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Cambridge-Huawei Report

Key findings

Since 2016, the University of Cambridge (Cambridge) has received roughly £28m from Huawei and its subsidiaries for high-tech research in sensitive areas such as artificial intelligence (AI), Internet of things, cybersecurity and network technology.[1] AI research at Cambridge involving Huawei funding spans a range of areas, from basic research to autonomous transport, swarm robotics, and image, face & speech recognition. Huawei built links with scientists working in sensitive areas: one network technology expert funded by Huawei has co-written papers with Huawei and scientists linked to China's military; other recipients of Huawei funding run projects linked to Western defence ministries.

Cambridge has made claims that are arguably misleading about the nature of this support and acted to obscure the university's relationship with Huawei.

- Cambridge has refused to release a 'framework agreement' on long-term research collaboration with Huawei, has hidden details of the nature of its relationship with Huawei by redacting key information from Freedom of Information (FOI) releases,[2] and has opted not to reference Huawei's name in scholarships funded by the company.
- Cambridge told one journalist in February 2020 that "None of the research undertaken with the c.£14.8 million in gifts, grants and research funding since 2017 from Huawei is dual-use".[3] However, some of this funding *had been* spent on potential 'dual-use' research areas, including network technology, cybersecurity, and machine vision. Cambridge told UKCT prior to publication of this report: "While research may have taken place in areas with potential for dual-use, this does not mean that specific research included research into controlled technology or exports."
- Cambridge university announced in November 2021 that "in relation to Huawei, we will not engage in any research in relation to 5G".[4] Scholars at Cambridge who are funded by Huawei continue to work on network technology projects, although these are, according to the university, "internet related, not wireless in general or cellular specifically". In this connection, it should be noted that 5G is an abbreviation for 'fifth-generation cellular networks'.

A top Cambridge ethics committee, the Committee on Benefactions and External and Legal Affairs (CBELA) approved millions of pounds of funding from Huawei for research with surveillance applications without duly considering the ethical ramifications. Huawei is one of the main suppliers for China's surveillance state,[5] including in Tibet and Xinjiang,[6] where it is alleged that the state is carrying out ethnic cleansing. Committee members cast doubts about Huawei as political and

[1] This sum reflects UK-China Transparency's (UKCT's) analysis of figures provided to three journalists and to UKCT itself. Interested scholars are welcome to contact UKCT for more details.
[2] **All FOIs that informed this project have been published at www.ukctransparency.org/library** - individual links to specific documents have been included in the footnotes of this report.
[3] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2020-107.pdf
[4] https://www.cam.ac.uk/news/international-partnerships-and-funding-from-china-and-hong-kong-blog
[5] Huawei admits it provides general purpose network gear, which is used for surveillance purposes. It is also alleged that Huawei provides services and technologies for direct surveillance purposes. See, for example: https://www.washingtonpost.com/world/2021/12/14/huawei-surveillance-china/
[6] See, for example, https://www.bbc.co.uk/news/technology-55634388 and https://www.theguardian.com/technology/2021/dec/15/documents-link-huawei-uyghur-surveillance-projects-report-claims

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approved large amounts of funding from Huawei after the UK opted to exclude Huawei from core parts of the 5G network.

Cambridge received more than £4m from Huawei before CBELA first scrutinised the university's links to the company. Early due diligence documents produced for CBELA described Huawei as a private company and its links to the Chinese government as alleged.

Cambridge has since paused all new collaboration with Huawei, whilst allowing the completion of existing projects. Cambridge told UKCT ahead of the publication of this report: "In March 2022, CBELA decided to pause all new benefactions and research, consultancy, or other engagements with Huawei until further notice; and received an update on all existing projects, which it agreed could continue to completion." This pause was renewed in July 2023.

Cambridge has not referred any of its work with Huawei to the government's Research Collaboration Advice Team, set up specifically to provide advice about research with partners that could pose a risk to national security.[7] Cambridge told UKCT: "Our understanding is that the Research Collaboration Advice Team first became available to UK universities for advice in February/March 2022. As noted below, in March 2022, CBELA decided to pause all new benefactions and research with Huawei until further notice. This pause remains in place and so there has been no need for RCAT advice on new engagements. […] RCAT were kept informed about CBELA's review and renewal of the pause on new engagements in July 2023."

Cambridge's response

"The University of Cambridge, like all other global research universities, relies on international collaboration to make possible the discoveries which improve the lives of people worldwide, from antimicrobial resistance and climate change mitigation to treatments for disease and sustainable finance.

"In March 2022, the University of Cambridge stopped all new engagements with Huawei for the foreseeable future after years of self-imposed restrictions on that relationship dating back to 2018 when the UK government was still welcoming Huawei's involvement in UK 5G.

"All grants and donations from China are subject to robust scrutiny, backed by a specially formulated set of principles for managing risks in international engagements which include, where necessary, assessment against UK Government Export Controls and close collaboration with the UK Government's Research Collaboration Advice Team (RCAT). Less than one percent of our annual research spend is derived from China.

"Our pages on international collaboration (https://www.strategic-partnerships.admin.cam.ac.uk/managing-risks-international-engagement) are clear in terms of our strategic approach and guidance. Readers of this report may wish to review all of these pages, but in particular Research Governance | Strategic Partnerships Office (cam.ac.uk) and checks for research and philanthropic donations (https://www.strategic-partnerships.admin.cam.ac.uk/managing-risks-international-engagement/responsible-collaboration).

"Our approach includes full consideration of and compliance with UK government export controls and a thorough due diligence process. This is a pragmatic risk-based approach and was put in place to be transparent."

[7] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2023-169.pdf

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Due diligence issues

Files reviewed by UK-China Transparency (UKCT) shed detailed light on Cambridge's due diligence process for Huawei donations, and the decision-making process of the university's Committee on Benefactions and External and Legal Affairs (CBELA).

According to Cambridge, CBELA "is tasked with scrutinising engagements between the University and external parties to ensure that they are appropriate on ethical grounds and in terms of reputational risk."[8]

During the relevant period (November 2018 to May 2019), CBELA had six members and was chaired by the university's Vice-Chancellor.[9] The following points are drawn from documents relating to this period.

Cambridge conducted its first due diligence investigation into Huawei for CBELA only in March 2018, after a long relationship that had included more than £4m of funding in the previous six years and an intellectual property partnership that had resulted in dozens of patents for Huawei and the university.[10]

Due diligence notes drawn up for CBELA were slow to accept the reality of Huawei's relationship with the CCP, at first referring to the company as an independent firm owned privately by its employees, and referring to Huawei's connection to the regime as alleged.[11] At the time (March 2018) Cambridge made this evaluation, China's Company Law, which demands a CCP structure within each company, had been in place for over two decades; and China's National Intelligence Law requiring companies to "support, co-operate with and collaborate in national intelligence work" had just been passed.[12] Neither was mentioned in Cambridge's first due diligence notes produced for CBELA. Later documents acknowledged these rules but continued to balance these considerations with reports casting claims about Huawei's connections to the CCP as allegations.[13]

CBELA suspected that fears about the security of working with Huawei could be attributed to American politics. Briefing notes presented to CBELA indicated that American political shifts associated with populism and isolationism were an important context to concerns.[14] Minutes of CBELA's meeting in November 2018, although sparse, indicate that members gave credence to this theme, agreeing that the approach to Huawei in the USA and Australia was being driven partly by 'politics'.[15]

By contrast, in the two dozen pages of due diligence notes reviewed by UKCT, there is no mention of the authoritarian trend in China under Xi Jinping, the development of a leadership cult around him, the dramatic tightening of authoritarian controls and a more militant Chinese nationalism.

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[8] https://www.governance.cam.ac.uk/committees/cbela/Pages/default.aspx and https://www.governance.cam.ac.uk/committees/cbela/Pages/tor.aspx
[9] https://www.admin.cam.ac.uk/reporter/2018-19/special/06/section2.shtml#heading2-9
[10] See Appendix 1
[11] Committee on Benefactions and External and Legal Affairs (CBELA), "Due Diligence Review" dated 19th March 2018.
[12] https://www.chinalawtranslate.com/en/national-intelligence-law-of-the-p-r-c-2017/
[13] CBELA, "Cover sheet" dated 27th March 2019.
[14] CBELA, "Due Diligence Review" dated 1st November 2018; CBELA, "Cover sheet" dated 27th March 2019.
[15] CBELA, "Draft minute" dated 12th November 2018, referred to in CBELA's "Due Diligence Review" dated 23rd November 2018.

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Similarly, the notes contain no reference to Huawei's role as a major provider of equipment for China's surveillance state, or the potential ethical or reputational ramifications of working with the company on surveillance-related technology. CBELA approved a number of collaborative projects with Huawei that related to video and voice recognition and processing technology.

CBELA relaxed its approach to Huawei just as concerns about privacy and national security were escalating in the UK in early 2019:

- In November 2018 CBELA sought assurance that whatever agreements were reached with Huawei, the company would not be able to influence or determine the nature of research.[16] However, within six months CBELA was considering a sweeping 'Framework agreement' for a programme of "collaborative research projects" between the university and Huawei, which involved the creation of a joint steering committee which "considers areas of research of joint interest".[17] The agreement was signed, and the steering committee has met five times since 2020 (see below.)[18] The signing of the agreement was preceded by the signing of a joint letter in January 2019, which stated the two sides' "long-term" intent to "work together to set the strategic direction and vision [continues, but redacted]".[19]
- In December 2018, CBELA agreed that the university's relationship with Huawei should be subject to continued, close supervision.[20] However, by March 2019, CBELA had agreed that donations worth up to £1 million need not automatically be subject to its scrutiny. The next month, the UK government opted to ban Huawei from core parts of the 5G network; CBELA's decision stood.[21] Cambridge told UKCT prior to publication that CBELA has "reviewed all philanthropy over £1 million and all proposed research engagements since then".
- In December 2018, CBELA received assurance that Huawei funding would not support any research related to 5G.[22] However, in February 2019, the university agreed a research agreement with Huawei for work on a range of network technology projects (see below). Again, in August 2019, the university accepted a gift from Huawei for 5G-related research (see below).[23] In November 2021, Cambridge's pro-vice-chancellors for research and for enterprise and business relations publicly pledged that "in relation to Huawei, we will not engage in any research in relation to 5G and we do not use their technology platforms".[24] Reiterating the pledge later, Cambridge stated that this was because of concerns about "compatibility with our mission and alignment with our values".[25] Scholars at Cambridge who are funded by Huawei continue to work on network technology projects, although these are, according to the university, "internet related, not wireless in general or cellular specifically". In this connection, it should be noted that 5G is an abbreviation for 'fifth-generation cellular networks'.

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[16] CBELA, "Draft minute" dated 12th November 2018, referred to in CBELA's "Due Diligence Review" dated 23rd November 2018.
[17] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2023-266.pdf and https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2022-806.pdf
[18] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2022-806.pdf
[19] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2022-706.pdf
[20] CBELA, "Draft minute" dated 11th December 2018.
[21] CBELA, "Cover sheet" dated 31st May 2019, which describes proposals formulated on the basis of the decision made in March 2019, and describes the decision itself.
[22] CBELA, "Draft minute" dated 11th December 2018.
[23] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2023-266.pdf
[24] https://www.cam.ac.uk/news/international-partnerships-and-funding-from-china-and-hong-kong-blog
[25] https://www.cam.ac.uk/a-global-university/china/our-funding-partnerships-with-china

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Cambridge's relationship with Huawei accelerated after the UK government opted to ban Huawei from core parts of the 5G network in April 2019. Within a year, the university had accepted millions more pounds of funding from the company.

Contacted prior to the publication of this report, Cambridge told UKCT: "In response to changing geopolitical contexts, the University's due diligence around Chinese engagements has become significantly more sophisticated and thorough since the [papers reviewed by UKCT] from 2018-19.

"CBELA mandated that any proposed new formal engagements with persons or institutions from the People's Republic of China, anywhere in the University, should be discussed with its Secretary to ascertain whether referral to CBELA is appropriate, based on the risk profile. Consultation with the Secretary and (if appropriate) referral for Committee decision must take place before any formal agreement is concluded."

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Projects and donations

Files reviewed by UK-China Transparency detail Huawei's support for research projects in sensitive areas. UK-China Transparency has supplemented this information with open-source research, which is footnoted, and Freedom of Information requests.

→ **£6.97 million from Huawei for a partnership between Huawei, Cambridge and BT.** This was announced publicly in 2017.[26] Although there is little information about this partnership in the public domain, Cambridge told UKCT prior to the publication of this report: "Projects supported involve: a Technical Stream for Engineering and Physics, totalling £6.3 million; and a Societal Impact Stream for Cambridge Judge Business School and the Faculty of Education. The Societal Impact Stream projects included virtual internships for school children and research into sustainable supply chains. Outputs from this project were published as normal. The partnership framework was closed in May 2022."

***→ $140,000 (£109,046) from Huawei for cybersecurity research at the Computer Lab.** The donation was approved by CBELA in December 2018.

Cambridge told UKCT prior to the publication of this report that this funding went towards a small short-term project that was part of a much larger programme, Capability Hardware Enhanced RISC Instructions (CHERI). According to CHERI's website, it has been funded by the United States' Defense Advanced Research Projects Agency (DARPA) since 2010.[27] The UK government describes CHERI as "a cutting-edge microprocessor technology" and funds efforts to apply the technology, including through a Defence and Security Accelerator that is part of the Defence Science and Technology Laboratory (Dstl) Cyber Programme.[28]

Cambridge stated: "The funding was received as a charitable donation so Huawei had no control over what work was undertaken and there were no specified deliverables. This research involved no exports to Huawei of any proprietary information, any physical items, or any research information that was not already in the public domain."

→ **At least £3.6 million from Huawei for Cambridge's Centre for Advanced Photonics and Electronics (CAPE), led by Professor Daping Chu 初大平. Huawei is a formal CAPE partner and nearly a third of CAPE's affiliated researchers are employees of the company.**[29] In March 2018, CBELA was told that CAPE had received £3.6 million from Huawei to date.[30] Chu's work funded by Huawei resulted in 16 joint Huawei-Cambridge patents from 2014 to 2019 (see Appendix 1) in augmented reality, image processing, display technology and holography. Huawei has been one of CAPE's four partner organisations since April 2017.[31]

Cambridge told UKCT prior to the publication of this report: "CAPE's interactions with Huawei have decreased sharply since 2019 and they have since paused any new engagements with Huawei. The last new CAPE project with Huawei began in 2021. CAPE has already entered into discussions with Huawei with a view to Huawei giving notice to withdraw from the CAPE Partnership Agreement."

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[26] https://www.cam.ac.uk/news/bt-and-huawei-announce-five-year-collaboration-with-cambridge
[27] https://www.cl.cam.ac.uk/research/security/ctsrd/cheri/
[28] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009577/uk-innovation-strategy.pdf and https://www.gov.uk/government/publications/competition-cheri-within-defence-and-security/cheri-within-defence-and-security-competition-document
[29] https://www.cape.eng.cam.ac.uk/people
[30] CBELA, "Due Diligence Review" dated 19th March 2018.
[31] https://www.cape.eng.cam.ac.uk/cape/partners/huawei

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Researchers from Huawei's London and Cambridge R&D centres gave talks at CAPE in January 2023 and October 2022.[32] In the January talk, Huawei's London research director explained his team's work on image recognition and AI, technology with surveillance applications. In the October talk, Huawei's Cambridge director advertised opportunities for collaboration and employment.

→ £2.5 million from Huawei in 2018 for PhD studentships at Cambridge's departments of Computer Science and Technology, and of Engineering. The donation was approved by CBELA on the 12th of November 2018.[33]

Cambridge told UKCT prior to the publication of this report: "The list of preferred areas are as per the original agreement of research. They are: Artificial Intelligence; Computer Architecture; Natural Language Processing; Computer Vision; Computer Graphics; Security. The Management Committee were permitted to agree studentships in other areas."

→ A further £2.28 million from Huawei in 2018 for studentships and post-doctoral researchers in network technology at the Department of Computer Science & Technology.

The donation was for the Department of Computer Science & Technology's Computer Lab and its Open Systems Innovation group under Professor Jon Crowcroft. The donation was approved by CBELA on the 11th of December 2018, shortly after the approval of £2.5 million for the department (along with the Engineering Department) more broadly.[34] CBELA had been advised in late November 2018 that Huawei were keen to proceed with the donation as soon as possible.[35]

Professor Jon Crowcroft is a world-leading network technology expert who holds Cambridge's prestigious Marconi professorship and is researcher-at-large at the Alan Turing Institute, where he was until recently chair of the Programme Committee.[36]

UK-China Transparency has been informed of the details of the £2.28 million donation. The donation went towards research support for three "projects":

- "Future Intelligent Networks" - £766,000
- "Solving Network Routing Problems Based on New Graph Theory" - £761,000
- "Next Generation Programmable Networks" - £761,000

Cambridge told UKCT prior to the publication of this report that the projects "are not to do with 5G. They are all internet related, not wireless in general or cellular specifically. Specifically they are, respectively, focused on in-network compute [sic], IP routing algebra and software defined networking. The PhD studentships referred are ongoing."

According to Cambridge, the donations "have been used to fund a number of PhD studentships for early-stage research. There has been no further income from Huawei to the Open Systems Innovation Group since that year."[37]

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[32] https://www.cape.eng.cam.ac.uk/events/cape-advanced-technology-lecture-introduction-huawei-cambridge-research-center-and-research and https://www.cape.eng.cam.ac.uk/events/cape-advanced-technology-lecture-detclip-scalable-open-vocabulary-object-detection-fine

[33] CBELA, "Draft minute" dated 12th November 2018, referred to in CBELA's "Due Diligence Review" dated 23rd November 2018.

[34] CBELA, "Draft minute" dated 11th December 2018.

[35] CBELA, "Due Diligence Review" dated 23rd November 2018.

[36] https://www.turing.ac.uk/people/researchers/jon-crowcroft

[37] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2023-112.pdf

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Cambridge has clarified through a Freedom of Information release that the donations for the projects "were made on a charitable basis and so are not subject to any restrictions/rights relating to any intellectual property".[38] Cambridge also provided redacted versions of the individual agreements for these donations, which obscured the names of the projects reproduced above on the basis that "the redacted information would be likely to prejudice the commercial interests of the University and/or Huawei".[39] The redacted agreements state that: "Subject to University compliance with Export Control Regulations and data protection legislation, the University will provide the Donor with an annual report on the activity supported by the Donation including copies of any publications resulting from the Projects." [40]

Cambridge told UKCT prior to the publication of this report: "[The work involved in the projects] is open source and publicly available. There is no commercial aspect to these donations. Most of it pertains to Internet Standards which are free and openly available. Project names are sometimes not released in response to FOI requests because they contain commercially confidential or personal information, this does not impact the open source and unrestricted nature of the research."

Initially, on the 12th of November 2018, CBELA was told that the donation would mean that the associated programme or research group would be named after Huawei.[41] Shortly afterwards, CBELA were told that this was no longer the case and Huawei's name would not be used publicly in relation to the funded programme or group.[42]

Although the money for PhD studentships was received, UKCT was only able to identify one PhD thesis from the Department of Computer Science & Technology that acknowledged support from Huawei, and this was in an unrelated research area.[43]

Cambridge told UKCT prior to the publication of this report: "It is common for approaches to naming opportunities to evolve during gift discussions and not unusual for the decision to be taken not to include a naming opportunity. This decision was taken as part of standard processes and was not designed to obscure any relationship. While PhD students may have received some or all of their funding from this donation, there is no technical liaison between the student and Huawei, not is there any contractual link between what the student does and the donating body."

There is no mention of these projects or the donations on Cambridge's websites, although Huawei is listed as a member of the computer science Department's 'Supporters' Club', with the associated right to advertise at the Department's job fairs.[44]

In the past few years, Professor Crowcroft has published several papers on network technology with senior researchers from Huawei.[45] One paper from October 2021, 'RAN Information-Assisted TCP Congestion Control Using Deep Reinforcement Learning With Reward Redistribution', acknowledges

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[38] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2023-112.pdf
[39] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2022-706.pdf
[40] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2022-706.pdf
[41] CBELA, "Due Diligence Review" dated 1st November 2018.
[42] CBELA, "Due Diligence Review" dated 23rd November 2018.
[43] https://www.repository.cam.ac.uk/home contains Cambridge's PhD repository, https://www.repository.cam.ac.uk/handle/1810/219482 contains Computer Science PhDs. The exception is a PhD entitled 'Constructive Online Disagreement', https://www.repository.cam.ac.uk/items/a03cb386-1224-4be4-b46b-72fd1e52b6cb
[44] https://www.cst.cam.ac.uk/supporters-club
[45] See, for example: https://arxiv.org/pdf/2211.09029.pdf (2022), https://www.researchgate.net/publication/353423842_Limited_domains_considered_useful (2021),

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funding from the Chinese government and Huawei.[46] Alongside Crowcroft, the paper's authors include:

- Wu Jianjun, "Chief Researcher and the Director of the Future Network Laboratory, Huawei Technologies."
- Li Rongpeng, a Chinese researcher formerly employed by Huawei who had worked on several projects with the Chinese military, namely with the People's Liberation Army University (PLA Uni) of China.[47] In 2020, Li worked at Crowcroft's computer lab at Cambridge as a visiting researcher.
- Zhao Zhifeng, a graduate of and former senior researcher at the PLA Uni. Zhao now works at the Zhejiang Lab, a government-sponsored lab in China that works with Chinese arms manufacturers and military universities.[48]

Crowcroft had previously published two other papers - 'Intelligent Slicing of Radio Resource Control Layer for Cellular IoT: Design and Implementation' and 'The implementation of stigmergy in network-assisted multi-agent system' - with Zhao and Li in 2020.[49]

Crowcroft has in the past 18 months worked with institutions in China connected to the Chinese military: in June 2022, he co-authored a paper on machine learning and network technology[50] with researchers (included one supported by a Chinese national defence fund[51]) from the Beijing Institute of Technology, which hosts a number of national-level defence laboratories.[52]

Cambridge told UKCT prior to the publication of this report: "The University has consulted Professor Crowcroft who has informed us that the referred to papers relate to general networking resource problems. The work concerns resource management in networks and is not specific to cellular network operations. None of the work concerns any defence aspect ([…] it is all for public network use) and do not feature any security dimension either. All of these have some link to open standards."

***→ £800,000 for speech recognition and AI dialogue.** At its meeting in March 2019, CBELA approved a donation of £800,000 for two studentships in dialogue AI systems.[53]

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[46] https://ieeexplore.ieee.org/abstract/document/9585436

[47] Li Rongpeng, see for example his work with Jianchao Zheng: https://arxiv.org/pdf/1606.04778.pdf , https://www.researchgate.net/profile/Jianchao-Zheng/publication/297676474_Game-Theoretic_Multi-Channel_Multi-Access_in_Energy_Harvesting_Wireless_Sensor_Networks/links/5a7baefdaca27233575b1d94/Game-Theoretic-Multi-Channel-Multi-Access-in-Energy-Harvesting-Wireless-Sensor-Networks.pdf , and https://www.researchgate.net/profile/Jianchao-Zheng/publication/283618670_Optimal_Base_Station_Sleeping_in_Green_Cellular_Networks_A_Distributed_Cooperative_Framework_Based_on_Game_Theory/links/5641683d08aec448fa607d89/Optimal-Base-Station-Sleeping-in-Green-Cellular-Networks-A-Distributed-Cooperative-Framework-Based-on-Game-Theory.pdf

[48] See https://en.zhejianglab.com/collaboration/partnernetwork/ and, for example, https://www.sohu.com/a/392091637_349135, https://en.zhejianglab.com/newsevents/news/202006/t20200616_1008.shtml

[49] https://arxiv.org/abs/2004.06935 and https://dl.acm.org/doi/10.1145/3372224.3417318

[50] https://ieeexplore.ieee.org/abstract/document/9804872

[51] Harold Liu Chi 刘驰, whose work has been funded by the Defence Technology 173 Programme Technical Field Fund 国防科技 173 计划技术领域基金 https://cs.bit.edu.cn/szdw/jsml/gjjgccrc/lc_1065cf35e06845a7a667945726df0886/index.htm (archive: https://archive.ph/8byyr)

[52] https://unitracker.aspi.org.au/universities/beijing-institute-of-technology/

[53] The donation is described in a CBELA "Due Diligence Review" dated 27th February 2019; its approval in March 2019 was acknowledged by Cambridge in correspondence with UKCT prior to the publication of this report.

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→ **£250,000 for research on Message Passing Algorithms (MPA) for wireless receivers.** This support was considered by CBELA in March 2019. The aim was to look for ways to improve the performance of MPA in multiple-input and multiple-output (MIMO) detection.

Cambridge confirmed via Freedom of Information release that "the funding was received in August 2019 and ran to February 2021."[54] The research is related to next-generation network technology.

Cambridge told UKCT prior to the publication of this report: "The lead on this project has been consulted and has confirmed that these projects were not targeted specifically at next generation technology. Rather they were open-ended research projects whose outputs (papers) are available in the public domain."

*→ **£150,000 from Huawei for a studentship in computer vision technology.** This donation was approved by CBELA in March 2019 after Huawei told Cambridge that they were aware of a professor's work and wished to support him by funding a PhD student.[55] This would involve work on using AI to improve image processing.

Cambridge told UKCT that "Huawei had no control over the work that was undertaken and there were no specified deliverables. [The professor] has also confirmed that the PhD work involved no exports to Huawei of any proprietary information, any physical items, or any research information that was not already in the public domain. […] We did not develop, or help Huawei to develop, a new face detection method."

In January 2019, Cambridge and Huawei together had filed a patent for a "Colour space coding method and device", of which the professor and Huawei staff were listed as the inventors.[56] The patent was granted in China in September 2022.[57] In October 2019, Huawei alone filed a patent for an "Image signal conversion processing method and device and terminal equipment", of which the professor and Huawei staff were listed as the inventors.[58] The patent was granted in China in August 2022.

[54] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2023-226.pdf
[55] CBELA, "Due Diligence Review" dated 27th February 2019.
[56] https://www.lens.org/lens/patent/158-909-563-695-42X/frontpage?l=en
[57] See https://library.imaging.org/ei/articles/31/12/art00006 (2019), https://www.cl.cam.ac.uk/research/rainbow/projects/hdr4cv-dataset/2021-hdr4cv-data.pdf (2021), https://library.imaging.org/lim/articles/3/1/04 (2022)
[58] https://www.lens.org/lens/patent/051-696-343-875-115/frontpage?l=en

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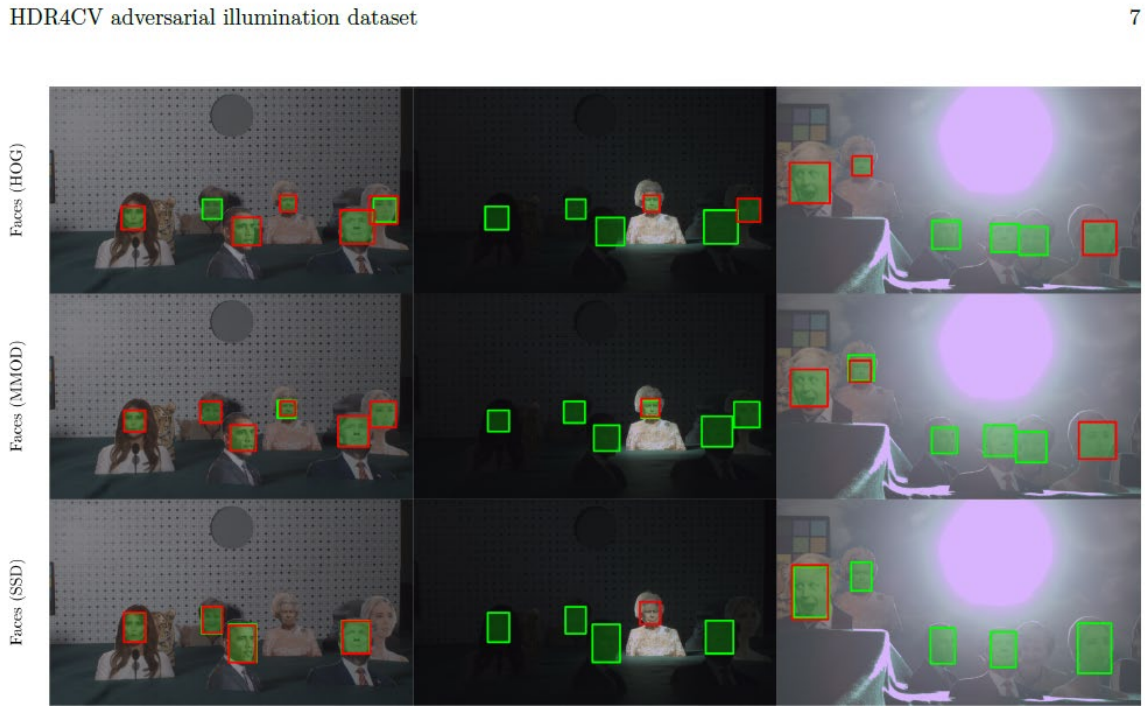

Figure 2. One of the papers written in 2021 by a Cambridge professor and staff from Huawei describes the construction of a dataset that can be used to test the effectiveness of image recognition in sub-optimal lighting conditions.

See 'HDR4CV: High dynamic range dataset with adversarial illumination for testing computer vision methods', https://www.cl.cam.ac.uk/research/rainbow/projects/hdr4cv-dataset/2021-hdr4cv-data.pdf

→ £1.9 million to support a "collaborative research programme" in computer architecture, machine learning and machine vision, cybersecurity, graphics and natural language processing.

This programme is covered by a framework agreement between Cambridge and Huawei that was first considered by CBELA in March 2019. The framework agreement was initially the result of a letter of intent signed by Cambridge's computer science department and HiSilicon, a Huawei subsidiary, in January 2019.[59] Cambridge provided a redacted version of the letter in response to a UK-China Transparency Freedom of Information request.[60] The letter states Cambridge and Huawei's intent to "maintain a long-term relationship" and to "work together to set the strategic direction and vision [continues, but redacted]".

Cambridge refused to provide the framework agreement itself on the basis that "its disclosure would be likely to prejudice the commercial interests of the University and/or Huawei", and due to the "confidentially negotiated nature of the specific framework arrangements in this case, the intellectual property and trade secrets contained in the text, and the competitive/commercial disadvantage that disclosure would be likely to place on Huawei and the University when exploring and negotiating future partnerships with other organisations…"[61]

[59] CBELA, "Cover sheet" dated 31st May 2019.
[60] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2022-706.pdf
[61] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2022-735.pdf

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Cambridge also describes the projects governed by the agreement as "open-source in terms of IP provisions."[62]

Cambridge told UKCT prior to publication: "There is no contradiction between the reason for refusal to disclose an agreement and the fact that the outputs of the projects are open-source in terms of IP provisions. […] The University would have taken the same approach of not releasing an agreement of this sort with a commercial entity regardless of which commercial entity was involved – this was not an approach specific to Huawei. The confidentiality of the agreement is a different matter to the outcome of the projects (e.g. research data), which are designed to be open source."

The framework agreement provides for a steering committee to oversee projects under the agreement. According to Cambridge: "There are Steering Committee meetings twice a year. Dates have been as follows: 27 March 2020; 6 November 2020; 11 June 2021; 1 December 2021; 4 July 2022. The membership of the Steering Committee comprises three Huawei representatives plus an observer, all from the Huawei UK Research Centre, and three senior University academics plus an observer. The Steering Committee considers areas of research of joint interest."[63]

Cambridge refuses to release the steering committee notes on the basis that it "would be likely to prejudice the commercial interests of the University and of Huawei" and that the "academic work" of researchers is their personal data.[64]

Cambridge initially refused also to list the projects when UK-China Transparency requested a list. One was eventually provided, but without precise dates or funding allocations:[65]

- "This research provides a programmable real-time hardware monitoring solution, which enables software to detect and mitigate existing hardware vulnerabilities quickly after encountering new vulnerabilities.
- "This work aims at improving CPU core robustness to permanent and transient faults. Errors within a main core are detected by using heterogeneous parallel small cores, with an adjustable trade-off between performance and error coverage.
- "Obtaining a better theoretical understanding of existing meta-learning algorithms, and show how these understandings can lead to new methods for neural architecture search (NAS) and semi-supervised learning (SSL).
- "Autonomous driving is dependent upon camera, lidar, acoustic and other sensors; this project develops a new approach for robust combination of that data.
- "Developing a framework to allow users to run Julia-based scientific computing programs and deep learning models on MindSpore® without further modification."

In response to FOI requests, Cambridge stated that the following amounts had been spent on these projects: in 2019-20, £15,013; in 2020-21, £373,761; in 2021-22, £871,266; in 2022-23 (to 2nd June), £640,879.[66]

There is no reference to the Cambridge-Huawei framework agreement on Cambridge's websites.

[62] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2023-266.pdf
[63] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2022-806.pdf
[64] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2022-903.pdf
[65] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2023-266.pdf
[66] https://ukctransparency.org/wp-content/uploads/2023/10/FOI-2023-266.pdf

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→ An unknown amount towards 'Huawei HiSilicon Scholarships', which has included sponsoring theoretical work on swarm robotics, a key dual-use technology, at Cambridge's Bio-Inspired Robotics Lab.

Two papers, from 2022 and 2023, on swarm robotics by scholars at Cambridge acknowledge support from "a Huawei HiSilicon Scholarship".[67] The first paper's abstract states that its "novel proposed model opens new avenues in swarm robotics research." The second paper's abstract states that its "proposed simulation system is advantageous for augmenting the collective behaviors in swarm robotics."

Swarm robotics is a key dual-use research area with military applications.

Cambridge told UKCT prior to the publication of this report: "the project is basic scientific research focusing on the field of complex systems, fluid mechanics, and physics at large, and [the lead researcher involved] would not expect any direct practical and/or technological applications."

Cambridge were not able to say whether 'Huawei HiSilicon Scholarships' is meant to be a reference to one of the other Huawei-funded PhD programmes described above.

[67] https://link.springer.com/chapter/10.1007/978-3-031-43360-3_30 (2023) and https://api.repository.cam.ac.uk/server/api/core/bitstreams/16bb1a7b-be11-4ac2-9d04-2cd1e6377636/content (2022) There is also reference to this scholarship at https://news.yale.edu/2023/04/27/fellowship-winners-will-continue-their-studies-england

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Appendix 1. Joint Huawei Cambridge patents – CAPE/Professor Daping Chu*

*Date in list below indicates date patent filed unless stated otherwise

2014, "Display Device"[68]

2015, "Optical Image Processing System"[69]

2015, "Stereo Imaging Device, Method, Display and Terminal"[70]

2016, "Stereoscopic imaging apparatus and user terminal"[71]

2016, "Display Apparatus"[72]

2016, "Stacked Display Device"[73]

2016, "Back Projection System and Screen"[74]

2017, "Spatial Phase Modulator and Method for Producing Spatial Phase Modulator"[75]

2017, "Stereoscopic Imaging Apparatus and Method, Display, and Terminal"[76]

2017, "Projection System"[77]

2017, "Display apparatus, stereoscopic display apparatus, and application thereof"[78]

2017, "Optical System"[79]

2018, "Head-mounted display device and display method"[80]

2019, "Image Display System"[81]

2019, "Device and method for generating a 3D light field"[82]

2019, "System, apparatus and method for displaying image data"[83]

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[68] https://www.lens.org/lens/patent/189-786-245-164-268/frontpage?l=en
[69] https://www.lens.org/lens/patent/186-984-301-804-02X/frontpage?l=en
[70] https://www.lens.org/lens/patent/135-397-741-849-997/frontpage?l=en
[71] https://www.lens.org/lens/patent/053-313-976-483-631/frontpage?l=en
[72] https://www.lens.org/lens/patent/198-948-282-748-428/frontpage?l=en
[73] https://www.lens.org/lens/patent/173-251-254-154-06X/frontpage?l=en
[74] https://www.lens.org/lens/patent/033-372-099-059-162/frontpage?l=en
[75] https://www.lens.org/lens/patent/199-151-754-343-516/frontpage?l=en
[76] https://www.lens.org/lens/patent/164-264-692-136-386/frontpage?l=en
[77] https://www.lens.org/lens/patent/189-257-360-057-077/frontpage?l=en
[78] https://www.lens.org/lens/patent/017-397-332-698-720/frontpage?l=en
[79] https://www.lens.org/lens/patent/157-897-392-212-937/frontpage?l=en
[80] https://patents.google.com/patent/CN111989609A/en?q=(%22University+of+Cambridge%22)&assignee=%22Huawei%22&oq=%22University+of+Cambridge%22+%22Huawei%22&page=1
[81] https://www.lens.org/lens/patent/013-044-165-759-397/frontpage?l=en
[82] https://www.lens.org/lens/patent/121-179-745-213-87X/frontpage?l=en
[83] https://www.lens.org/lens/patent/129-726-010-131-743/frontpage?l=en