Sensors and devices

Sensors, actuators y middleware

Samsung SmartThings

Samsung SmartThings

SmartThings sensors are a very simple to use sensors with a powerful performance commercialised by Samsung. For the communication, they use the ZigBee standard. At present we have SmartThings Hubs and the following sensors

- **Samsung SmartThings Hub**. It connects using wireless with hundreds of compatible smart devices, which allows to supervise, control and protect an environment since any location.
- **Samsung SmartThings Arrival Sensor**. The arrival sensor can send a notification when people, domestic animals and cars arrive or leave home.
- **Samsung SmartThings Multipurpose Sensor.** This sensor can control if the doors, windows, or wardrobes are opened, closed or has been left open after leaving the environment. In addition, it can obtain temperature and vibration values from the place where it is installed.
- **SmartThings Motion Sensor.** It detects moving objects, particularly people and sends notification if an unexpect movement is detected when there is no one at home. Thanks by this sensor, lights can be activated or desactivaed when a person arriving or leaving home.

External Link: Samsug SmartThings

Philips HUE y Philips HUE Bridge (HUB)

Philips HUE

Philips Hue lighting system is formed by “Smart” bulbs connected wirelessly to control the illumination of an environment. Some bulb models allow to change the colour of these depending of the enviroment.

The Philips Hue bridge (HUB) is all you need to mount your Philips Hue personal system. At present, it's used like a brain to control the smart light system with routines, timers, custom light scenes and more.

At **CEATIC,** we are using the Philips Hue Bridge and three types of bulbs:

- Philips HUE Lux: bulb that regulate light intensity (Tungsten light).
- Philips HUE Hue GU10: type A bulb, which can change its color and regulate the light intensity.
- Philips Hue LightStrips: a LED light strip, which can change its color and regulate the light intensity.

External Link: Philips HUE

Raspberry Pi

Raspberry Pi

Raspberry Pi is a low-cost single-board computer (SBC) developed in United Kingdom by the Raspberry Pi Foundation with the goal of encourage the computing sciences education in the schools.

All models use a SoC chip, which includes a CPU (ARM type) and a GPU. The CPU's clock speed is usually between 700Mhz to 1.2GHz and the Ram memory is between 256MB to 1GB. It uses a SD card to store the information. Most boards have between 1 and 4 USB slots and one HDMI, VGA and 3.5mm Audio Jack slot. Some models have wireless connectivity, Ethernet or bluetooth.

At **CEATIC**, we are using Raspberry Pi to develop a Hub standar to interconnect devices and sensors. The software used is openHAB.

Link: Raspberry

Smart Floor

Suelo inteligente

The laboratory has a smart floor developed with the SensFloor technology by Future-Shape. This technology allows to detect the location and movement of people or objects in an accurate way through the conductivity of the surface in the laboratory, making it possible to capture the information for subsequent analysis.

To make tests, a small square metre panel can be used with this technology. The communication is done by USB Transceiver.

External Link: Future-Shape

Withing Smart Body Analyzer (WS-50)

Withing Smart Body Analyzer

Smart Body Analyzer is not just a digital weight scale, it is also tracks weight, body composition, heart rate and air quality for up to eight people. Through its Bluetooth connectivy the Body Analyzer is very easy to configure in iPhone, iPad o iPod Touch. After each measuring, this scale automatically load and synchronise its data through WiFi or Bluetooth. It also controls 8 different users, so it can be used with different profiles or devices.

External Link: Withing

Mother (Hub) and Cookie (Sensors)

Mother and Cookie

Mother (Hub) and Cookie (Sensors) are smart devices designed to help at home. It has a central HUB which gets all information provided by the sensors through the ZigBee communication standard. At present, this device has many applications, and it’s possible to access to a public API to develop new ideas.

Available API Sense functions:

- Motion alerts at home.
- Help us to keeping fit.
- Reminder notification to take a medication.

- Smart alert.

More functions from Cookie (Sensors):

- Motion analysis.
- Temperature.
- Presence.

External Link: Mother

Estimote Beacons

Estimote Beacons

Estimote Beacons are small Wireless beacons that can be sticked on any place or object. These beacons transmit radio signals (Bluetooth LE) which can be received and interpreted by any smart device. Thanks to these signals it is posible to calculate from what distance a device is, like a Smartphone or a Smartwatch, of each of the installed beacons.

Developer SDK: GitHub Estimote

Link: Estimote Beacons

LG WATCH URBANE

LG Watch Urbane

LG WATCH URBANE has a full metal body of stainless steel and a stitched leather strap. The design gives to this device an elegant lines and a classic style. It is dust and water resistant to secure its durability. It has Android Wear like operating system. Some of its functionalities are checking the email and contacts, navigating, using Google Assistant...

External Link: LG Watch

Sonos PLAY

Sonos PLAY

Sonos PLAY is a wireless multiroom music system which offers clear sound perfect for kitchen, bedroom, office or any other room that needs music or customized alerts.

Wireless communication: its works through the WiFi net with any router capable of emiting in 802.11b/g to 2,4 GHz. It also works in SonosNet, a point-to-point wireless mesh network, where the security is guaranteed thanks to the AES encryption, this network is specially dedicated to the Sonos system to reduce the WiFi interferences.

External Link: Sonos Play

Everspring Door/Window Sensor

Everspring detector de contacto

The main advantage of this device is the compatibility with any receiver that allows the Z-Wave communication standard with the 868.42 MHz frequency. After its installation, it’s necessary a Z-Wave Hub controller so that the opening or closing signal of the door offered by the module be picked up somewhere. These Hub controllers get the module data and execute the programmed scenes, as alert with push notification, SMS or email message to the smartphones or tablets of registered users.

Withing Pulse 0x

Withing Pulse 0x

This Smart Strap helps to be more active and improve the health. Thanks to its internal sensors, it’s capable of track the following metrics: steps taken, distance travelled, elevation climbed actively, calories burned, sleep duration and quality, instant heart rate, blood oxygen level and more things..

At **CEATIC,** we are developing new functionalities for the health using this Smart Strap.

FIBARO Flood Sensor

Fibaro sensor inundación

FIBARO Flood Sensor is the most advanced functional flood measurement technology in the world. This sensor has the best battery available and security technology. It’s a small and compact device that can be easy installed.

External Link: Fibaro

FIBARO Door/Window Sensor

Fibaro sensor puerta/ventana

This door/window sensor works with a battery. Its working under the Z-Wave standard guarantees compatibility with the Fibaro Home Intelligence System and other Z-Wave gateways. The sensor increases the system capacities by an access control for doors, windows and garage doors. It can be used in automatic lighting control, access control and security systems for home. The installation of this sensor at home improves the security and comfort for its residents. It also eliminates the risk of high heat and air conditioning rates. In addition, the module can be equipped with a temperature sensor and use the integrated binary imput.

External Link: Fibaro

FIBARO Motion Sensor

Fibaro sensor movimiento

This small motion sensor is also a light and temperature sensor. It uses a battery and Wireless network and thanks to a smart bracket with grip it can be affixed almost anywhere. The sensor’s location can be changed at any time. It can used with the Voice control through Apple Siri and works with Apple devices with iOS 9 and newer.

External Link: Fibaro

Harmony Ultimate Hub

Harmony Ultimate Hub

Harmony Ultimate Hub is a device that allows to any mobile device based on iOS o Android becomes a powerful remote control for TVs, A/V receivers, High fidelity (hi-fi) equipments and other types of consumer electronics equipment. This small device can be obtained separately or in solution packs from the Harmony collection. This smart remote control hub works with the free application for iOS and Android, the Logitech Harmony Smart Control, which allows to control the access to the functions to the electronic devices controlled.

Enxternal: Harmony

NFC TAGS

NFC Tags

NFC tags are passive devices, which means that they work without energy supply and depend on active devices in a certain range to be activated. Every NFC tag is equipped with a small microchip. They are used to transfer information to active devices like a Smartphone.

At **CEATIC,** we use these tags to multiple purposes, like activity monitorization, access control among other things.

External Link: NFC-TAG

Brain-computer Interface

BrainLink Macrotellect

BrainLink Macrotellect

The neural oscillations are rhythmic or repetitive electrochemical activity in the brain and central nervous system. Such oscillations can be characterized by their frequency, amplitude and phase.

Brainwave entrainment is a colloquialism for such 'neural entrainment', which is a term used to denote the way in which the aggregate frequency of oscillations produced by the synchronous electrical activity in ensembles of cortical neurons can adjust to synchronize with the periodic vibration of an external stimuli, such as a sustained acoustic frequency perceived as pitch, a regularly repeating pattern of intermittent sounds, perceived as rhythm, or of a regularly rhythmically intermittent flashing light.

At **CEATIC**, we are using brainlink headbands to research mental health issues using mobile applications that connect to the device.

External Link: BrainLink

Emotiv Insight

Emotiv Insight

EMOTIV Insight is a sleek, 5-channel, wireless EEG headset that records your brainwaves and translates them into meaningful data you can understand. Designed for everyday use, Insight boasts advanced electronics that are fully optimized to produce clean, robust signals anytime, anywhere.

Features:

Signals

- 5 chanels: AF3, AF4, T7, T8, Pz.
- 2 references: CMS/DRL noise-cancelling configuration.

Connectivity

- Wireless and Bluetooth 4.0LE
- Wireless properties: 2.4GHz band.

Energy

- Battery: Internal Lithium Polymer battery 480mAh
- Battery life: minimum 4 hours

External Link: EMOTIV Insight

Emotiv Epoc+

emotiv epoc

Controller based on neuronal recognition. Emotiv Epoc + technology processes the electrical signals collected in different points of the brain by means of electro-encephalography, sending them to a software wirelessly for their later interpretation. The device has a total of 14 electrodes as well as a gyroscopic sensor to detect changes in the physical orientation.

For its use, Emotiv Epoc+ has a development kit, in which some applications are included, allowing to associate a few movements such as Up, Down, Left, Right, Push, Bring... The communication is carried out using Bluetooth technology or its own USB device. To facilitate the use of the device is necessary to make a software calibration (the length of this calibration is 10 minutes).

External Link: Emotiv

Cameras

IP D-Link 5020L Camera

Cámara IP D-Link 5020L

This camera allows to easily connect to the network (Cable or WiFi), and view remotely and through different devices (Smartphones or Workstations) the place where they are installed.

Thanks to the rotation motors and the digital zoom, with these cameras it’s possible to view any angle of the laboratory.

Human Computer Interaction

XBOX ONE Kinect

XBOX ONE Kinect

Kinect for Xbox One is a user interface device that can be used by the home video game console and games user interface, providing a motion control system that uses an infrared matrix to detect the presence and movements of players, a voice recognition system, a microphone, and a video camera that can be used to record and stream.

The new Kinect has improved motion tracking and voice recognition features over its predecessor, including a larger field of view, the addition of a high definition camera, the ability to track up to six bodies simultaneously, and the ability to track a player's heart rate, among other features.

Amazon Echo

Amazon Echo

Amazon Echo is a smart speaker developed by Amazon. This Echo device includes functions such voice interaction with the intelligent personal assistant service Alexa, music playback, making to-do list, etc. The device responds to the name "Alexa".
The device has a cylindrical form that measures around 9.25 inches (23.5 centimeters) with a sensor matrix with 7 microphones, speakers which include a woofer/tweeter and a remote control. Amazon has been developing it in its Lab126 for at least 4 years. The device, also called 'Doppler' or 'Project D', was part of first attempt to expand its device market in addition to the original Kindle E-reader.

Termostato inteligente Nest

Termostato inteligente Nest

Nest Learning Thermostat is a smart thermostat programmable, and self-learning Wi-Fi-enabled thermostat that optimizes heating and cooling of homes and businesses to conserve energy. The device is based on a machine learning algorithm: for the first weeks users have to regulate the thermostat in order to provide the reference data set. The thermostat can then learn people's schedule, at which temperature they are used to and when. Using built-in sensors and phones' locations, it can shift into energy saving mode when it realizes nobody is at home.

External Link: Nest

Leap Motion

Leap Motion

Leap Motion controller is a small USB peripheral device which is designed to be placed on a physical desktop, facing upward. It can also be mounted onto a virtual reality headset. Using two monochromatic IR cameras and three infrared LEDs, the device observes a roughly hemispherical area, to a distance of about 1 meter. The LEDs generate pattern-less IR light and the cameras generate almost 200 frames per second of reflected data. This is then sent through a USB cable to the host computer, where it is analyzed by the Leap Motion software using "complex maths" in a way that has not been disclosed by the company, in some way synthesizing 3D position data by comparing the 2D frames generated by the two cameras. In a 2013 study, the overall average accuracy of the controller was shown to be 0.7 millimeters.

External Link: Leap Motion

HP PRO SLATE 12

HP Pro Slate 12

HP Pro Slate 12 4GB is a commercial-grade Android tablet which works very well both outside and within the office, with Full HD quality and a Qualcomm Snapdragon 800 series processor. It includes a HP Duet Pen what allows to make the most out of its funcionalities. It works with 4G.

SAMSUNG GALAXY TAB S

Samsung Galaxy Tab S

Samsung Galaxy Tab S 10.5 is a 10.5-inch Android-based tablet computer produced and marketed by Samsung Electronics. It belongs to the ultra high-end "S" line of the cross between the Samsung Galaxy Tab and Samsung Galaxy S series, which also includes an 8.4-inch model, the Samsung Galaxy Tab S 8.4. It was announced on 12 June 2014, and was released on July 2014. This is Samsung's first 10.5-inch tablet which is aimed to be a direct competitor against the iPad Air.

External Link: SAMSUNG

iPad

ipad

iPad is a line of tablets computer designed and marketed by Apple Inc. that uses the iOS operating system. The first iPAD was released on april 3, 2010. The user interface is built around the device's multi-touch screen, including a virtual keyboard. The iPad includes built-in Wi-Fi and cellular connectivity on select models.

External Link: IPAD