

Thesis Proposals

M. Sc. Computer Engineering

Research Areas: information systems; temporal databases (Temporal DataBase Management System - TDBMS); workflow and business process modelling (Workflow Management System – WfMS); biomedical signal processing; mobile applications.

Suggested/Required skills. SQL query language, programming languages (C, C++, Java).

Some proposed topics deal with:

- i. **Process and data modelling.** The thesis aims at defining criteria to be followed when modeling processes (process model), data (information model), and when accessing data within a business process (BP) managed by a WfMS (Workflow Management System).
Prerequisites: course on Workgroup and Workflow Systems.
- ii. **WfMS Interoperability.** The thesis aims at defining criteria by which two different WfMSs (Workflow Management Systems) can interact each-other. Criteria suggested by the WfMC (Workflow Management Coalition) are a starting point.
Prerequisites: course on Workgroup and Workflow Systems.
- iii. **WIDE editor and mapper to X-PDL.** The thesis aims at designing a business process model with the WIDE graphical notation, then saving it in X-PDL for its execution on top of a WfMS (e.g. Enhydra Shark)
Prerequisites: course on Workgroup and Workflow Systems.
- iv. **Portability benchmark of X-PDL files among WfMSs from different vendors.** The thesis aims at verifying the portability of a set of business processes defined in X-PDL among WfMSs which declare themselves as X-PDL compliant.
Prerequisites: course on Workgroup and Workflow Systems.
- v. **X-PDL and access to DBMs.** The thesis aims at extending the X-PDL language, so that processes can connect to a DBMS and directly issue some SQL commands.
Prerequisites: course on Workgroup and Workflow Systems.
- vi. **Biosignal acquisition.** The thesis aims at developing optimized firmware code for an ECG-signal acquisition device, running over extreme low power microcontrollers.
- vii. **Biosignal processing.** The thesis aims at developing some algorithms for ischemia detection on ECG recordings, running on mobile systems.
- viii. **Biomedical image analysis.** The thesis aims at automatizing the analysis for X-ray diagnostic images, to evaluate the quantity of pernicious radiations absorbed by the patient during the exam itself.

- ix. **Analysis of historical data from patients.** The thesis aims at implementing some data warehouse techniques to identify approximate temporal functional dependencies over data.
- x. **Analysis of geodata.** The thesis aims at extending to spatial data the concept of approximate functional dependency.
- xi. **Archives of business process models.** The thesis aims at analyzing big repositories of business process models, to measure them according to suitably defined business process metrics.
- xii. **Business intelligence/data mining.** The thesis aims at parsing playlists from radio broadcastings, matching them and enriching an already existing, yet quite complex, database – in cooperation with an international Company.

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