

# The Ring

THE JOURNAL OF THE CAMBRIDGE COMPUTER LAB RING

Issue XLVII— January 2018

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# Who's Who

**Danielle Ainsworth** (F BA10) is a baker at Stir Bakery in Cambridge.

**Sherif Akoush** (PhD11, RA16) is a senior engineer at ARM.

**Alex Bate** (R BA16) has joined Amazon Development Centre in London where he is a software development engineer.

**Fred Brewin** (K BA11) is working in the San Francisco Bay Area for Google Lens where he is a product manager.

**Robert Bowman** (CC BA17) is working for PROWLER.io where he is a machine learning engineer.

**Thomas Chetwin** (CHR BA13) is a software developer at Bloomberg.

**Shaw Chuang** (K PhD01) has joined Swim. it where he is VP of Engineering.

**David Cleevly** CBE, FEng, FIET (PhD82) has been appointed a non-executive director of Cronin Group.

**Joseph Connan** (CAI BA16) has joined Dyson.

**Peter Cowley** (F MA77) has launched 'The Invested Investor' (<https://www.investedinvestor.com/>) to 'improve the journeys of startups by educating angels and entrepreneurs to make fewer mistakes, work better together and produce more successful exits'.

**Richard Davies** (MA99) has joined Project Sapiens as CTO.

**Julien Dersy** (MPhil96) has moved to Amazon where he is working in product management.

**Dominik Diak** (CAI BA16) is an associate at Entrepreneur First.

**Steve Guest** (JN MA00, Dip01) has joined PROWLER.io as a senior software engineer.

**Matej Hamas** (R BA15) has joined Blue Vision Labs as a software engineer.

**Kevin Hinde** (BA94) is Director, Software Engineering at Elsevier, Inc.

**Henry Jong-Hyeon Lee** (PhD00) has recently joined Samsung Electronics where he is Senior VP, Mobile Security Technologies.

**Dawn James** (R BA03) is now technical architect at Kobalt Music.

**Ricky Jones** (JE MA12) is a senior trader at IMC Financial Markets.

**Andreas Koltes** (PhD15) is working at Diehl Defence in Germany where he is a R&D engineer.

**Devan Kuleindiren** (R BA17) has joined Google as a software engineer.

**Oli Lane** (TH BA15) is a software engineer at Gearset in Cambridge, UK.

**Jochen Leidner** (PET MPhil02), Director of Research at Thomson Reuters, has been appointed Royal Academy of Engineering Visiting Professor of Data Analytics at the University of Sheffield.

**Gerard Martin** (TH BA10) is working at Icomera in Cambridge where he is a software engineer.

**Neil McClements** (MBA10) has been appointed CEO of Liatrix near Kraków, Poland.

**Jack Morris** (CAI BA15) is working at Google where he is a software engineer.

**Joel Moss** (F BA13) has joined Venner Shipley LLP where he is a trainee patent attorney.

**Nikola Mrkšić** (T BA13, MEng14, PhD17) is CEO at PolyAI, a London-based machine learning start-up creating conversational user interfaces for third party product and services.

## Events calendar

### 2018

#### February

Wednesday 7th, 6.30pm  
**London Ringlet Bar**  
*Venue to be confirmed*

#### April

Tuesday 3rd, 6.30pm  
**London Ringlet Bar**  
*Venue to be confirmed*

Wednesday 11th, 7pm  
**Cambridge Computer Lab  
 Ring Annual Dinner and  
 Hall of Fame Awards**  
*Queens' College, Cambridge*

*Tickets cost £55. Please contact  
 cam-ring@cl.cam.ac.uk to book*

#### June

Wednesday 6th, 6.30pm  
**London Ringlet Bar**  
*Venue to be confirmed*

#### August

Thursday 2nd, 6.30pm  
**London Ringlet Bar**  
*Venue to be confirmed*

#### October

Wednesday 3rd, 6.30pm  
**London Ringlet Bar**  
*Venue to be confirmed*

#### December

Tuesday 4th, 6.30pm  
**London Ringlet Bar**  
*Venue to be confirmed*

**Will Muldrew** (T Dip00) is now Head of Software at GSA Capital.

**Sean Mullaney** (CC MA00) has been appointed Senior Engineering Manager, Sales Tools & Business Intelligence at Google in Ireland.

**Elliott Pace** (F BA12) is working at Elliott Advisors, an investment advisory firm.

**Priyesh Patel** (R BA16) is a software engineer at Monzo Bank.

**Larry Piano** (CHU MPhil94) is a speech recognition consultant at Abacii, a company he started in 2012.

**Kim Powell** (F BA06) has been appointed COO at Deutsche Asset Management in Birmingham, UK.

**Niall Rutherford** (PEM BA15) is Head of Growth at Code Kingdoms.

**Quentin Stafford-Fraser** (CAI BA89, PhD95) has won this year's Lovie Lifetime Achievement Award for his role in inventing the first webcam. The Lovie Awards honour European online excellence.

Through his invention of the XCoffee client program in 1991 — utilising a video feed that showed a coffee pot captured in just three frames per minute — Quentin took the first step towards making the connection between live video and the web. As the Lovie Awards commented 'Stafford-Fraser's program sparked interest in creating similar video monitoring feeds, and XCoffee stands as a clear precursor to the now-ubiquitous webcams on computers and handheld devices all over the world.'

**Andrew Warfield** (PhD06) has recently joined Amazon in Vancouver where he is Senior Principal Engineer.

## Job listing

December 2017

### OVO Energy

- *Junior backend engineer*
- *Junior developer*

November 2017

### Fluidly

- *Lead front end engineer*

### Imperial College London

- *Senior research software engineer*

October 2017

### Tab

- *Full stack developer*

### Project Sapiens

- *Software engineer*
- *Bioinformatician*
- *iOS/Android engineer*

### Cambridge Intelligence

- *Javascript developer*
- *Inside Sales Representative*
- *Solutions engineer*

### Granta

- *Software engineer (C++)*
- *Software engineer (C#)*
- *Senior QA automation engineer*

*If you have a job advert that you would like included in the weekly listing, please send the details (as a word doc) to [cam-ring@cl.cam.ac.uk](mailto:cam-ring@cl.cam.ac.uk)*

# Hall of fame news

## Aircloak

Aircloak has received a \$1.3mio equity investment and has received approval for GDPR-level anonymity by the French data protection authority.

General Data Protection Regulation (GDPR) comes into effect in May 2018 and applies not just to European companies, but to companies globally that collect personal information in Europe. According to a recent PwC survey, GDPR compliance is a top data protection priority for 92% of US organizations.

Aircloak's solution enhances data privacy protection, simplifies regulatory compliance processes, and reduces compliance costs. In addition, the solution allows for higher quality analytics and real-time insights as (structured and unstructured) data does not need to be anonymized prior to analysis or machine learning.

## Bromium

The Metropolitan Police Cybercrime Unit (FALCON) has deployed Bromium to rapidly investigate and mitigate cybercrime impacting businesses and the public in London.

Using Bromium for real-time cyber forensics, the Met Police Cybercrime Unit can now contain dangerous malware and allow it to run. They can immediately analyse how all forms of malware behaves, including polymorphic variants, ransomware, targeted nation-state attacks and zero-day exploits. If police departments or civilians report malware infections, the FALCON team can respond, extract the malware and contain it in a safe, isolated environment for further investigation. Then the Cybercrime Unit can analyse malware immediately to see

how it behaves, and receive the full kill chain analysis in real-time as the malware runs without a patient zero.

This new approach is far faster than anything the FALCON team has been able to do before and lets them move more quickly to identify and arrest cybercriminals. In addition, the unit will be able to use Bromium for kill chain analysis that provides the evidence for building a case and pursuing prosecutions.

## dividiti

dividiti has won an Innovate UK grant to extend their CK-based technology. Innovate UK is the UK's innovation agency, sponsored by the Department for Business, Energy & Industrial Strategy.

## Factmata

Factmata has secured \$750k in seed funding for its artificial intelligence project aimed at tackling fake news.

Factmata had previously raised a €50k grant from Google's Digital News Initiative.

## GeoSpock

Richard Baker has been appointed GeoSpock's new CEO.

Founder Steve Marsh will transition to the role of CTO where he will continue to lead R&D and will provide strategic guidance for the company.

## Improbable

Automaton Games, the British independent games studio behind the popular multiplayer psychological stealth and combat game *Deceit*, is partnering with Improbable to

bring SpatialOS technology to its new multiplayer survival game following \$10m investment from Cambridge Ventures.

SpatialOS is Improbable's distributed operating system for game development and operation in the cloud, which allows developers to exceed the power of a single game engine or server. By building games with standard tools and deploying on SpatialOS, developers like Automaton Games can build virtual worlds that offer permanent, persistent and engaging experiences.

## Masabi

Masabi, the global leader in transit mobile ticketing and innovative fare collection, is operating a two month trial in South Australia, with the Department of Planning, Transport and Infrastructure, to test the feasibility of smartphone-based payments on South Australia's public transport network.

Masabi's Justride is a cloud-based, deployment-proven, end-to-end mobile ticketing and fare collection platform. It comprises award-winning apps for ticket purchase, display and inspection together with back-end infrastructure for secure payments, ticket management, customer service, reporting and real-time analytics.

Trials in Australia follow on from successful deployments in cities such as New York, Boston, Los Angeles and London.

Masabi has also unveiled Account-Based Ticketing (ABT) capabilities for the Justride Platform.

This new development means riders no longer need to buy a ticket before boarding, they simply tap using stored value from their cloud-based Justride account, paying for their journey after it has taken place at the best possible fare.

The new system can operate a full range of fare models including; flat, time-based, distance and zonal based fares. The flexible architecture enables a mix of fare types as well as pre-pay and account-based tickets. The system also enables transfer rules when moving between modes of transit, such as offering free or discounted bus journeys after you complete your subway trip. The system is fully configurable in real-time providing maximum flexibility to agencies.

## Speechmatics

Speechmatics has launched Automatic Linguist (AL), an Artificial Intelligence powered framework that drastically improves the speed at which new languages are built for use in speech-to-text transcription. AL has the potential to learn any language in the world in a matter of days, enabling Speechmatics to expand their service offering to any region globally, even those that have previously been uneconomic to serve. The system also allows for the rapid iteration, improvement and adaption of existing languages.

## Tractable

Some of America's Top six insurers are already testing Tractable's artificial intelligence photo estimating system — technology which could possibly replace human desk review on up to 70 percent of vehicle collision claims, according to the company's founders.

Tractable's AI can identify individual exterior auto parts from photos and classify each part's damage as repairable, replace-only or unscathed.

## Hall of Fame Awards 2018

We are now accepting nominations for the 14th annual Hall of Fame awards, which celebrate the success of companies founded by Computer Lab graduates and staff.

The awards ceremony will be held at Queens' College on April 11th 2018 when the winners will be announced by Professor Andy Hopper CBE, FIET, FEng, FRS, and presented by guest speaker, Herman Narula, co-founder and CEO of Improbable, a member of the exclusive UK tech 'unicorn' club.

The award categories, along with the names of last year's winners are:

1. Company of the Year (Improbable 2017)
2. Product of the Year (Grakn Labs for GRAKN.AI 2017)
3. Publication of the Year (Jatinder Singh, Thomas F. J.-M. Pasquier, Jean Bacon, Julia Powles, Raluca Diaconu, and David Eysers for "Big Ideas paper: Policy-driven middleware for a legally-compliant Internet of Things" 2017)

*If you wish to submit a nomination for any of the three categories, please send nominations, explaining why you have nominated the company/product, to [cam-ring@cl.cam.ac.uk](mailto:cam-ring@cl.cam.ac.uk)*

*Nominations close on February 10th 2018.*

# Research Skills course

## Thomas Sherborne: Teaching AI to pull faces.

If you've ever felt unnerved when looking at a humanoid robot or AI, don't worry — it's not just you. The effect of unease when interacting with an artificial person, whose nearly realistic motions might be a little awkward, is called the "Uncanny Valley" effect and it's a big problem for the tech companies researching how AI can integrate into our daily lives. What use is a robot or an assistant like Apple's Siri if they are too unsettling to interact with?

Recently, Facebook AI Research (FAIR) has begun to look at how artificial agents can be designed to express themselves in a more human-like manner. The core tenet is that in order for AI to understand and express human emotions, AI systems must learn from real people in a naturalistic setting. To this end researchers at FAIR have developed Learn2Smile, a system for training artificial faces to learn from and copy real human behaviour. A neural network was developed to generate an artificial face learnt from an input of a real person's expressions, tracking subtle facial movements using 68 key facial markers. To encourage a dynamic emotional range for the system, the network was trained to predict artificial expressions using hundreds of hours of Skype conversations. Then, the model uses a feedback loop to infer the most likely expression to come based upon the history of the conversation. This resulted in a model that can track fast-moving changes, like blinking, and also less pronounced movements, such as head nods. These instinctive movements are ways you or I show engagement in a conversation, even though we might never realise that we do them.

Finally, to evaluate how human-like the simulated expressions appeared, crowd-sourced evaluators were shown the artificial face in a conversation and asked to assess how engaged the AI appeared. The results demonstrated that when AI is able to fully encapsulate the facial features to express emotions and engagement, human assessors have trouble telling the AI apart from a real person. To encourage the research community to build more AI in this area, the Learn2Smile dataset has been made publicly available for anyone to experiment with.

Human-like robots — powered by AI — that can go to the office in your place are some time away from being ready. The authors reported that, because the Learn2Smile system watched expressions over many different faces, the personality of the AI appeared "averaged out". In the future an AI with more individuality might be possible. This experiment from Facebook has shown that we are close to accurately simulating naturalistic expressions. This is a step in the direction of creating AI interfaces that we can communicate with on a conversational and emotive level. If AI can break out of the Uncanny Valley then future machines could be so lifelike, you might not be able to tell the difference.

### Sources

[1] Facebook AI Learns Human Reactions After Watching Hours of Skype

<https://www.newscientist.com/article/2146294-facebook-ai-learns-human-reactions-after-watching-hours-of-skype/>

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*The best essays from the Research Skills module of the MPhil in Advanced Computer Science course 2017/2018 are being published in 'The Ring'. This is the first of these essays.*

# Computer Laboratory news

## Annual Report of the Faculty 2016–2017 Selected Highlights

### Personnel

As at September 30th 2017, there were 194 members of staff: 46 academic; 32 academic-related and Assistant staff; 1 Research Fellow; and 115 post-doctoral researchers.

Six new members of academic staff were appointed: Dr Nada Amin, University Senior Lecturer; Dr Paula Buttery, Reader; Dr Evangelia Kalyvianaki, University Senior Lecturer; Dr Amanda Prorok, University Lecturer; and Dr Damon Wischik, University Lecturer.

Six members of staff enjoyed personal promotions effective from October 1st 2017: Frank Stajano, Professorship; Simone Teufel, Professorship; Alastair Beresford, Readership; Paul Buttery, Readership; Mateja Jamnik, Readership, Andrew Rice, Readership.

Numerous staff and student honours, awards and achievements were reported in 2016/2017.

The Department's Wiseman Award was also launched. It aims to recognise research staff and students who make a commendable contribution to the work of the Department. The 2016–2017 recipients were:

Lucian Carata; Matthew Daggitt; Gyuri Denes; Guy Emerson; Kevin Hefferman; Graeme Jenkinson; Alex Kuhnle; Marwa Mahmoud; Theo Markettos; Ewa Muszynska; Christian O'Connell; Raphael Proust; Daniel Thomas; Philip Saville; and Petar Velickovic;

### Research

Research grant income in the last financial year was £7.7M, an increase of £3M on the previous year.

### Teaching

Undergraduate numbers increased slightly in 2016; our first year intake was 99 students (96 in 2015). For 2017 the intake has risen to 104 students including 2 Caltech students. Around 79% have chosen the Computer Science 75% option. The proportion of female students in 2017 has risen to 18%, as opposed to 14% in 2016 and 19% in 2015.

The proportion of students obtaining a First or II.1 in 2016 rose to 89%.

The MPhil in Advanced Computer Science continues to run smoothly with 32 modules (including three offered at the Department of Engineering), spanning the wide range of research interests found in the Department. Applications remain strong, with 329 students applying for entry in 2017/2018.

### Appointments and Awards

**Dr Mateja Jamnik** has been appointed as a Specialist Adviser to the House of Lords Select Committee on Artificial Intelligence.

**Professor Alan Blackwell** has received a 20-year Most Influential Paper award from the IEEE symposium on Visual Languages and Human-Centric Computing.

His 1996 paper, written when he was a PhD student at the MRC Applied Psychology Unity [1] challenged the Visual Language community to ask "What do we think we are doing"? It made a textual analysis of publications in which authors described a cognitive rationale for VL research, observing that many relied on insights from folk psychology, from introspection, or speculative computer analogies to the brain. This was a study of metacognition — beliefs about one's own cognitive ability that shape the mental strategies we choose. In the case of programming language designers, the choices being shaped were not their own problem-solving strat-

egies (something everybody does), but the design rationale for new languages (which will affect others).

At VL'96, scientific attention to human factors was a minority interest, and few user studies were reported, although two keynote speakers that year — Thomas Green and Ben Shneiderman —demonstrated growing engagement of visual languages with HCI research. However, within a few years, the whole community became convinced that these were the central questions — first with a radical change of name to Human-Centric Computing, and then to the integration of VL and HCC.

This question of whether papers at a programming languages conference like VL should only present scientific or engineering results continues to be active 20 years later. Until 1996, VL had been proceeding on the assumption that the primary focus of the conference should be on engineering work. The fact that engineering work relied on hidden psychological assumptions had not been noticed. However, bringing in more insights from human-facing fields such as HCI, and broadening the base of disciplinary sciences, helped overturn fallacies that had been acquired by holding to a strictly engineering mindset.

[1] A.F. Blackwell. Metacognitive theories of visual programming: What do we think we are doing? In IEEE Symp. on Visual Languages, 1996, pp. 240–246.

## Cambridge team triumphs at Northwestern Europe Contest (NWERC 2017).

Team Me[N]ta]]ca went one better than last year, winning a gold medal at at Northwestern Europe Contest (NWERC 2017).



to r : Dimitrije Erdeljan, Petar Velickovic,  
Marko Stankovic, Dušan Živanovic

The NWERC is integrated in the ACM International Collegiate Programming Contest and draws students from colleges and universities throughout Belgium, Luxembourg, Great Britain, Ireland, Iceland, Norway, Sweden, Finland, Denmark, Germany and the Netherlands.

Team Me[N]ta]]ca will now go on to contest the ACM-ICPC World Finals at Peking University in Beijing.

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Web: <http://www.cl.cam.ac.uk/ring/>

E-mail: [cam-ring@cl.cam.ac.uk](mailto:cam-ring@cl.cam.ac.uk)

Tel: +44 1223 763585

Post: William Gates Building, Cambridge CB3 0FD

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