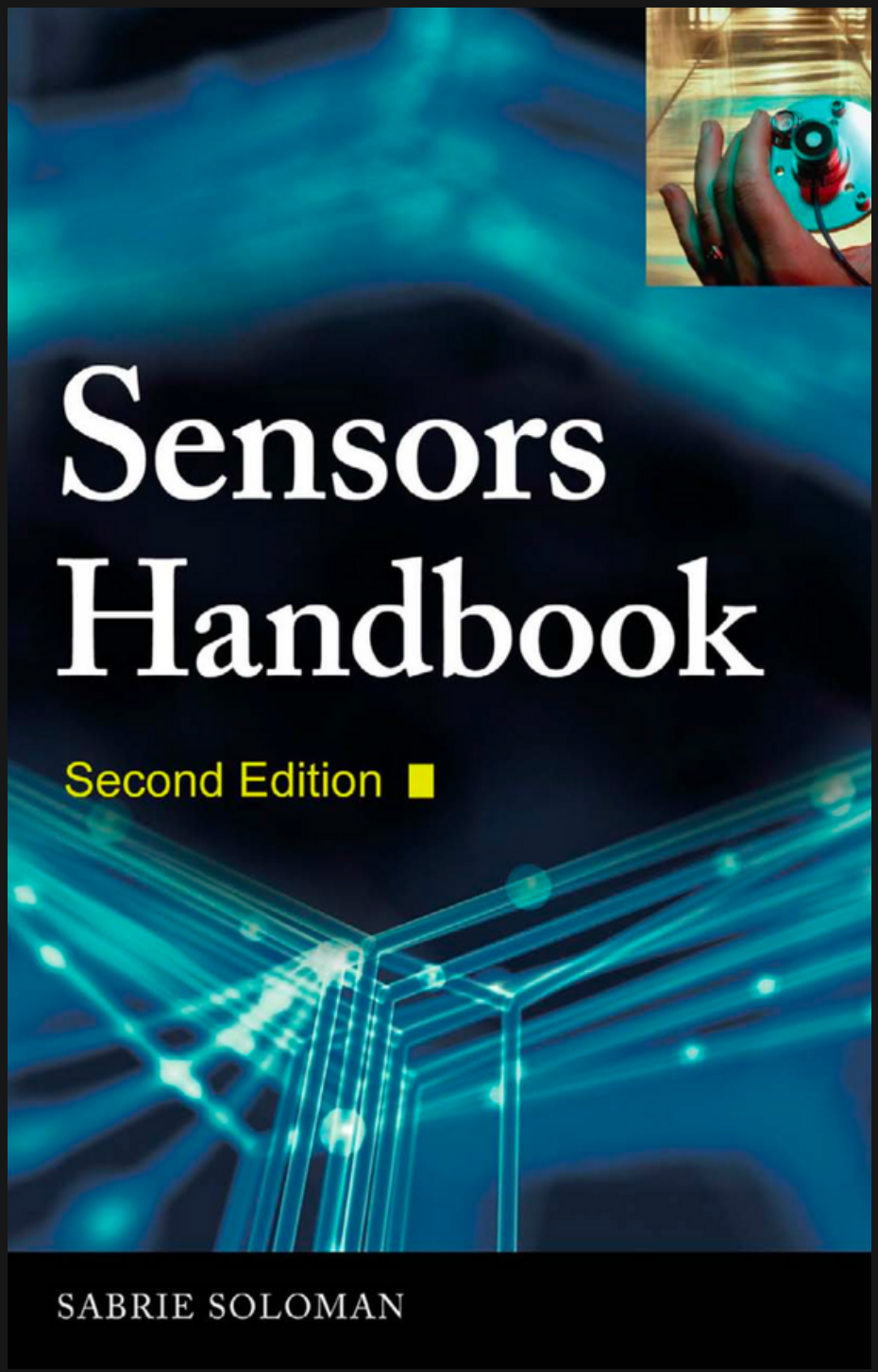
Measuring

During the final electrical measurement, all sensors are checked. Depending on their classification or assembly they are qualified either with a 2-point calibration measurement or resistance-testing. According to their accuracy they are sorted into different classes.

"Our versatile technological portfolio covers different substrate material choices, the use of thin- and thick-film technologies and patterning technologies as well as diverse test and assembly options."



Sensor Engineering and Various Sensor Types:
https://www.researchgate.net/publication/295072199_Sensors/link/62e267c47782323cf1815cb0/download


Sensors
Handbook
Second Edition
SABRIE SOLOMAN

James Project

1. Measure the soil temperature and water content of approx 30 Bonsai Trees

2. Once soil humidity is read dry, then automatically water plant/tree.

Ordered 12 soil sensors ¶

¶

Connect via Pi or Arduino all the signals and read them at any stage (especially when on holiday!) ¶

Wi-Fi sensors would be great, but wired alternative OK. ¶

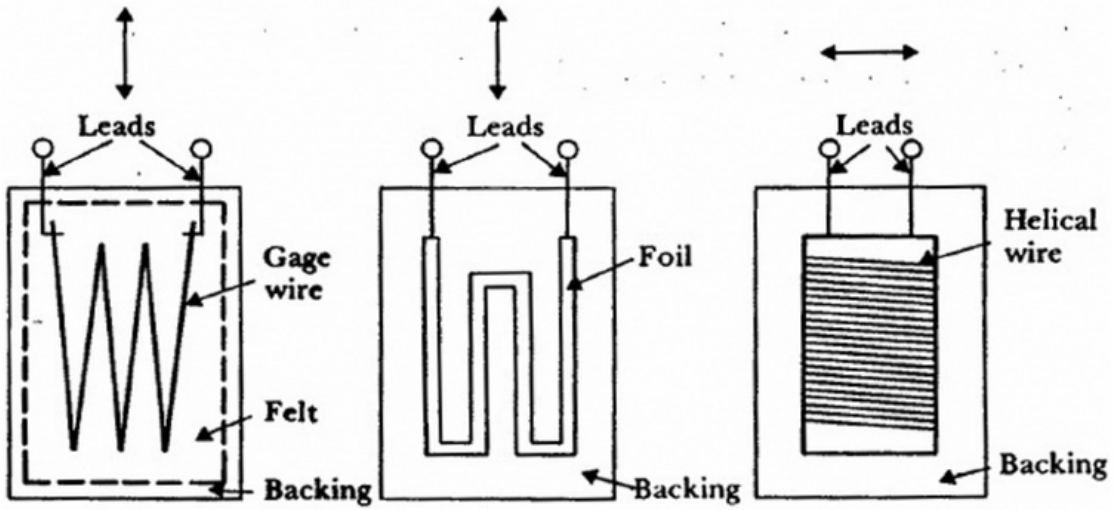
NB: I really need your collective help SAMG…. Especially the coding, of which I'm illiterate. ¶

¶

Displacement Meas. - Resistive Sensors –

Bonded

– consisting of a metallic wire, etched foil, vacuum-deposited semiconductor bar, is cemented to the strained surface



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REFERENCES

WWW REFERENCE

https://electronics.howstuffworks.com/gadgets/clocks-watches/smart-watch.htm?utm_source=howstuffworks&utm_medium=recirc

WWW REFERENCE

The best three smart watches on the market as of 2021 are the Apple Watch Series 6, Samsung's Galaxy Watch 3, and the Fitbit Sense.

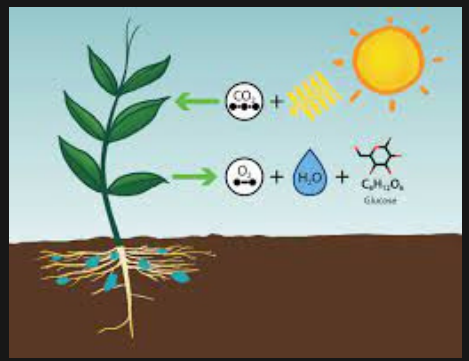
https://consumerexpertreview.com/top-smartwatches.php?gclid=Cj0KCQiA14WdBhD8ARIsANao07hXpwonDayWso93JWsv7mivyKm8wlWgxQnDRlNTbcGjqqgKYOrgY1MaAkO1EALw_wc

WWW REFERENCE

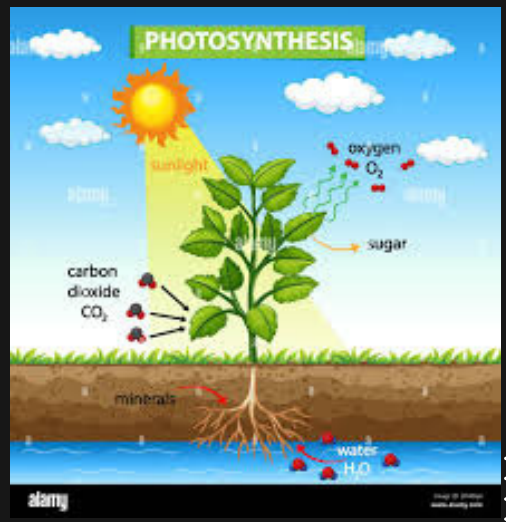
Hiking Maps watches:
Linux data
https://phoenixnap.com/kb/linux-cpu-temp
t

NATURE

PHOTOSYNTHESIS

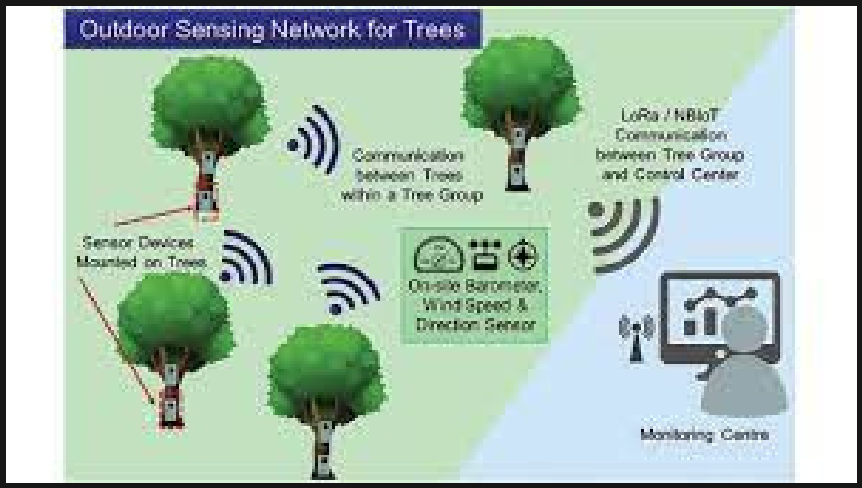


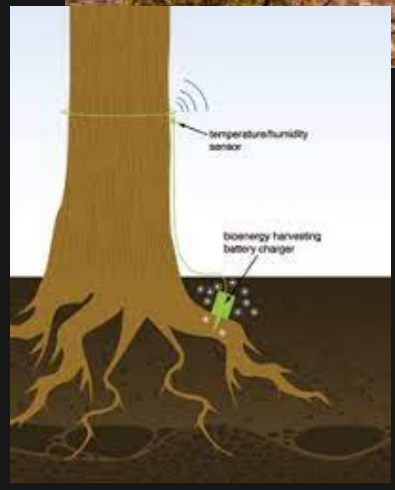
Plants need sunlight and sensors



NATURE

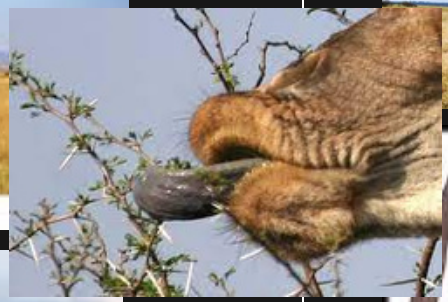
TREES





NATURE

SELF PROTECTION - INTRINSIC



IS EVERYTHING CLEAR?

Brain Functioning

ADVANCES:

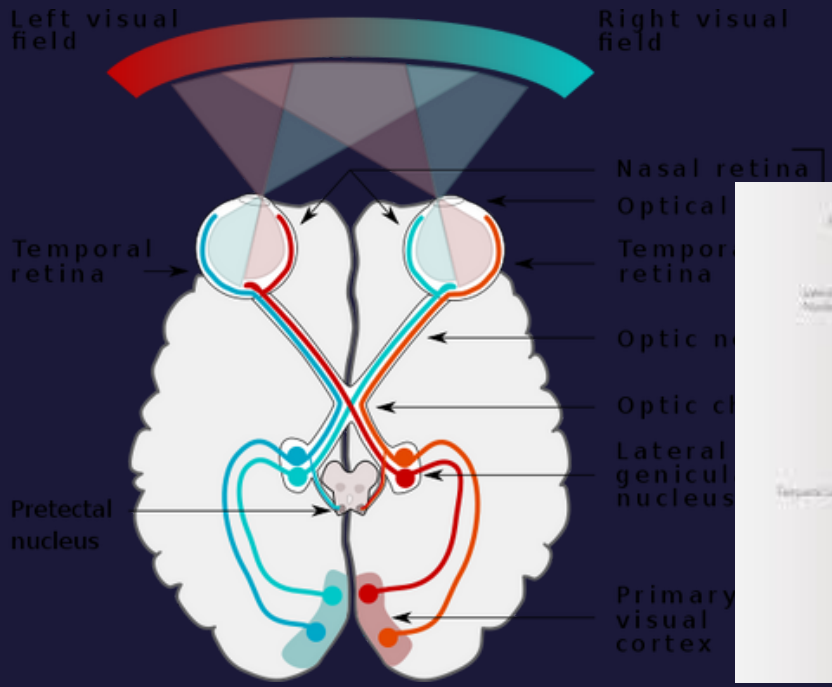
1. Wheel
2. Ships and Mechanical
3. Steamships
4. Railway Engines and Rail systems
5. Flight and Aerodynamics
6. Space Exploration and Rockets
7. Television
8. Computers
9. AI

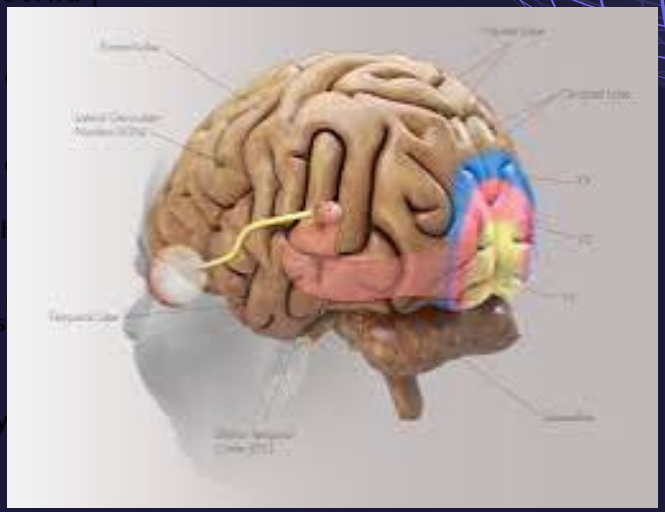
BRAIN SENSORS

Brain Functioning. WHO wins?
Intelligence Vs AI Computers.

BRAIN SENSORS

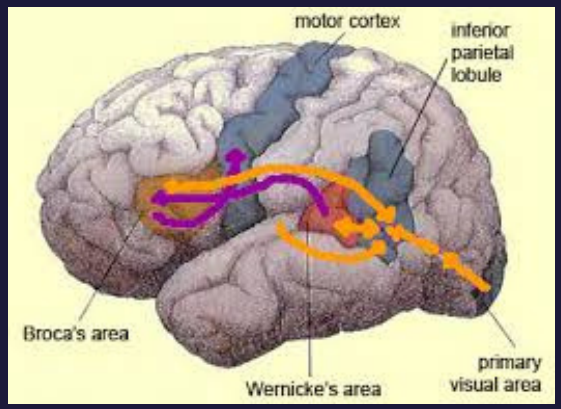
Vision

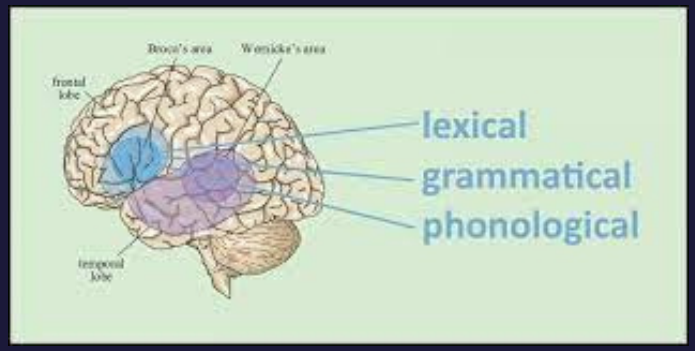


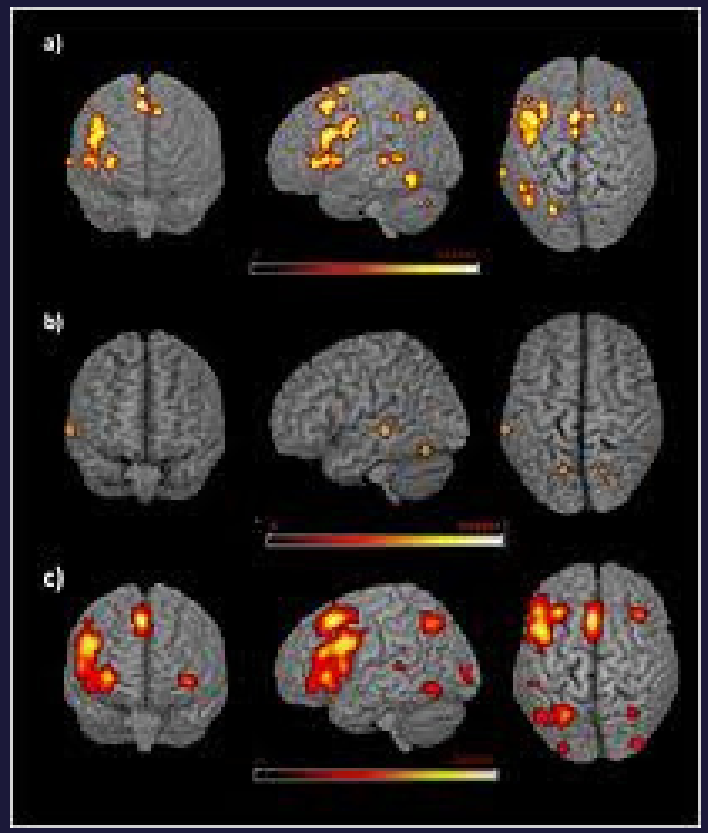


BRAIN SENSORS

Language

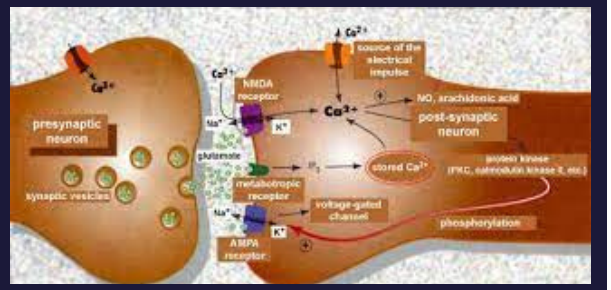


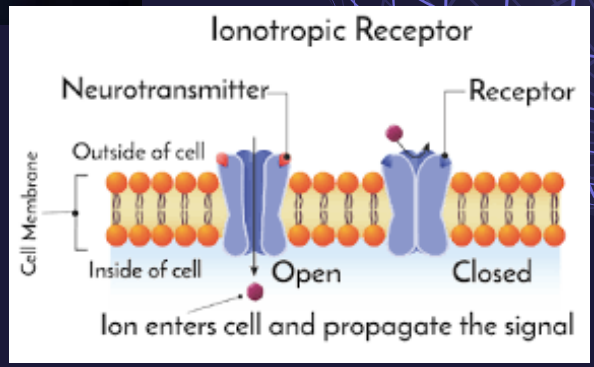




BRAIN SENSORS

Neurotransmitters and "Sensors"/receptors in the Brain





IS EVERYTHING CLEAR?

Brain Functioning. -
NO, only scratching the knowledge surface!

Thank You

(for having me this week)