Software Engineering Design Symposium 2015
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Professors Derek Rayside, Lin Tan, Krzysztof Czarnecki, Patrick Lam, Andrew Morton, & Paul Ward

1 Software tools to provide real-time analytics of a codebase. (Ac- cio)

Accio is a collection of software tools to perform analytics on a software codebase in realtime, by integrating with programmers' editors to take "snapshots" of what they're currently working on. The system integrates these snapshots to determine which areas of the codebase have hidden dependencies and keeps track of who knows what about the codebase. We expect these measures to help both individual programmers to be able to implicitly search through the knowledge of others, as well as help the project maintainer find areas of the codebase that might soon become a maintainance nightmare.

Austin Dobrik, Jeff Lee, Matt Maclean, Alexander Maguire, Adam Sils
productivity
http://uwaterloo.ca

2 Small-scale easy set-up web server solution. (Ailurus)

Ailurus is a solution that provides users with an affordable server-in-a box and a simple administration interface, integrated with several services (such as DNS) that make it easy to bring the device online. It allows anyone to be completely self-hosted without needing the technical knowledge that's normally required to get everything set up.

Jiaer Wang, Tian Yu Zhang, Andrew Howe, Richard Peng
society
http://ailurus.ca

3 Build an Excel-like web interface to a database that is highly accessible to non-technical users. (DataHarmony)

We are building a web spreadsheet application that translates Excel-like commands to relational database queries for efficient processing of big data. In particular, we want to make it possible for a non-technical user to create a report summarizing and aggregating the contents of a company's database and share a link to that report with another user.

Desiye Collier, Alex Klen, Sanjay Menakuru, Jonathan Wei
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4 A networked 2D physics simulation library (Delta)

Networked Box2D is an open source library for synchronizing 2D physics simulations over a network. It is an extension of the popular 2D physics engine, Box2D. The idea is that the physics simulation will be run on a server based on a stream of inputs from one or more clients. Each client will approximate the server physics locally and periodically synchronize with the server. The purpose of this library is to enable multiplayer gaming experiences.

Matthew Aitken, Junjie Fang, Zijian Feng, XiaoChuan Yu
fun
http://uwaterloo.ca

5 A high-level programming language and toolchain for systems engineering (Manifold)

Microfluidic circuits are currently designed by hand, using educated intuition to select values for design parameters. These hand-made designs are then simulated/verified using Matlab, to confirm that the values for the design parameters respect the design constraints. This is essentially a satisfiability (constraint satisfaction problem). Recent advances in SMT (Satisfiability Modulo Theories) solvers make them applicable to this problem. A SAT solver finds a satisfying assignment (if one exists) to a boolean formula. An SMT solver extends the domain of the formula to include other kinds of variables. SMT solvers such as dReal can tackle formulas with non-linear inequalities and trigonometric functions over the reals.

Tyson Andre, Murphy Berzish, Max Chen, Lucas Wojciechowski
research
http://manifold-lang.org/

To make these advances accessible to microfluidics engineers, we have designed and implement a hardware description langauge that can express microfluidics circuits in a functional-programming style. This language is inspired by, but different from, hardware description languages (such as VHDL or Verilog) for digital circuits. In digital circuits, the wires are all uniform size and can be any (reasonable) length and follow any path. In microfluidics, the characteristics of the channel matter: diameter, length, and pressure are related; angles cannot be too sharp or they will induce turbulent flow; etc.

Although microfluidics is the focus of our development, we believe that the resulting programming language is powerful enough to describe a very large class of designs, including digital circuits, analog circuits, neural networks, and classical fluid networks (pipe systems). We have also constructed a backend for digital systems that allows developers using our language to use it to construct digital circuits, using the same high-level language that is used for microfluidic circuit design. This demonstrates that our language is applicable for a variety of real-world designs.

(credit to Derek Rayside for part of this text, which has been borrowed from an NSERC grant application for this project)

6 Backend platform to facilitate rapid mobile application development. (EdgyVentures)

Many successful start-ups over the past couple of years have achieved success by focusing on the incorporation of social features into mobile apps (see: SnapChat, WhatsApp, etc.). These start-ups also share similar technical challenges that, if isolated, could be generalized.

Didier Smith, Nikolai Semenenko, Josip Vulic, Christian Sumido
entrepreneur
edgy.works

EdgyVentures' goal is to facilitate rapid mobile application development by leveraging shared server-side and mobile infrastructure

between applications. We are able to easily modularize our codebase, quickly deploy a new app, and monitor the health of our systems with high granularity. As a demonstration of our back-end infrastructure, we have developed two mobile applications and a website which independently use our back-end services to achieve their intended functionality.

7   Anonymously search the web (AnonAsk)

As concerns for people's privacy have been growing in recent years, Team AnonAsk looks to provide a tool for searching the web anonymously. We will provide users with a browser extension and a web interface for searching popular search engines through a country of their choice. This is accomplished by deploying a fleet of proxy servers which retrieve search results for our web servers. Any form of tracking will be stripped from the results and nothing will be logged about our users.

Scott Somerville, Kyle Bennett, Dane Carr, Alex Laviolette
society
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8   Commenting platform for websites (Commento)

Commento is a comments platform that aims to solve the shortcomings of existing commenting systems. At it's core, Commento acts as a service for content publishers, such as news websites and blogs, which facilitates and manages user-submitted comments. Commento improves the usability of comments systems, by organizing large bodies of comments and providing a unique user interface to allow users to easily consume comments. The central idea behind Commento is to direct discussions towards specific, relevant topic questions. Organizing the discussions based on common themes should not only improve the navigability of large numbers of comments, but should also lead to an improvement in discussion quality by encouraging the community to create and discuss thoughtful and constructive questions.

Abdul Al-Dhalaan, Avishesh Shah, James Kim, Shival Maharaj
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9   E-commerce auctions viewed in reverse, where buyers create auctions and sellers bid on them (Bazarpal)

Bazarpal is e-commerce auctions viewed in reverse. Instead of a traditional seller creating an auction, a buyer creates an auction for a product. The buy auction works like a wish list, except the buyer can specify constraints, such as auction time, conditions, etc. Bazarpal automates the work required by a traditional buyer to find products. For sellers, we introduce a simplified workflow for allowing easy uploading of listings.In the background, our system tries to

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http://bazarpal.com

match buyers with sellers, and vise versa. Sellers are automatically presented with buyers that best fulfill their criterion and are able to bid on buy auctions. Bazarpal maintains its own search index and ranking algorithm to best satisfy both buyers and sellers, without the need for users to manually perform searches.

10   An organizational calendar which helps you schedule your day (Team Lavendar)

Traditional calendar software provides users with a limited tool set for planning their daily and weekly lives. Typically people use calendar software along with reminder software as well as maps to plan out their days effectively and this can become a hassle. Lavendar is an iOS application provides an all in one solution for scheduling your day to day life. Users can attach notes to calendar events, use their current location to get departure times for next events and use map integration to get directions to their upcoming events. Lavendar will use existing knowledge of a user's schedule to help them schedule future tasks based on optimal times and locations to acomplish each task in order to reduce travel time.

Nigel Chan, Elisa Lou, Aaron Pang, Maxim Rabiciuc
productivity
http://lavendar.ca

11   personalized trip scheduler (Trippify)

Trippify is a web application that aims to provide an efficient way to plan and create schedules for people visiting new cities.

Over the years, as we plan weekend trips while on co-ops and search for possible venues for grad trips, we noticed that there are multiple websites that help search for deals, tourist hot spots and restaurants. However, none of these websites provided all those services in a usable timeline. Hence, we plan to address as many points that go into creating an itinerary of the trip as possible, considering the data about cities that we can find and the time outlined by the user.

Given a user's travel destination, start and end time of trip, budget choices and other outlined filters, we aim to provide other useful recommendations and create an optimal, exportable calendar.

Aayushi Kaushik, Jasmine Haider, Sarah Chan, Zainab Zahid
fun
http://trippify.me

12   Identity-Based Wifi Access Control (Homebrü)

Homebru is creating an identity-based login solution to wifi administration. Instead of passing around a cryptic password, add your friends to wifi for them to join.

We link social networks that are identity providers with identities used for the radius authentication protocol used to authenticate

Shale Craig, Jacob Abrahams, Gurjant Kalsi
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http://homebru.me

access to wireless access points. By approving (and denying) the wireless requests used by your friends, fumbling to find the password is replaced with just adding your friends. You can even use group-based wifi settings to configure access.

As it stands, setting up a home network is one of the most painful and error prone processes undertaken everyday, especially for those who are less familiar with technology. By simplifying the process, yet expanding the configurability at an end-user's fingertips, we hope to make the simple acts of connecting a new laptop to the internet, collaborating with others in your home, or simply having guests over, just that much easier.

13   Music editor allowing users to create, share and build upon music snippets (Continuity)

If you are an aspiring musician looking inspiration, or an average music enthusiast looking to share your ideas to the world. Songbook will be the website that will bridge these two demographics together. Songbook has a simple and easy-to-use music editor that lets anyone recreate that catchy tune in their head. It adapts the source control principle from software development that allows anyone to chime in and make updates and extensions to your work (with your permission). Watch your three second melody grow and blossom into full tracks before you and make contributions to other peopleâĂŹs work to help them do the same.

An Shi Cai, Scott Dermott, Li Bo Hu, Julien Vong
fun
TBD

14   Context-sentive game audio auto-generator (Procedurally Generated Transitional Audio (PGTA))

Video games are a unique form of entertainment that require a high degree of user interaction. The nondeterministic nature of this interaction makes it difficult to synchronize gameplay with a soundtrack. Ambient audio is used in video games as a means of enhancing immersion, and having this ambient audio react to gameplay furthers this immersion. One way to achieve this level of integration between ambient audio and gameplay is to procedurally generate sound based on in-game events. Though this technique has been explored before by game developers, all of the work has been proprietary and thus not accessible to the public. PGTA provides an open-source solution to procedurally generate audio targeted towards integration with game engines. In addition to procedural generation of tracks using pre-recorded audio samples, PGTA also offers a means of dynamically transitioning between tracks. The PGTA

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http://www.pgtaengine.com

engine also comes with a custom editor for PGTA projects providing an intuitive method to create tracks and transitions while requiring minimal technical skills. PGTA provides an easily accessible and user friendly approach to creating procedurally generated ambient audio.

15   Podcast creation and sharing web application (ShuttlePod)

The creation, editing and publishing of a podcast is a task which requires the creators to have audio editing programs installed on their machine. These may not necessarily provide the most straightforward approach to accomplish the creator's goals for simply sharing their recordings. ShuttlePod is a web application which allows users to record, upload and edit their podcasts, and share their creations with others through the website. This is valuable, as despite other online services exist for sharing and uploading, there are not many which provide a framework for editing.

Raymond DiCecco, Jason Gatt, Santiago Gil Castaneda, Joel Phillip
fun
https://shuttlepod.me

16   Context-aware music recommendation (Team Sonicle)

Project Sonicle is a mobile application that uses raw sensory data of modern smartphones to derive various types of user activites and context and recommends appropriate music based on user taste developed through machine learning approaches.

Hong Lu, Arash Mortazavi, Shaishav Siddhpuria Research/Entrepreneurial
http://uwaterloo.ca

17   Investigating the impact of a touch-sensitive keyboard on usability. (TSK – Touch-Sensitive Keyboard)

Several virtual reality products have appeared on the market in recent years. Among them are the Oculus Rift headset and the Leap Motion controller. With the proliferation of this new hardware, more developers are seizing the opportunity to develop virtual reality applications. However, developing an application without a preexisting user control library can be time-consuming. In addition, the developers cannot be sure that their user interface is intuitive and easy to use. Hence, we have decided to build a library of user controls for use with the Oculus Rift, Leap Motion controller and the Unity environment. Our focus is primarily on developing text input fields and menu systems. After development is complete, we plan to conduct a user study to assess the usability of our user control library. We also plan to release the user control library to the public as open source software.

Ariel Weingarten, Mark Roukema, Adam Watson, Theodor Gugoiu, Saba Saba
research
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18 A music player that streams torrent (WhitewaterPlayer)

WhitewaterPlayer is a music player that allows users to search, explore, stream and store music torrents on the web easily.

Anushervon Saidmuradov, Viktor Stanchev, Francis Williams, Rui Zhao
music, fun, torrent
https://github.com/n00shie/WhiteWaterPlayer

19 File format specifying changes in light hues at different timestamps (hrt)

The goal of HRT is to create a file format that provides video viewers with an immersive experience while playing the video. HRT has a specific structure that describe the hue of different lights at exact timestamps in order to enhance the viewing experience while watching, for example, a movie or a TV show. Using data from an HRT file, the colours of different lights can be changed at specified timestamps in order to create a fully immersive experience while watchingvideos

David Guo, Desmond Chan, Ruoyi Wang, Zhenqian He
society
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20 Mass email notification management system designed specifically for Skylink Express. Its job is to track responses for the purpose of audits by Transport Canada. (CTS)

Skylink Express is a small Canadian aviation company which is regulated by the government department Transport Canada (TC). One of the requirements stipulated by TC auditors is that when an important message is sent out to crews or engineers (for example regarding a new operational policy or safety procedure) Skylink must be able to confirm that everyone has received, read, understood and will comply with the content of the message. Currently this task is performed manually. What the Correspondance Tracking System (CTS) aims to do is automate and streamline this process. It will allow the management and mass distribution of email messages, and will provide an affordance within each email which the recipient must click in order to confirm he/she has read and understood the message. It will track which recipients have responded to the message, and will provide the ability to easily follow up with those who haven't. CTS will provide a centralized, secure solution that is catered to Skylink's technical requirements.

Brandon McDole, Joe Price, Brian Chow
entrepreneur
No live URL at the moment

21 Our project analyses a patient heart beat and determines wether or not the patient has a heart disease. (SiScope)

Our project will be an electronic stethoscope. Here are our main features: 1. Assist doctors with poor hearing by broadcasting the heartbeat across the room. 2. Help instructors teach students by matching

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Research
git@bitbucket.org:teamstethoscope/siscope.git

what they hear to what student hear. 3. Assist novice doctors determining whether the heartbeat is normal or abnormal. The stethoscope will consist of speakers that will amplify the heartsound of the patients. It will also contain logic which will determine whether the patient's heartbeat is normal or abnormal. We will use machine learning algorithm to generate the logic used.

22   Mobile Route Planner. (Map2Go)

This is a mobile application that is designed to help users plan their lives better. It starts out with being a simple route planner but is capable of planning using time-sensitive entries. Furthermore, it can conform to the busy traffic during the day and advise smarter routes that direct the user in the most timely fashion. The app allows users to prioritize and assign precedence order to different stops in a route. For people who want to get the most out of their day, time management is essential and this app helps facilitate this process. Given a set of locations and a list of constraints provided by the user, our app determines the best possible route for the user in a way that allows them to use their time best for day-to-day tasks or for larger trips around the world.

Collins Chung, Austin Lee, Eric Tam, Ajay Sreenivasan
entrepreneur, utility
https://github.com/d4l/Bourbon.git

23   Track and analyze the sports you play. (Sports Tracker)

Sports Tracker is a web and mobile application used to keep track of scores within a group. It allows players to search and filter amongst past matches, challenge friends and view detailed statistics about themselves and others. The user creates an account by signing in using their Facebook account, and is given the option of creating a new group or joining an existing one. The project can be accessed at www.sportstrackingapp.com and is in the Androind Market. It is available open-sourced.

Akif Hossain, Anandh Sridharan, Nirujan Suresh, Ragulan Ravinthiran
fun
http://www.sportstrackingapp.com/

24   App to organize lunch/dinner with friends (Noomee)

We are building a mobile application that eases the process of creating a group lunch/dinner event. An organizer is able to create an event that is visible to his friends, then his friends can choose to join the event. We also provide a restaurant randomizer in case people don't have a consensus on which restaurant to go to.

Qi Feng Liu, Yi Kun Song, Hong Wen Zhu
society
http://uwaterloo.ca

25 Card Game Domain Specific Language (Shuffle)

To most people, programming seems cryptic and difficult. Kids in elementary school, Grades 5 and up, may find program syntax daunting. Shuffle is a domain specific language for creating card games. It aims to break down the barrier amongst those that do not attempt to learn programming due to scary syntax. Almost everyone is familiar with card games and the mechanics behind them; by leveraging familiarity with the card game domain, we aim to make programming more accessible. Shuffle is designed to help kids and others learn programming, possibly aiding the transition into programming in more commonly used languages.

Alex Swanson, Chhavi Kankaria, Holly Babaran, Sujen Sathiyanathan
society
n/a

26 Group meal recommendation (Dishlicious)

Dishlicious is a web application that aims to provide recommendations of dishes and restaurants for groups of users. The recommendations will be adapted to each group member's taste buds according to their likes and dislikes. Users will also be able to rate and review individual dishes.

This app aims to provide users a convenient way to organize group meals without the hassle of collecting everyone's likes and dislikes.

Schukey Shan, Neha Sharma, Chao Gao, Mai Wang
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