Master Degree Project Ideas (Fall 2014)

Proposed By Faculty

Department of Information Systems

College of Computer Sciences and Information Technology

Dr. Maruf Hasan

MS-CIS Program
Potential Project or Thesis Topics
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Notes:

- Students are requested to discuss their own project ideas/topics with the faculty members. Every now and then, with a little guidance from the faculty members, students' initial ideas can be developed into a feasible project or thesis topics that they would likely to enjoy more.
- For further details about any of the following projects, students are encouraged to contact me.
- Some projects can be supervised jointly with other CSIT faculty members.

Project Title	**Customer Relationship Management (CRM) and Social CRM Review and Recommendations in the context of KSA and GCC**
Proposed by	Dr. Md Maruf Hasan (Mobile: 0 541 220 466, mhasan@kfu.edu.sa)
Brief Description	**:** In this project, the student is to investigate how businesses in KSA or GCC region are adapting their CRM initiatives and focuses in the social networking and big data era. It is desirable that the student starts with a global survey of CRM technologies and trend followed by a local (detail) investigation and analysis of CRM practices and technology adoption with the businesses in KSA and GCC. The success of this project would depend on how actively the student could create opportunities to visit local businesses to collect relevant data and information. Strong background in questionnaire and survey design, quantitative and qualitative data analysis as well as business and system analysis are needed
Expected Outcomes	A survey based analysis, review and comparison as well as recommendations**.**
Required Resources	Literature on recent development in CRM and Social CRM; Survey and CASE tools; Data Mining and Warehousing Tools
Skills Required	Good knowledge in System Analysis and Design, Data Analysis, Data Mining and Warehousing and CRM.
Specialized Tutoring/Help to be Provided by the Supervisor	Tutorial and lecture on Data Mining, Social CRM, Big Data will be arranged by the supervisor. Suitable as a project or a thesis depending on the amount and quality of work and effort.

Project Title	Design Patterns for Dependable Systems
Proposed by	Dr. Md Maruf Hasan (Mobile: 0 541 220 466, mhasan@kfu.edu.sa)
Brief Description	Software engineers face an uphill struggle over the increasing size and complexity of systems they are expected to develop, a problem only exacerbated by the increased use of software to control safety critical functions in automobiles, aviation and the rail industry to name a few. When developing such systems from scratch, the process can be highly error prone. Safety is critically influenced by architecture, an aspect of software development that has previously seen successful application of the *patterns concept* where design expertise is captured in a way in which it may be systematically reused. In this project, students will develop a pattern catalogue for real-time, embedded systems. Strong background of system analysis and design is necessary.
Expected Outcomes	Design-patterns for safety-critical system in various domain; Comparative analysis of existing design patterns; recommendations
Required Resources	Literature on recent development in Design Patterns, Dependable system and traceability, safety-critical system; CASE tools
Skills Required	System Analysis and Design, Object-Oriented Software Engineering, knowledge of OO programming, UML and CASE tools
Specialized Tutoring/Help to be Provided by the Supervisor	Tutorial and lecture on dependable system and design pattern and CASE tool. Suitable as a project or a thesis depending on the amount and quality of work and effort.

Project Title	Error-Driven Foreign Language Learning
Proposed by	Dr. Md Maruf Hasan (Mobile: 0 541 220 466, mhasan@kfu.edu.sa)
Brief Description	Learning a foreign language is painstaking. Foreign language learners with different background (different mother tongue and different level of proficiency, etc.) are prone to make different types of mistakes. In an error-driven foreign language learning framework, learner's errors are identified and annotated from a large number of people into a database. This collection is known as learner corpus. Patterns of errors and association of errors with learners can be easily identified using the annotated corpus and data mining algorithms (as it is done with shopping basket analysis in e-commerce to predict who is likely to buy which products). It is possible to teach foreign language effectively by identifying error-patterns in a learner and presenting the most relevant learning materials based on the mistakes a learner makes and likely to make. In this project, students will be required to collect and annotate errors in Arabic Speaker's English followed by subsequent error analysis using machine learning and data mining algorithms. The students will also develop a prototype to demonstrate the effectiveness of error driven learning. Strong background in AI, XML and programming is necessary.
Expected Outcomes	Preparation of data (corpus), Data Analysis, Prototype Applications
Required Resources	Data Mining and Machine Learning Software (open source or commercial)
Skills Required	XML, AI, Data Mining, algorithm development; data analysis, experimentation, System analysis and design
Specialized Tutoring/Help to be Provided by the Supervisor	Tutorial and lecture on natural language processing and data mining will be offered. This is a unique data mining project. Depending on how quickly a student can develop his/her knowledge in this area, it is possible to pursue this project as a MS thesis (by justifying data analysis and algorithmic contribution). Prototype system Analysis and Design must be done by the students. Implementation/Programming help can be outsourced if required.

Dr. Rajkomar

Project Title	Sensing Real World Topics from Social Media
Proposed by	Dr Rajkumar Kannan (rkaruppan@kfu.edu.sa)
Brief Description	Due to pervasiveness of online social media, social networking services generate rich and timely information about real world events at real time. However, making sense of all relevant topics and events from these huge amount of data is a daunting task. In this project, student will develop a real time system that will identify and report new and trending topics from multiple channels. This will help citizens to get awareness and current trend happening around the world
Expected Outcomes	Proof-of-concept prototype that will demonstrate and report all topics that happen around the world real time
Available Resources	
Required Resources	Basic knowledge on Topic Detection algorithms and Machine Learning libraries (Open source)
Skills Required	Strong programming skills in languages such as Python or Ruby
Specialized Tutoring/Help to be Provided by the Supervisor	Tutorial / Lecture on Web Information Retrieval

Project Title	Mining Health Information from Online Health Forums
Proposed by	Dr Rajkumar Kannan (rkaruppan@kfu.edu.sa)
Brief Description	Online health forums allow users to share their health information and to get relevant reviews from other users regarding their healthcare. The extracted information would be the gold dust for policy makers, marketing departments and others looking for current health trend. The aim of this project is to sense users health related needs and their current wellbeing for their improved health.
Expected Outcomes	Proof-of-concept prototype that will demonstrate and report all health related needs, current wellbeing and trend of citizens
Available Resources	
Required Resources	Basic knowledge on Information Retrieval and Machine Learning libraries (Open source)
Skills Required	Strong programming skills in languages such as Python or Ruby
Specialized Tutoring/Help to be Provided by the Supervisor	Tutorial / Lecture on Web Information Retrieval

Dr. Amer Khawaja

Project Title	**Implementation of code generator for the concurrent processes constructs of RealSpec real-time executable specification language**
Proposed By	Dr. Amir Khwaja
Brief Description	RealSpec is a declarative executable language for the prototyping of concurrent and real-time systems based on a dataflow functional model. RealSpec supports modeling of concurrent process and multiple threads. The RealSpec processes and threads can also communicate via message passing using synchronous/asynchronous and blocking/non-blocking options. Following IEEE paper provides an introduction to RealSpec processes and threads: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4550882 RealSpec is an executable prototyping language. The executability of the language requires implementation of a compiler for the language to be able to compile, execute, and debug system prototypes. This project requires implementation of part of a compiler for RealSpec to generate code for the concurrent processes and multi-threading of the RealSpec language using a pre-generated parse tree. The code generator will generate "C" code from RealSpec specifications that can run on a freeware RTOS called eCos. The project implementation will be demonstrated to be successfully working on few decent concurrency examples such as producer-consumer.
Expected Outcomes	• Implementation of the code generator for RealSpec concurrent processes and multi-threading features in "C" language for eCos RTOS • Successful demonstration of few decent concurrent/multi-threading examples such as producer-consumer
Available Resources	• RealSpec language details • RealSpec lexical analyzer and parse tree (two other major components of any compiler needed for code generation) • eCos RTOS freeware (http://ecos.sourceware.org/)
Required Resources	• Freeware eCos RTOS • Linux system
Skills Required	• Compiler concepts • Programming in C/C++ • Systems knowledge to download and install eCos RTOS on Linux
Specialized Tutoring/Help to be Provided by the Supervisor	Will provide overview of real-time concepts Will provide overview of RealSpec specification language Will provide overview of eCos RTOS Will go over details of lexical analyzer and parser for RealSpec

Project Title	**Implementation of code generator for the timing constraints constructs of RealSpec real-time executable specification language**
Proposed By	Dr. Amir Khwaja
Brief Description	RealSpec is a declarative executable language for the prototyping of concurrent and real-time systems based on a dataflow functional model. Timing, resource, and precedence constraints and constraint handling are integral parts of real-time systems. RealSpec supports various timing constraints to allow accurate prototyping of real-time software systems. Following IEEE paper provides an introduction to RealSpec processes and threads: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4550882 RealSpec is an executable prototyping language. The executability of the language requires implementation of a compiler for the language to be able to compile, execute, and debug system prototypes. This project requires implementation of part of a compiler for RealSpec to generate code for the various timing constraints and exception handling constructs of the RealSpec language using a pre-generated parse tree. The code generator will generate "C" code from RealSpec specifications that can run on a freeware RTOS called eCos. The project implementation will be demonstrated to be successfully working on few decent examples involving various types of timing constraints.
Expected Outcomes	• Implementation of the code generator for RealSpec timing constraints and exception handling features in "C" language for eCos RTOS • Successful demonstration of few decent timing constraint examples
Available Resources	• RealSpec language details • RealSpec lexical analyzer and parse tree (two other major components of any compiler needed for code generation) • eCos RTOS freeware (http://ecos.sourceware.org/)
Required Resources	• Freeware eCos RTOS • Linux system
Skills Required	• Compiler concepts • Programming in C/C++ • Systems knowledge to download and install eCos RTOS on Linux
Specialized Tutoring/Help to be Provided by the Supervisor	Will provide overview of real-time concepts Will provide overview of RealSpec specification language Will provide overview of eCos RTOS Will go over details of lexical analyzer and parser for RealSpec

Dr. Shadi Ettantawi

Project Title	**Arabic Morphological Analyzer**
Proposed By	Dr. Shadi Ettantawi saltntawi@kfu.edu.sa 035899252
Brief Description	Morphology - التصريف اللغوي - aims to find the root for a given word, and to provide other forms or words based on the same root to give other meanings. This project aims to build a tool that:- a) Accepts a word in Arabic and then return its root. b) Accepts a root and display all its derived words.
Expected Outcomes	- Desktop Application, or - Web-based Application, or - iPhone/ iPad App.
Available Resources	- Articles about building Morphological Analyzers. - Objective-C/ VB.Net courses.
Required Resources	- None.
Skills Required	- Good command of a 3GL such as C++ or Java. - Ability to learn a new programming language such as VB.Net or Objective-C. - Good command of Arabic Language. - Good command of Web-based languages such as ASP.Net, PHP, JavaScript, and HTML. {optional}
Specialized Tutoring/Help to be Provided by the Supervisor	- Guidance to survey related work and to tackle the problem can be provided by the supervisor.

Project Title	**Part of Speech Tagger**
Proposed By	Dr. Shadi Ettantawi, saltntawi@kfu.edu.sa 035899252
Brief Description	Part of Speech (POS) tagging is a required task in Natural Language Processing, where each word in a given text is classified as noun, verb, .. etc. This project aims to identify a method for POS tagging for English or Arabic language, and implement the proposed method into a working system. A comparison wither other methods/ systems may be provided. A serious work can be documented into a scientific paper for publication.
Expected Outcomes	- Desktop Application, or - Web-based Application, or - iPhone/ iPad App.
Available Resources	- Articles about POS tagging. - Objective-C/ VB.Net courses.
Required Resources	- None.
Skills Required	- Good command of a 3GL such as C++ or Java. - Ability to learn a new programming language such as VB.Net or Objective-C. - Good command of Arabic/English Language. - Good command of Web-based languages such as ASP.Net, PHP, JavaScript, and HTML. {optional}
Specialized Tutoring/Help to be Provided by the Supervisor	- Guidance to survey related work and to tackle the problem can be provided by the supervisor.