Innovative Projects

Winter 2014

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List of projects

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#1	Lost signal
Project goals	Finding closest position with the mobile network signal
Scope definition	Let assume that we are picking up mushrooms in a forest or we are climbing in the mountains. Our friend had an accident. We need to call for help. Our mobile says: *Sorry dude, no signal*. We are in a deep shit. Application could periodically test the network signal and correlate this data with our position from GPS. Then, if needed, it could lead us to the closest position with the last visible signal. Application can also consist of web service that would gather the data from other users and would allow to download the area coverage for the offline usage. It can also use maps (HERE, Google, etc.) for the localization purposes.
Requirements	-
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-5

#2	Smart, memory-saving collections in Java
Project goals	Java library to store large objects collections in memory. Research and comparison of different techniques.
Scope definition	Create library that transparently saves memory usage of large collections. For instance: first zip objects in memory, then serialize them to disk when they are still not accessed. Try out different compression algorithms and inventory methods like LIFO, FIFO, etc.
Requirements	Java
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-2

#3	Where is my boss?
Project goals	Mobile application for finding coworkers and user location in a building
Scope definition	We are living in environment with abundance of radio signals. Some signal are easy to receive on long distance (for instance FM radio) and some are designed to serve on smaller area (http://en.wikipedia.org/wiki/IBeacon). Wi-Fi has range about 60 meters. All devices which are designed to use Wi-Fi can calculate Received Signal Strength Indication (RSSI) which tells the device about power of received radio signal. Such RSSI could (with simple and naive approach) tell how far we are from source of signal. If there are many Wi-Fi fields, we can estimate our position based on RSSI from different sources. Goal of project would be to produce application which will work in two modes. First mode (lets name it Scout Mode) will run periodical checks of Wi-Fi RSSI from all sources in "sight". After Scouting the area (just by walking with device), data will be saved and pushed to data mining program (either on device or on remote server). Data mining program will try to classify data based on one parameter - number of rooms, floors etc. Then application could be switched to second mode (Location mode) which will check Wi-Fi RSSI for current location, push it to data mining script and receive result. With some luck result could give indicator in which room/floor user is currently. The same data can be used for determining position of other application users. Project should be implemented either on Android or on Linux, preferably by using Android SDK or Python. Knowledge of unsupervised learning techniques are not required.
Requirements	Android SDK or Python
Author	Damian Melniczuk
Planned duration	1 semester
Team size	1-5

#4	Optimal subset
Project goals	Algorithm for finding optimal subset of elements based on given conditions

Scope definition	Database contains millions of entries with different properties. The idea is to implement solution that would be able to find minimal set of entries covering set of given rules. In the worst case (depending on rules) problem is NP hard. Rules has to be easily editable. Example conditions:
	
	`at least 60% of results has property A = 1`
	`at most 10% of results has property B in (1,3,4)`
	`at least 1 result has property C = 7`
	`at least 25% of results has property D matching /abc-.*/`

Requirements	-
Author	Rafal Mijas
Planned duration	1 semester
Team size	1-2

#5	GPS waker-upper
Project goals	Mobile waker-upper with GPS
Scope definition	Mobile application that can notify you when you are around your destination. Really helpful when you are tired in a bus or tram.
Requirements	-
Author	Jakub Stasiak
Planned duration	1 semester
Team size	1-3

#6	Anonymous surveys
Project goals	Web application for making anonymous surveys
Scope definition	Application should allow survey creation for dedicated group of people. Neither survey author nor participants could be able match people with answers. Participants should be able to verify if their answers were not modified. Security of the solution should be provable. Questions can have a form of T/F checkboxes, comboboxes and text fields (in this case we can assume that the participants are aware of the risk of revealing themselves). Project can include adjustment of existing solution for voting.
Requirements	-
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-4

#7	Pomodoro device
Project goals	Small device that would simplify using Pomodoro Technique
Scope definition	The Pomodoro Technique is a time management method (http://en.wikipedia.org/wiki/Pomodoro_Technique). The device should consist of timer and some notification system, using light, sound, etc. Plenty of imagination and innovation highly welcome.
Requirements	-
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-2

#8	Help!
Project goals	Mobile application for calling for help in urgent cases
Scope definition	Application should consist of simple interface that would be easy to use in stress and harsh conditions. It would allow to notify family, police or call for ambulance with a few clicks. It can send sms, email or just call (voice synthesis) and provide predefined user information and GPS position. It can also contain first aid hints.
Requirements	-
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-4

#9	Big Data spreadsheet
Project goals	Spreadsheet application for big data analysis
Scope definition	Application that would allow to override excel lack of scalability (e.g. limited number of rows/columns) and to perform excel formulas (conditions, aggregations, etc). Project can be based on Microsoft Excel, Libre Office or can be an independent application or library.
Requirements	-
Author	John Torregoza
Planned duration	1 semester
Team size	1-4

#10	Ad hoc search engine
Project goals	Application for crawling web pages in a fastly changing environment
Scope definition	Web application that would allow crawling web pages for the given set of key words. The data does not have to be stored and indexed as usually do the web search engines because of its volatility. It could support authentication on sub-pages with the given username and password.
Requirements	-
Author	Adam Pomykala
Planned duration	1 semester
Team size	1-4

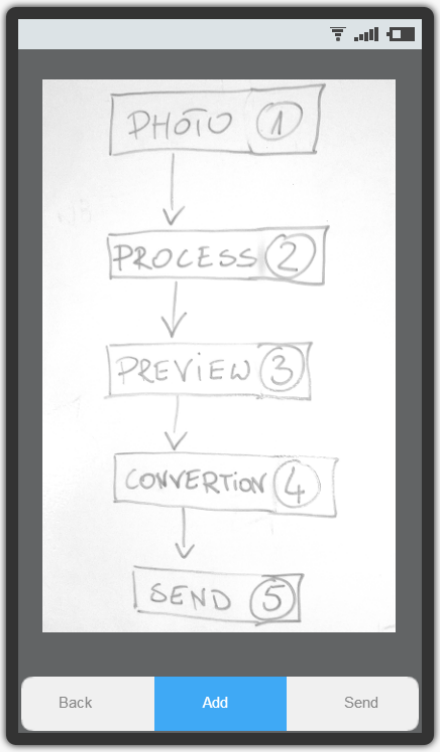
#11	Network Simulator
Project goals	Monte Carlo simulator for mobile networks
Scope definition	Application that would allow simulating network behaviour for the given topology, UEs distribution, pathloss model and power control algorithms. It could also support different traffic models and present detailed interferention statistics.
Requirements	-
Author	Adam Pomykala
Planned duration	1 semester
Team size	1-4

#12	SQL unit
Project goals	Test framework for SQL queries and functions
Scope definition	Test framework that would allow writing unit tests for SQL code. Should be driver independent and support standard SQL syntax (but obviously additional extensions for specific database features would be welcome). Tests can be written in python, java, scala or any other language, not necessarily in SQL (probably it would not be a good idea).
Requirements	Preferred databases: MySQL, PostgreSQL
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-3

#13	Lightweight & energy saving continuous integration
Project goals	Lightweight server for running build scripts with command line interface for configuration and simple web page for results presentation.
Scope definition	Checkout SVN & Git repositories periodically Run build scripts Parse and visualise result files (Common formats). Notify and display build status (Web page, Emails
Requirements	Preferred technology: NodeJS
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-4

#14	Website branding validator
Project goals	Sometimes the branding (i.e. name of company/product, logo or logotype) is changing. It would be useful to have a website crawler to walk the website and validate that all proper changes has been introduced.
Scope definition	A program in any form that will accept inputs as i.e. renames, brand colors etc and will crawl given website looking for errors in logotype or branding.
Requirements	-
Author	Mateusz Wronski
Planned duration	1 semester
Team size	1-2

#15	DocsDB
Project goals	Database system that will be able to store and index any popular form of documents like mails, microsoft office formats, pdfs.
Scope definition	Web application with simple human interface based on google's search engine and RESTful API for feeding the database. Application should provide full-text search for the stored documents which can be based on Elasticsearch database. Possible extensions: - ability to fetch and index e-mail boxes - ability to index files from disks Useful links - http://www.elasticsearch.org - http://tika.apache.org - http://aperture.sourceforge.net
Requirements	NoSQL database
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-4

#16	OCR for graphs and structured data
Project goals	Optical character recognition library for conversion of handwritten graphs and structured data into digital format. Implementation can have a form of mobile app.
Scope definition	Graphs can have some fixed form and limited number of elements to recognise, i.e. they can consist of arrows and boxes filled with text. They can be converted to any text format. For structured data you can define some abstract structure like: 'text and number in circle on the right hand side' and application should try to match those with the photo. Example: 
Requirements	-
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-3

#17	Augmented notification system
Project goals	Composite solution for distributing notifications via light, sound and touch.
Scope definition	The system could have a form of central controller with many different peripheral devices that would be used for handling notifications and alarms. The main aim is to present status of continuous integration server in a highly visible manner. Those peripheral devices could have a form of RGB lamps, signal lights (same as used for the traffic control) or usb rocket launchers.
Requirements	-
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-4

#18	Meetings Helper Device
Project goals	Design and create prototype of device to simplify sending recorded materials (a/v, photos) to meeting attendees.
Scope definition	Meetings Helper should be a standalone device that would allow you to record audio / video and to take photos (with integrated camera or using a phone). At the beginning of the meeting attendees use their ID Cards (with RFID?) to register themselves at the meeting. During the meeting they take some photos / record videos and then using one button the device distributes recorded materials to everyone that has been attending (via e-mail).
Requirements	-
Author	Mateusz Jaworski
Planned duration	1-2 semester
Team size	2-4

#19	Knowledge-based Expert System simulation environment
Project goals	Ready to use simulation environment with CLIPS production system implemented.
Scope definition	Knowledge-Based Expert System (KBES) is an artificial intelligence branch used for defining human-like reasoning, i.e. decision-making. The goal of the project is to integrate CLIPS system with some simulation environment (e.g. MATLAB), propose the object to be controlled, and define some set of production rules to test, whether it works fine enough.
Requirements	C, C++, MATLAB, CMake, general AI knowledge
Author	Pawel Ptasznik
Planned duration	1 semester
Team size	1-2

#20	Eclipse plugin - Logs parser
Project goals	Implement Eclipse plugin that parses project source code for logs printings. After loading of log file plugin is capable to jump into source code to point the place where log was printed. There are many applications in the world that generate logs in text format. It is difficult to find quickly where given log message comes from.
Scope definition	- Plugin for Eclipse to index code and parse logs - UI Eclipse configuration front-end - Jump into code after selecting particular log line - Ability to filter the log file after applying set of filters
Requirements	- Configurable log format - Configurable log print functions in code (allow support standard and custom print functions) - Jump into code after selecting particular log line - Support for C/C++ or other languages
Author	Grzegorz Kokot
Planned duration	2 semesters
Team size	2-6

#21	Acceptance tests framework for JS-heavy web applications
Project goals	Web testing framework for acceptance tests in natural language (similar/based on Cucumber) for JS-heavy (AJAX) web applications.

Scope definition	Example:
	
	`OPEN http://www.nsn.com`
	
	`TYPE 'hello' INTO .login-input`
	`TYPE 'pasword' INTO .pass-input`
	`CLICK input[type=submit]`
	
	`ASSERT SUCCESS`
	`ASSERT .status CONTAINS 'welcome'`
	`ASSERT .main-page IS VISIBLE`

Requirements	Java/C#/Python/JS
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-3

#22	Acceptance tests framework for REST APIs
Project goals	Web API testing/documenting framework in natural language (similar/based on Cucumber or Concordion).

Scope definition	Example:
	
	`OPEN http://www.nsn.com/api/data?id=123`
	
	`ASSERT SUCCESS`
	`ASSERT RESPONSE IS JSON`
	`ASSERT RESPONSE CONTAINS '{`
	`name: <string>,`
	`pages: <array::int>,`
	`data:  id: [1,2,3]`
	`}'`

Requirements	Java/C#/Python/JS
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-3

#23	Jenkins Shepherd
Project goals	Single web application for multiple Jenkins servers managing
Scope definition	Functionalities: mass update, copying single job, copying whole configuration, defining workflows, aggregated statistics, visualisation of jobs relations
Requirements	NodeJS/Python/Java
Author	Mateusz Jaworski
Planned duration	1-2 semester
Team size	1-4

#24	Jenkins: deployment plugin
Project goals	Plugin for web applications deployment
Scope definition	After build: - connect via ssh with remote server - copy and unzip selected artefacts - run script externally
Requirements	NodeJS/Python/Java
Author	Wojciech Stachowski
Planned duration	1 semester
Team size	1-2

#25	Jenkins build trigger
Project goals	Jenkins plugin for builds triggering based on result of database query
Scope definition	Jenkins periodically queries the database, builds are triggered when query result matches given condition
Requirements	Support for PostgreSQL, MongoDb
Author	Jacek Tomasiak
Planned duration	1 semester
Team size	1-2

#26	Performance tests plugin for Jenkins
Project goals	Jenkins plugin for execution and visualisation of performance tests' results
Scope definition	- runs JUnit tests marked with @Performance annotation - generates report in xml format - presents results on CI server
Requirements	Preferred language: Java (JUnit)
Author	Mateusz Jaworski
Planned duration	1 semester
Team size	1-2