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Short Bio

Port folio

Selection

Dr. Eng. Hamed "K" Khandan is an engineer based in California. He is a pioneering figure in software engineering, mechatronics, and computational systems science. Notable for his work in Universal UI and Sociomimetic Computing, he specializes in programming languages, parallel computing, and intelligent machine control. Outside work, he's passionate about space, music, and environmentalism.

As Founder & CEO of Universal Informatics LLC, K leads the development of Universal UI and other technologies, aiming to reduce costs and expand accessibility for software developers. His prior roles include founding Mindscape Inc. and serving in leadership positions at KPMG Ignition Tokyo and Uzabase, where he drove technological innovation and project management.

K's academic background includes a Doctor of Engineering in Computer Science from Tokyo Institute of Technology, complemented by degrees in Mechatronics Engineering and Computer Software Engineering. With skills in machine learning, C++, research, and compiler design, he continues to advance technology's frontiers.

KFoundation Project

High-performance, portable, novel libraries designed around the concept of universality, for core, GUI, web servers, web clients, database, parallel and distributed programming, and other computing essentials — essentials needed for my dream operating system Mi|OS.

2013 — Present, Self-Funded, Mindscape Inc.

Keywords. Design and Implementation of Programming Languages, Compiler/Interpreter, Declarative, Dataflow, OSS Library, OSS Framework, Web Client, Web Server, Database Client/ORM, GUI, Scala, Java, JavaScript, C++

Universal UI

DSL and APIs for Dynamic media and UI development. It is declarative, concurrent, ports to desktop, web, mobile, and more. UUI is made possible thanks to Flow API and Content API & DSL technologies.



Universal Serialization

Read and write data as object models, to and from virtually any target format. It supports Postgres database, JSON, YAML, XML, and KFoundations's own K4 format. It can even convert URL query strings back and forth to objects.





// write url.query.withQuery(profile)

Universal Culture

Offers localization at a level other libraries don't. Source dictionary can be stored in any combination of formats supported by Universal Serialization. Other perks includes, recursive parameter evaluation, post-thrown localized exceptions, customizable fallback languages, and string interpolation for easier use in Scala language.

K4 and LoTeX Languages

```
MultiDictionary[default="en-US"
fallbacks={
    Fallback[from="zh-HANT" to="zh-HANS"]}
domains={
    Domain[name="co.mscp.uref.webui" entries = {
        EntrySet[key="LOGIN_HINT" values={
            Entry[lang="en-US" value="Hint: Login to create fancy urls."]}]}]
```

К4

is a machine- and human-readable marked up language that fixes lack of typesafety in JSON, and bulkiness of XML.

LoTeX is a typesetting language inspired by LaTeX, retaining the simplicity but fixing grammar ambiguity of Markdown. This web application is a demonstration of various technologies in \b{KFoundation} software platform. KFoundation is an open-source project development and maintained by Mindscape Inc. \list{

* Localization is provided by \b{Universal Culture} - one the most complete and advanced localization toolsets.

* Interaction between client and web server, and between web
server and database server is enabled by \b{Universal
Serialization}.

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KFoundation POSIX Edition

Built on Unix API calls, and completely replacing C++ standard libraries turning it into a modern re-imagined language.

Ref<MyClass> myObject = new MyClass(); myObject.AS(MyBaseClass)->baseClassMethod(); No Pointers with automated memory management

KStrings and streams are

UTF-8 encoded and can embed objects Ref<InternetOutputStream> output = new InternetOutputStream(ipAddress); Ref<UString> myStr = K"I can " + *myObject + " like Java, and store in UTF-" + 8; PrintWriter(output) << K"Huston! We have an object: " << *myObject << OVER;</pre>

myObject->readFromXmlStream(inputStream); myObject->writeToXmlStream(outputStream);

Universal Serialization

KnoRBA Project

Recursively built on KnoRBA itself with its only other dependency being KFoundation POSIX Edition, it is an attempt to create *a new unifying and universal operating system* based on a new programming paradigm, called Agent-Based Computing (inspired by Minskey's ideas, and comparable to Hewitt's Actor).

2010 — Present, TokyoTech, RIKEN, Self-Funded, Mindscape Inc.

Keywords. Parallel and Concurrent Programming, Cluster Computing, Decentralized Systems, Design and Implementation of Programming Languages, Operating Systems Design, Runtime Environment, Software Agents, Fault-tolerance, Unix, C/C++, REST-no-more

KnoRBA is distributed and parallel in its very core. It can operate dynamically changing clusters of devices as a single fault-tolerant integrated system in a decentralized fashion. The resulting system can be a supercomputer, a car, or a smart home. Current prototype is made of a runtime environment (ARE) that does distributed process management and interprocess communication (IPC), as well as a C++ library for building KnoRBA Apps (KAP).



Portable Data Type System and Serialization

KnoRBA comes with its own platform-independent binary data representation format. It is optimized for remote IPC. It is both fast to transmit, and fast to decode/encode to target machine format.

KnoRBA automatically serializes/deserializes messages to object models, with everything in between including decode/encode, and networking made transparent to the programmer.

Knowledge Interface Schema Language (KnolS)

KnoRBA's original interface definition languages allows agents (KnoRBA's processing units) to declare their "anthology" to others, that is verbs, messages, datatypes, and protocols that they can understands.

KnolS comes with a compiler that helps developers by translating KnolS definition into stub and skeleton code in the target language.

Knowledge Invocation Query Language (KnolL)

Made to considerably increase networking performance by doing more in less interactions, KnolL is technically an interpreted declarative logic language. There is a high level optional inference functionality available for KnoRBA agents, giving them the ability to accept KnolL messages and process several interdependent operations in a single transaction.

JVM and JavaScript Support

Other than its native C++, KnoBRA type system is also available in Scala, cross-compiled and ported to JVM and JavaScript, making it universally accessible to desktop, mobile, and browser-based apps.

Particularly, on **Kafka**, KnoRBA type system has proven to bring noticeable cost and performance advantages.

REST-no-more!

With universal availability of its type system and potential capability to tunnel through HTTP, KnoRBA can be used in place of currently popular REST framework for web application programming. There can be REST no more.

Sociomimetic Computing (Doctoral Thesis)

I believe we can synthesize artificial societies and civilizations out of intelligent agents, and that was the main motivation behind my doctoral work. It was also the reason why I decided to create KnoRBA in the first place. It was meant to the be environment these agents live in.

and other orange

objects.

Keywords. Artificial Intelligence, Distributed Intelligence, Ensemble Systems, Machine Learning, Concurrent Programming



running on an early prototype of KnoRBA and solving a curve fitting problem. A virtual agency employing intelligent agents with various skills, dispatches them to a problem space. They search and if they manage to find a piece of it they can solve, they get food. Agents have metabolism and if they don't eat enough, they perish.

Fuzzy-Baysian Inference System (Master Thesis)

By using **tensor** arithmatics, I could find a way to formulate bayesian probabilities in such a generic, multi-purposed, artificial intelligence with capability of sensor future. Among other

Keywords. Artificial Intelligence, Robotics, Machine Control, Fuzzy Logic, Bayesian Reasoning

$$P_{new}\left(N^{[s]} \mid IN_{1}^{[s_{1}]}, \dots, IN_{n}^{[s_{n}]}\right)$$

$$= \begin{cases} \frac{\Pr_{old}\left(Node^{[s]} \mid IN_{1}^{[s_{1}]}, \dots, IN_{n}^{[s_{n}]}\right) \times cnf_{Node,IN_{1},\dots,IN_{n}}}{cnf_{Node,IN_{1},\dots,IN_{n}} + oc} & Node^{[s]} \neq o_{new} \\ \frac{\Pr_{old}\left(Node^{[s]} \mid IN_{1}^{[s_{1}]}, \dots, IN_{n}^{[s_{n}]}\right) \times cnf_{Node,IN_{1},\dots,IN_{n}} + oc}{cnf_{Node,IN_{1},\dots,IN_{n}} + oc} & Node^{[s]} = o_{new} \\ \frac{\forall s \in SS(N)}{\forall s \in SS(N)} \end{cases}$$

$$\left(conf_{Node,IN_{1},...,IN_{p}}\right)_{new} = \left(conf_{Node,IN_{1},...,IN_{p}}\right)_{old} + oc$$





Autonomous Soccer Robot's Vision

I was a core member of a robotics research team for two years. We made autonomous robots and had them play soccer against other autonomous robots in World RoboCup competitions. I got my hands dirty in different aspects of the projects, but I was mostly known for creating the vision system for those robots. I ditched the popular OpenCV library as it was not fast and flexible enough for me, and opted for making a low-level C++ program mixed with occasional assembly.

2005 — 2006, Mechatronics Research Lab, Azad Univ.

Keywords. Robot Control, Machine Vision, Artificial Intelligence, Autonomous Robot, C++





Speeda

As a business intelligence service, SPEEDA's main function is to combine the information it collects from 40+ different sources such China's Chenzen stock market, Bloomberg, and Japan's TSR, as servers them via its convenient web-based interface to it's subscribers. As leader of product team for Uzabase Asia Pacific Lts, I oversaw incoming pipelines from South East Asian incoming pipelines, and relevant search and reporting features in web app.

Keywords. System Architecture, Business Intelligence, Data Analysis, Management, JUnit, Cucumber, Mockito, Wiremock, Selenium, Jenkins, Docker, Kubernetes, Java, Jooq, Wicket, MySql, ElasticSearch, Kafka, Scala, Slick, REST, Play Framework

Traditionally, data pipelines were implemented using a large number of batch processes written in Java. Me and my team introduced a combination of Kafka and Kubernetes to upgrade this method to a scalable, distributed, parallel and realtime solution. Another well-received contribution we did was creation of an automated translate-and-cache pipeline for the purpose of providing contents to Chinese users. We also introduced the use ELK stack to monitor system operation in realtime.

The web-based user interface, which is an extensive collection of search and report creation tools, was implemented using Wicket framework running on a thin layer of Spring Boot.

SPEEDA			English V
	The information platform tailored for business and industry analysis professionals.	Welcome	
		Login ID	
	Asia Usability Champion	Save login details Forgot your password?	
	FREE TRIAL	LOGIN	
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	About SPEEDA System Require	ments Privacy Policy SSL Security	

mVaccation

An attempt to clone Airbnb business in Japan by a startup I used to work for called Bluewall Japan. Me and my team of 7 designed, developed, and deployed the first version in about 5 months.

2016. Bluewall Japan

Keywords. System Architecture, JUnit, Jenkins, AWS, Java, MySql, JPA (Hibernate), REST, Play Framework, AngularJS, OAuth 2.0



mscp.co

Mindscape corporate website. Elegant and responsive design, optimized to load fast, contains information about Mindscape product, full documentation for KFoundation and KnoRBA, plus tutorial videos and more.

2020 - Present, Mindscape Inc.

Keywords. Website Design, Responsive Design, CSS, HTML5, AWS

I designed and implemented this website on pure CSS and HTML5. It is containerized and deployed on ECS (AWS) via a CI/CD script that employs AWS CLI.



uref.io

Built entirely on KFoundation to demo its capabilities, it produces shortened URLs and URL aliases with emojis \mathfrak{S} . It is responsive, works on any JavaScript-enabled browser, has a dark mode, and is available in 10 languages.

2020, Mindscape Inc.

Keywords. Scala, KFoundation (Universal UI, Universal Serialization, Universal Culture, K4, LoTeX)



Dr. Foot

I made for one of my few private clients to design 3D-printed orthopedic insoles based on 3D scanned images of patient's feet.

2016, Private

Keywords. 3D CAD, C++, Qt, VTR

