About

Tuesday, 22 May 2007
Last Updated Sunday, 23 September 2007

TANGerINE acronyms stands for TANGible Interactive Natural Environment.

This project is an ongoing research on TUIs (tangible user interfaces) combining previous experiences with natural vision-based gestural interaction on augmented surfaces and tabletops with the introduction of smart wireless objects and sensor fusion techniques.

Unlike passive recognized objects, common in mixed and augmented reality approaches, smart objects provide continuous data about their status through the embedded wireless sensors, while an external computer vision module tracks their position and orientation in space. Merging sensing data, the system is able to detect a richer language of gestures and manipulations both on the tabletop and in its surroundings, enabling for a more expressive interaction language across different scenarios.

Users are able to interact with the system and the objects in three contexts: the active presentation area (like the surface of the table), the nearby area (around the table) and the external space (a transitional space between different active areas).

Every area is characterized by a different focus of the interaction: our aim is to develop a language that is natural and consistent across all of these contexts.

As a first approach we chose a cube to be the most useful neutral shape for users to manipulate, thanks to its six steady states, as well as its familiar (dice-like) affordance. The variety of the possible actions allows for a more expressive interaction language and provides to the application designer an environment with richer modes of operation that depend on the context in which the user acts. We have implemented software modules based on VIDIFACE framework which is able to receive and elaborate smart cube and vision data by applying sensor fusion theories in order to track the cube position.As Smart object we use the SMCube (Smart Micrel Cube), that it's a wooden cube case with a matrix of infrared emitter LEDs on each face and sensors inside. TANGerINE project is developed by the cooperation between MICC - Università di Firenze (Prof. Alberto Del Bimbo, Stefano Baraldi, Lea Landucci, Nicola Torpei) and MicrelLab @ D.E.I.S. - Università di Bologna (Prof. Luca Benini, Omar Cafini, Elisabetta Farella, Augusto Pieracci) and with the collaboration of other researchers interested in the cognitive aspect of TUIs (Giulia Gelmini, University of Nottingham).