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 broadcasts, matching them and enriching an already existing, yet quite complex, database – in cooperation with an international Company.

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