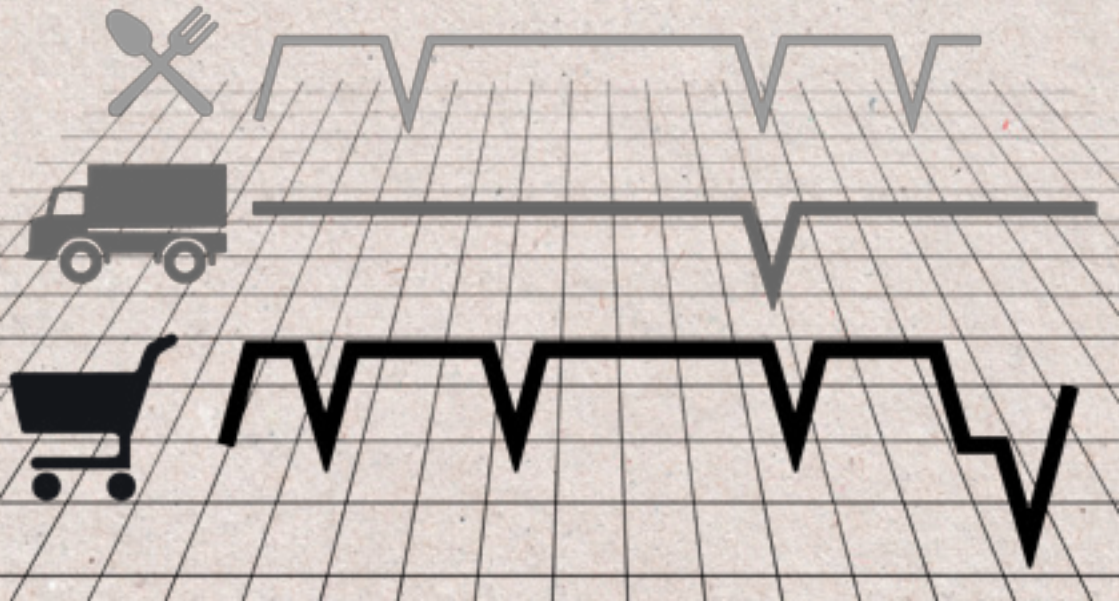
Volume Two
Issue One, March 2013

Newsletter

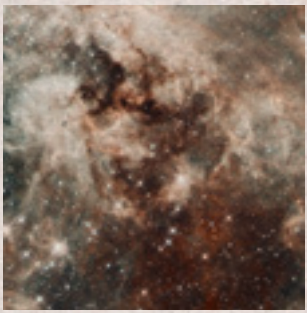


COVER

This issue's cover is an illustration from Jacky Mallet's project on economic simulation. Her controversial but empirically-founded results on how the economic system really works can be found in her IIIM Technical Report IIIMTR-2021-09-001 and her many other publications.

ILLUSTRATIONS

Inspired by IIIM's mission to create collaboration clusters of immense powers and energy, this issue features images of star clusters from NASA's Hubble Space telescope "The Tarantula nebula in the large Magellanic cloud" (http://hubblesite.org/gallery/album/entire).

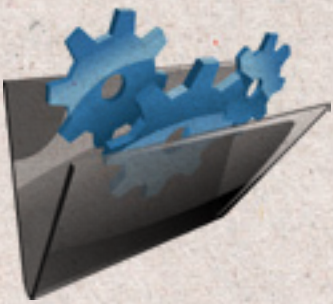


ON IIIM AND THE STARTUP ENVIRONMENT IN ICELAND INTERVIEW WITH BALA KAMALLAKHARAN

Bala Kamallakharan is a reserve Board Member of IIIM. He is one of the founding partners at Auro Investment Partners LLC, Chairman of the Board at CLARA, and Board Member of Glo Biopharma. His years of professional experience have been spent as a management consultant and investment banking advisor. Mr. Kamallakharan received his Dual M.S. in Information Systems and Economics & International Trade & Finance from Louisiana State University and his M.M.S in Business Management & Finance from Birla Institute of Technology and Science in Pilani, India.

What are your thoughts on IIIM's role in increasing opportunities for startups in Iceland and abroad?

A specialized skill set centered around machine learning, automation, and artificial intelligence is hard to find and expensive to acquire, therefore an organization such as IIIM provides the right housing for these skills. Typically startups and entrepreneurs are problem solvers, and a focused group like IIIM provides a channel to partner, collaborate, and innovate in real-world problem solving which creates value. Given the connected nature of the world, the role IIIM could play is not limited to startups in Iceland; with the right kind of exposure IIIM could open doors for itself and startups all over the world.



In your opinion, what needs to happen before IIIM's research model can be transferred to other fields in Iceland?

The broader application of IIIM's research and projects needs to get marketed to diverse industries. A lot of times those who are in a specific industry do not know that the research or projects under organizations like IIIM can be applied to their field. There needs to be more industry outreach to promote the ideas and projects housed within IIIM. There are different venues and activities for IIIM to participate in and get noticed.

What do you think about the state of support for Icelandic startups?

I would say the support for Icelandic startups is fair, but getting better everyday. Since the financial collapse in 2008, there have been renewed efforts towards entrepreneurship and startups, however it takes time to change people's minds and that includes institutions, governments, and the whole environment. The trust to invest and create value through new endeavors is coming back, but there is a long way to go in terms of building a sustainable and stable startup environment in Iceland.

What do you think about the state of support for Icelandic startups?

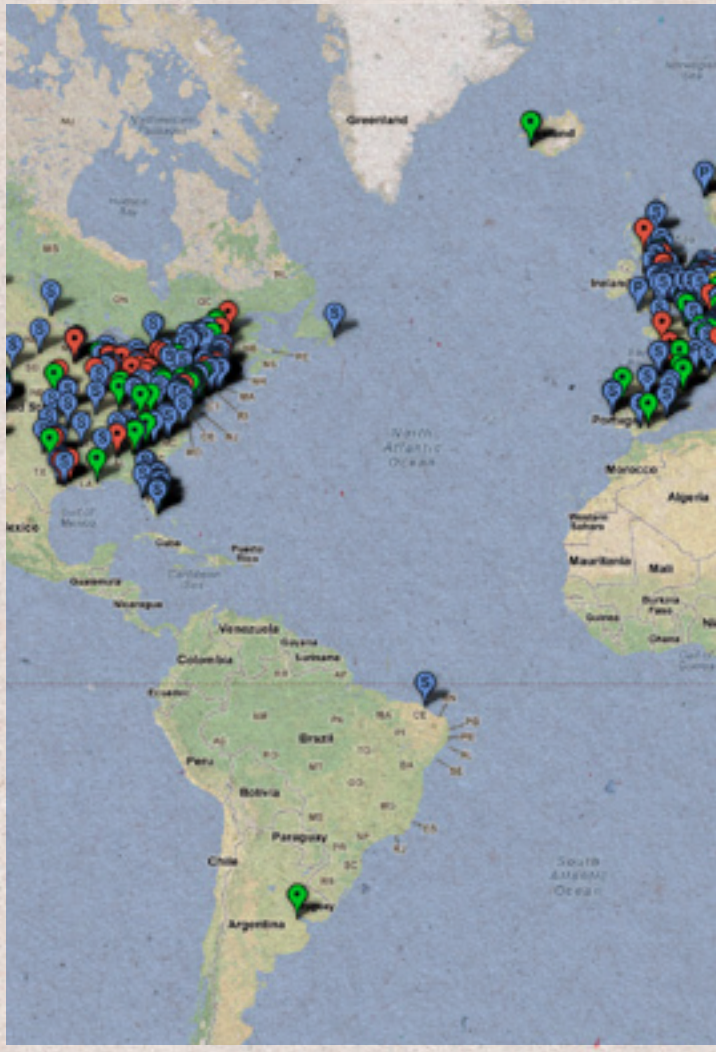
A famous investor once told me that the future is hard to predict and that is why he does not try to predict the future. I can see that there are many activities and support initiatives being set up to help entrepreneurs and startups. That is a good start. We are beginning to see that there is a calendar of activities around startup culture, like Gulleggið, Startup Iceland, Startup Reykajvik, Startup Weekend, and Hackathons. My belief is that if the community continues to engage and participate in these activities then we will create a vibrant startup environment in Iceland.

A GLIMPSE AT OUR ROBOTIC FUTURE

Frank Tobe is the owner and publisher of The Robot Report. After selling his business and retiring from 25+ years as a consultant for the DNC and major presidential, senatorial, congressional and mayoral campaigns and initiatives all across the U.S., Canada, and internationally, he has energetically pursued a new career in researching and investing in robotics.

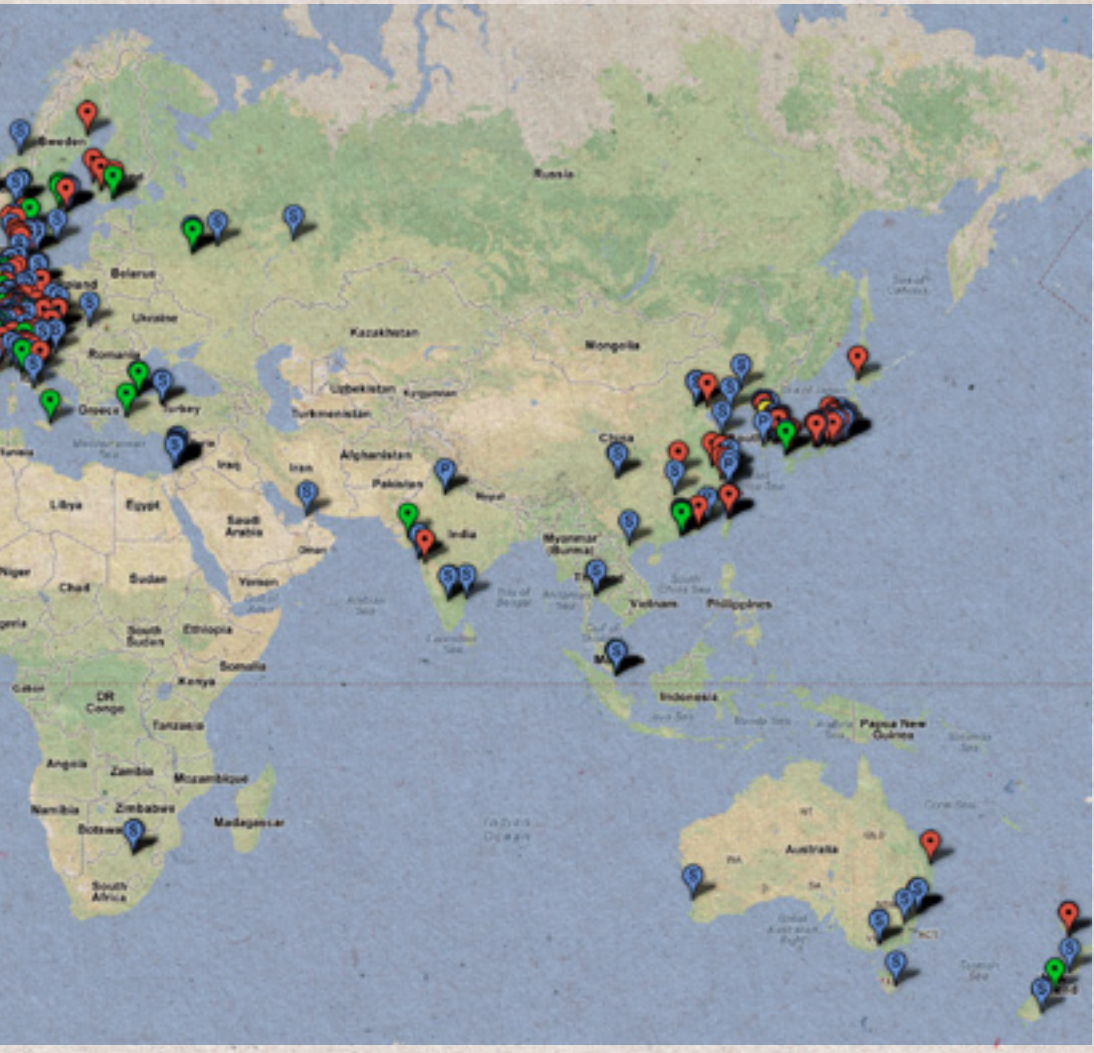
Legend: Red markers show industrial robot makers. Blue markers are for service robotics companies. Green markers are for startup companies. If you know of a robotics startup that isn't included on the map, please send the information to:

info@TheRobotReport.com



Robotics is evolving, and evolving at such a rapid pace all over the globe that it's hard to keep up with the changing players. The number of startup companies is one indicator of the dynamics of this industry, and the accompanying mash-up of robotic startup companies (see mash-up illustration) reflects only a tiny fraction of that revolution.

Many researchers have attempted to compile a database of all the companies involved in the production of robots. I am one of them and my database appears to be the most extensive and comprehensive thus far. Included in that database are 170



robotic startup companies, 200 industrial robot manufacturers, 575 manufacturers of service robots (which include everything from robotic milking machines to autonomous aerial and underwater drones), 800 ancillary businesses such as integrators, software firms, vision systems providers, etc., and 250 research labs.

This mash-up of robotic startup companies graphically displays how widespread robotic inventions and inventors are dispersed around the world and particularly around major robotic research centers. For the purpose of this mash-up, we are defining a

robotic startup as a company established to develop a concept or product or robotic-related service for sale but doesn't yet have it all together. They have established a business and are in motion toward their goals but haven't made any sales or aren't fully funded, haven't finished developing the product, or all of the preceding.

Each marker on the robotics startup map shows the company name, city and provides a link to the company website. This is valuable information for job-seekers, investors, early adopters, news media, and gadget freaks everywhere.

Interestingly, there are very few industrial robot startup companies; mostly the new companies are service robotic companies, a generic term for every form of robot except those used for industrial-grade manufacturing: surgical; healthcare; defense; space; security; personal service; shop assistance; unmanned aerial, underwater and ground vehicles; toys; vision enabled, etc.

These startups appear to be clustering in the Bay Area (Silicon Valley) of California, around Boston, Pittsburgh, Tokyo and Stockholm — all of which correspond with the locations of notable government or university-sponsored robotics research facilities and areas where big data manipulation is taking place. Each of those areas have ongoing entrepreneurial assistance programs for technology projects and provide nurturing and social get-togethers with prospective investors, software developers, fellow inventors and roboticists.

Many other young robotic companies have pushed beyond the startup phase into one of the other categories in our database. And many more are missing because they are too stealthy to have a web or social media presence just yet or are in a language that is difficult to search and translate. Hence my personal request: if you know of a robotics startup that isn't included on the map, please send the information to: info@TheRobotReport.com.

Thank you.

A NEW TYPE OF RESEARCH INSTITUTE COMES INTO BEING

Dr. Kristinn R. Thórisson is the Managing Director of IIIM. He has been researching artificial intelligence in academia and industry for over two decades. His research centers on artificial general intelligence, real-time interactive agents, and cognitive architectures. At MIT he pioneered new ideas in the area of multimodal communicative humanoids. Recent projects include a cognitive architecture for the humanoid robot ASIMO by Honda Motor Corporation and the constructivist-AI architecture AERA. He has taught advanced AI courses at Columbia University, KTH, and Reykjavik University, and consulted for NASA and British Telecom, among others. Kris has authored numerous scientific papers and sits on the editorial board of the Journal of Artificial General Intelligence and the LNCS Transactions on Computational Collective Intelligence. He is the co-founder of CADIA, Iceland's first AI lab. His work was recently awarded the Kurzweil Prize at the annual Artificial General Intelligence conference in Cambridge (UK).

"Speeding up the exchange of ideas, people, and projects"

Late 2008, it seemed to be a perfect setup: A seven-year grant from the Science and Technology Council of Iceland — the second largest research grant ever awarded in the history of the country. A number of companies were onboard from the start, ready to create a new kind of institute — a kind of "super-cluster hub" — called the Icelandic Institute for Intelligent Machines (IIIM). This new non-profit cluster was designed to create strong ties between academia and industry, emphasizing the fast-growing areas of artificial intelligence and simulation. With a goal of speeding up the exchange of ideas, people, and projects, the IIIM would not only strengthen work already underway at Reykjavik University but strengthen collaboration between the School of Computer Science and advanced technology companies focusing on a broad range of technologies. Everything from computer games to fishing quota simulations, and the prediction of online trends to the control of robotic assistive technologies would receive the attention and funding that it deserved. All we had to do was to list the new non-profit entity with the national registry of companies and make agreements with the participants, who were already lined up and ready to go.

"What would happen to our wonderful new initiative?"

Then came the financial crash. One by one the original parties pulled out, unsure whether they would be able to honor the necessary financial support they had promised.

I had been running the CADIA research center at Reykjavik University for four years with my colleague Yngvi Bjornsson. The proposal I had written about IIIM and submitted to the Icelandic Research Funding Agency Rannis suggested forging close ties with CADIA in a way that would take research and collaboration in these advanced information technology fields

The article is re-printed with corrections from 24 Proofs of Cluster Excellence - Successful Stories from Clusters in Northern Europe, pp. 30, published as part of NGP Excellence: Cluster Excellence in the Nordic Countries, Germany and Poland. Copenhagen: The Danish Agency for Technology and Innovation, 2011.

to a new level. Not only did IIIM offer a much-needed function for the national innovation landscape, giving funding partners royalty-free use of any and all its results, innovations, and software, it also presented a highly novel funding model, one which had never been seen in Iceland before. But therein was the rub: With the financial status of many companies now in question, what would happen to our new initiative? How would we convince the companies to participate?

I knew that without the direct involvement of CCP — one of the key parties showing interest in the project and the only one other than Reykjavik University (RU) focusing exclusively on software development — was essential to give the project credibility. The seven-year Rannis grant was still in the cards, but ultimately it would depend on getting key players like CCP on board.

"IIIM has provided a new model for clusters and collaboration, where the whole truly is greater than the sum of its parts"

It took a lot of creative thinking to bring the project forward, enlisting the help of many parties including the assistant Rector of RU, John Vander Sande, the Dean of School of Computer Science at RU and later RU Rector, Ari K. Jonsson, and my collaborators and friends Hannes H. Vilhjalmsson, associate professor and CADIA member, and Stacy Marsella, researcher at the University of Southern California. Advising me throughout this process was one of the founders of the German Artificial Intelligence Research Center (DFKI), Jörg Siekman.

Numerous other brilliant people gave their advice in the process. We drafted new contracts that clearly defined the benefits of being an IIIM funding member, and the role that IIIM would play in the context of academic and industrial research; contracts that ultimately guaranteed the successful launch of IIIM as a non-profit research entity; both RU and CCP came on board in a way that practically guaranteed its successful launch.

Today IIIM is growing strong, having already over half a dozen researchers and engineers on board, and several grants awarded from competitive funds. IIIM has provided a new model for clusters and collaboration where the whole truly is greater than the sum of its parts. The next five years will be definitive in life of IIIM: More funding members and competitive grants are needed to bring IIIM to a state of complete self-sustenance. But the seed has been sown and we are greatly optimistic and excited about its future.

AGI SUMMER SCHOOL

The chief organizer of the Summer School was Kristinn R. Thórisson, aided by Deon Garrett and Pei Wang of IIIM, and Eric Nivel from CADIA.

The Summer School was supported by a STReP research grant within the 7th European Community Framework Programme, by Reykjavik University, and by the Icelandic Institute for Intelligent Machines.

The AGI Summer School was held at Reykjavík University from August 1st-15th, 2012. Participants came from many corners of the world to enjoy lectures and tutorials from some of the world's most renowned AGI and constructivist AI researchers.

The AGI and Constructivist Summer School focused on the original goal of artificial general intelligence, namely building machines capable of operating in a range of different environments and domains capable of doing many unrelated tasks in a coordinated manner. It was the final event in the three-and-a-half-year long HUMANOBS project, which was funded by the EU and targeted the creation of new principles for creating general artificial intelligence.

Invited speakers and organizers, in collaboration with the attendees, addressed fundamental AI challenges, including:

What kinds of methodologies will be required to achieve artificial general intelligence (AGI)?

How different will these methodologies be from today's software development methods?

What role can logic and reasoning play?

How should we construct highly distributed architectures for these purposes?

Do we need new programming languages?

From left:
Kristinn R. Thórisson, Pei Wang, Selmer Bringsjord, Eric Nivel and Joscha Bach.

The AGI Summer School had some great lecturers that gave insights into their specific field of research followed by enlightening and fruitful discussions. In addition to lectures from Dr. Kristinn R. Thorisson, Eric Nivel , Dr. Pei Wang, Dr. Haris Dindo and Dr. Yngvi Björnsson, many invited lecturers introduced their work and expressed their views on the various topics discussed: Dr. Daniel Silver gave a lecture on Inductive Transfer, Machine Lifelong Learning and AGI. Dr. Selmer Bringsjord expressed his views on how Logic is the Key to Modeling, Simulating and (Partially) Replicating Person-Level AGI. Dr. Ben Goertzel gave an insight into the OpenCog architecture and discussed how the Symbolic/Subsymbolic Gap can be bridged. Dr. Joscha Bach introduced his work on the MicroPsi Project. Dr. Kai-Uwe Kühenberger shared his views on the Importance of Cognitive Mechanisms in AGI Systems.

All videos from invited lectures and discussions can be viewed at
youtube.com/user/CADIAvideos

For more information on the AGI Summer School
wiki.humanobs.org/public:events:agi-summerschool-2012

RECENT PUBLICATIONS & TECH REPORTS

Helgason, H. P., Nivel, E. & Thórisson, K. R. (2012). On Attention Mechanisms for AGI Architectures: A Design Proposal. Proceedings of Artificial General Intelligence, Oxford University, December. ***Recipient of the Kurzweil Prize for Best AGI Idea.***

Helgason, H. P. & Thórisson, K. R. (2012). Attention Capabilities for AI Systems. Proceedings of the 9th International Conference on Informatics in Control, Automation and Robotics, Rome, Italy, July.

Mallett, J. (2012). What are the limits on Commercial Bank Lending? IIIM Technical Report IIIMTR-2021-09-001. Version 1.1. Title of paper as published in Advances of Complex Systems, 15, supp02, 2012 DOI 10.1142/S0219525912500750 copyright, World Scientific Publishing Company.

Thórisson, K. R. (2012). A New Constructivist AI: From Manual Construction to Self-Constructive Systems. In P. Wang and B. Goertzel (eds.), Theoretical Foundations of Artificial General Intelligence. Atlantis Thinking Machines, 4:145-171.

Thórisson, K. R. & Helgason, H. P. (2012). Cognitive Architectures and Autonomy: A Comparative Review. Journal of Artificial General Intelligence, 3(2):1-30.

Thórisson, K. R., Nivel, E., Sanz, R. & Wang, P. (2012, Dec.) Self-Programming: Special Issue of Journal of Artificial General Intelligence. Contains four papers and an editorial by K. R. Thórisson, E. Nivel, R. Sanz and P. Wang, pp. 1 - 121.

Dindo, H., Chella, A., La Tona, G., Vitali, M., Nivel, E. & Thórisson, K. R. (2011). Learning Problem Solving Skills from Demonstration: An Architectural Approach. Proceedings of Artificial General Intelligence.

CONTACT

IIIM is located on the 2nd floor of Reykjavik University's new millennium building in Nautholsvik, within unique outdoors areas and near the country's only artificial beach.

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