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FLORIM AGE

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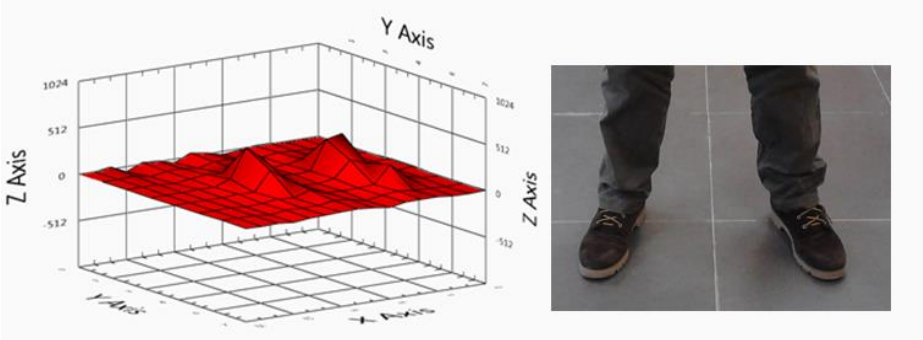
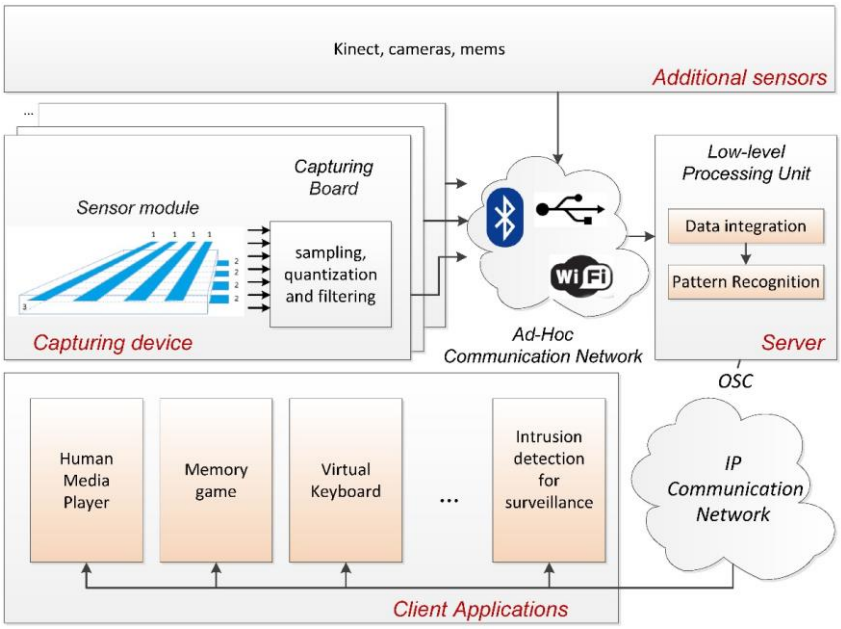


The system architecture is composed of three main entities 1: the capturing devices, a low-level processing unit, and the client applications. In addition, other sensor devices mounted in the environment can be included, and their input can be fused in the low-level unit.



The distributed architecture requires both ad-hoc and IP communication networks in order to deliver the input data from the sensors to the low-level processing unit, and the high-level events and information from the processing unit to the client applications. The architecture has been developed to guarantee modularity, so that each sensing module can be added according to the application requirements. Each capturing device is composed by a sensing layer and a corresponding electronic board which acquires, digitizes and transmits the sensed values. To cover large areas, more modules of capturing device can be equipped in parallel and can be synchronized, with the same methodology used for creating large camera networks. The capturing devices have unique identifiers that the low-level processing uses to address and manage multiple sensor instances. An ad-hoc serial communication protocol and infrastructure has been implemented to transfers the data from the capturing board to the low-level processing unit. The acquired values are transmitted in a continuous binary stream. The low-level processing unit collects and integrates the data coming from all the capturing devices as well as the additional sensors, if available. Then, the integrated data are analyzed to detect high-level events and patterns using algorithms of pattern recognition, machine learning and some multimedia computing functions. Finally, the client applications are connected to the low-level processing

server using a standard Open Sound Control (OSC) protocol, which delivers the required events according to the application needs and goals.

Each capturing device is composed by a sensing module and a corresponding electronic board which acquires, digitizes and transmits the sensed values. The sensor module is the first and most important part of the architecture. In the matter of fact, we selected as basic element a commercial paving technology, called ceramic floating floor. In particular, we use the SLIM4 technology produced by Florim. A commercial floating floor does not need to be nailed or glued to the sublayer and thus it might be constructed over a sub-floor or even over an existing floor. It consists of a polymeric, felt or cork layer holding up the tiles. Therefore, every tile can move perpendicularly to the floor plane and independently from its neighbors, so it can transmit pressure to the sublayer due to the presence of a weight on it. The VELCRO® attack system is employed to keep the tiles connected to the floor. We have introduced a sheet of conductive polymer (i.e., a foam of Polyethylene and Carbon) below the tiles instead of the original electrically insulating material. A matrix of copper stripes have been placed on the bottom side of the sheet. As a result, a sensing element is created at each intersection between a lengthwise and a crosswise stripes. When a pressure is applied on the top of the tiles, the rough surface of the conductive polymer is compressed onto the electrodes surface. The electric resistance between the two stripes is related to their physical pressure rate on the intermediate polymeric layer. In other words, the sensor converts the applied pressure to an electric resistance. The spatial resolution of the sensor depends on the width and the interleaving space of the copper stripes.

Alimentation	5 Vcc
Current consumption	30 mA
Resolution XY	12.5 cm
Resolution Z	12 bit
Acquisition frequency	4 – 35 Hz
Type of interface	RS485 /USB 2.0
Dimension	1000 mm x 2000 mm
Thickness	2.54 mm
Type of scanning	Matrix scan
Calibration	Automatic
Maximum pressure	70N/cm2