Project: Medical Mobile Assistant	**Document:** Hand-free application for supporting nursing process

1. Project Overview

This project consists in the application of an experimental hand-free infrastructure in the real context of nursing process.
The nursing process, shown in image 1, is used by nurses every day to help patients improve their health and assist doctors in treating patients. This process is in a continuous evolution and in the last few years many projects involving the nursing workflow was funded.

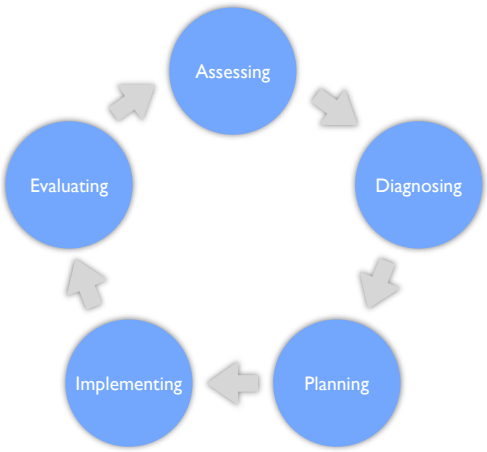

Image 1. Nursing process workflow.

Most of these projects are developed on portable devices in order to allow the implementation of helping functions for nurses. The weakness of these solution is the usage of touch type interaction that is incompatible with some medical standards. For example when a nurse visits a patient affected by an infective pathology, he can contaminate the device and contribute to the pathology diffusion.

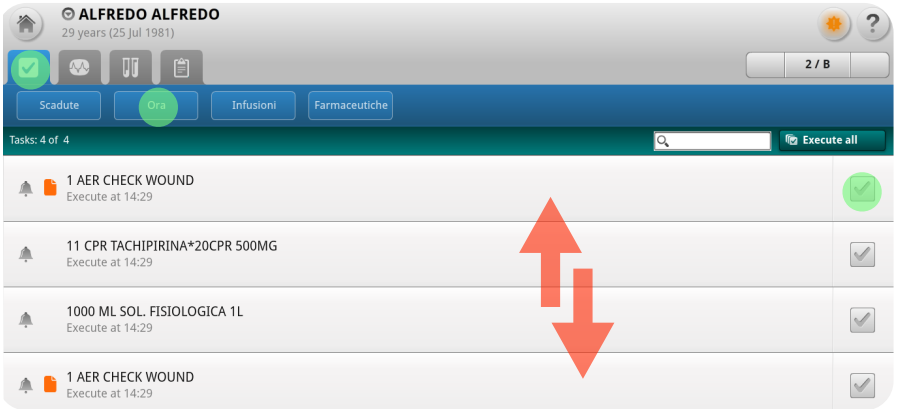

Image 2. Example screenshot of a nursing process application.

In this project we want to use an original solution to get an hardware/software system based on a hand-free interaction. Hand-free is an adjective describing equipment that can be used without hands interactions (for example via voice commands) or, in a wider sense, equipment which needs loose hands usage.

The image 2 shows a screenshot of a real nursing process application. Green and red labels represent all the possible touch type interactions of the interface. In a hand-free context these interactions need to be translated with a voice command or gesture.

The main goal is to obtain the same functions implemented on the touch-related system using hand-free interaction instead (with an efficient and performing solution).

The project is developed under the Android mobile OS.

The following topics are strictly involved in the project development:

- Software engineering of an android application
- Voice recognition techniques analysis
- Gesture recognition techniques analysis
- Machine Learning algorithms
- Design of a non standard user interface
- Hand-free interface mapping

2. Application Logic

The following schema shows the application logic. System's inputs consist in some environmental signals as voice commands or gesture. The system processes input signals with a feature extraction and pattern-matching techniques in order to obtain some sensible output.

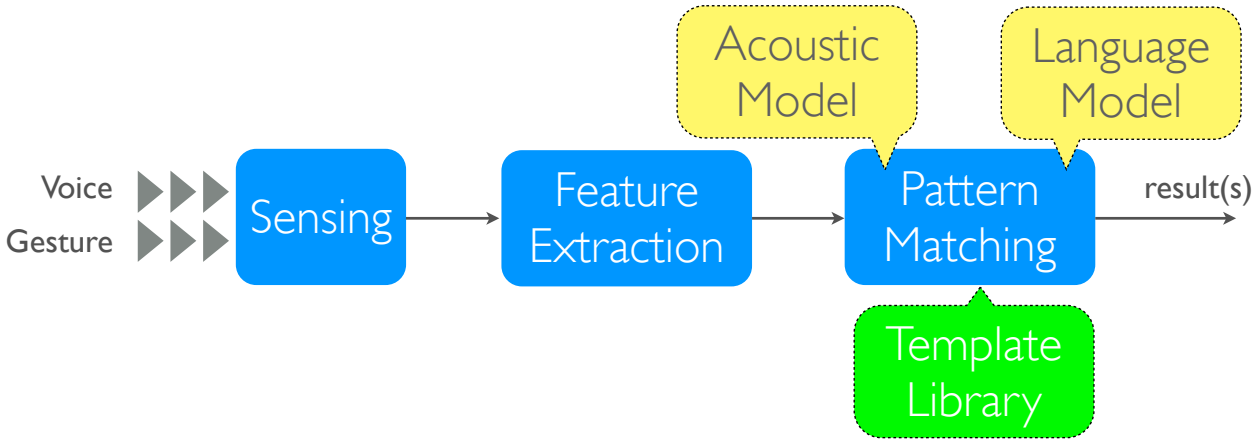

Image 3. Hand-free application workflow.

These results are used to perform a mapping from user inputs to the application logic.