[with Image] Justin Gottschlich, Ph.D. [Link his name to https://sites.google.com/view/gottschlich]

*Inventor, Leader, and Visionary in Machine Programming*

***By* The PRECISE Team ● 18 June 2019**

Justin Gottschlich, a Senior Staff Research Scientist at Intel Labs, is a prominent figure in artificial intelligence (AI) and machine learning (ML). His research in AI focuses on machine programming, anomaly detection, neural network verification, deep learning, and autonomous systems. Currently, he leads a team of AI researchers in the Programming Systems Research Group at Intel Labs, where he is the lead principal investigator and co-founder of the $6M Intel-NSF joint CAPA Research Center, which aims to simplify the programmability of heterogeneous computing. He also is responsible for directing Intel’s portfolio of intellectual property related to machine programming (MP).

Much research and engineering must be done before autonomous systems, like autonomous vehicles (AVs), can be fully realized. Contrary to some AV experts’ opinions, it is Gottschlich’s belief that anomaly detection must advance significantly before we will reach level 4+ autonomy. He believes that the current state of the art is not nearly advanced enough to be used reliably and a level 3-only AV can put human lives at unnecessary risk. Sadly, this is partially why we have seen a rising number of tragic AV fatalities.

To help address this problem, in December 2018, Gottschlich et al. published a paper at NeurIPS ’18, entitled “Precision and Recall for Time Series” [Link: 3] which re-defined the core mathematical foundation for the field of AD so the detection systems built using this new foundation could be more reliable, especially in the context of time series. To that end, Gottschlich’s hope is that this work could be used to improve the general robustness of new AD systems and eventually save human lives. To date, this model has already been adopted by BMW, Intel, and Stanford.

In the same year, Gottschlich, along with his fellow collaborators at MIT, published “The Three Pillars of Machine Programming (MP),” [Link: 1] detailing the ground-breaking efforts that are leading to significant advancements in software development productivity by partially or fully-automating software development tasks that are currently performed manually. They lay down a blueprint of how to fully unlock the power of MP and provide a roadmap for its future evolution. Gottschlich's work in this area is significant because it is key to the strategic vision of several industry leaders (e.g., BMW, Amazon, Facebook, Microsoft). In fact, Facebook's creation of an AI-based tool to automate bug fixes in 2018 [Link: 2] is an example of the “Adaptation Pillar” that Gottschlich wrote about in his paper.

Recent advancements in ML-centric computational hardware (e.g., GPUs, distributed computing, neural processors, etc.), key algorithmic discoveries and techniques, and the vast amount of learning data now available are some of the reasons why interest in MP has exploded and why Gottschlich is fascinated with this field of research.

In 2016, he co-founded the ACM Machine Learning and Programming Languages (MAPL) workshop, and subsequently has been the chair and the program chair of MAPL and TRANSACT. Previously, Gottschlich was the vice-chair of the C++ Standard Transactional Memory Working Group (SG5) during 2012 to 2014.

Gottschlich has led major projects and collaboration initiatives at some of America's top corporations, startups, and research working groups. He oversees and guides several Intel-driven ML research projects at top universities such as Berkeley, Brown, MIT, Stanford, Texas A&M, and the University of Washington. He has mentored some of the smartest minds at America's top universities to solve the problem of how to effectively build software for diverse hardware architectures.

In the corporate realm, Gottschlich oversaw an industrial collaboration between Intel and BMW on anomaly detection for autonomous vehicles. Gottschlich was previously the director of engineering at Machine Zone, where he oversaw the development of the popular video games, *Mobile Strike* and *Game of War*. He is also the CEO of Nodeka, LLC, an online, multi-player software gaming company that he founded in 1999.

On the research front, between 2015 and 2018, Gottschlich was awarded 20+ patents, with 50+ still pending. He also has 30+ peer-reviewed publications and has given 12+ presentations at conferences and seminars at BoostCon, BMW, IBM Research, Penn, VMWare Research, etc. He won the “Best Presentation” award at several conferences (Intel SWPC 2016, CGO 2010, and Raytheon ISaC 2009).

Gottschlich received his Ph.D. from the University of Colorado in Boulder, where he occasionally teaches a graduate-level course on neural networks. Last fall, at the University of Pennsylvania, he co-lectured a graduate-level course on anomaly detection for safe autonomy.

[No CV will be attached, but a **WHITE PAPER** for the keynote talk here]

**(“call-out” sidebar – on OUR INSIGHTS – need THICK border line)**

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**PRECISE views** Gottschlich as a major influencer who is advancing the unification of academia and industry to collectively solve some of the most challenging technical issues.

Gottschlich is at the spearpoint of intelligent safety critical systems. His early work focused on algorithms, parallel and distributed computing, computer architecture, embedded systems, software and hardware efficiency, C/C++ systems optimization, software programmability and productivity. Where his contributions can be found in many modern computing and embedded systems, more recently, Gottschlich has changed focus to intelligent systems (specifically autonomy) focusing on anomaly detection. This is an active area of research, where Justin's work stands out as a gold standard. One reason his work stands out as being innovative and impactful stems from his underlying knowledge of physical systems and their implementation.

Gottschlich constantly strives to leverage AI for the advancement and benefit of people and society. He represents a rare breed of researcher that has full-stack experience that enable him to see problems in ways other researchers can't. Leveraging this foresight, Gottschlich has become a force multiplier in the assured machine learning community by coordinating with Intel to fund and actively participate in foundational and translative research focused on real-world problems plaguing artificial intelligence systems that we believe will be critical to advancing the next generation of safe intelligent systems.

PRECISE is truly honored to host Gottschlich as our keynote speaker for Industry Day 2019, and give him the spotlight and recognition that he aptly deserves.

References:

[1] <https://drive.google.com/file/d/1FvztwHyfgmrPMdE0lkTLidnhjl2wHCrm/view>

[2] <https://siliconangle.com/2018/09/13/facebook-created-ai-based-tool-automate-bug-fixes/>

[3] <http://papers.nips.cc/paper/7462-precision-and-recall-for-time-series.pdf>