



MILTON KEYNES AND ARTIFICIAL INTELLIGENCE REPORT

APRIL 2020

NEURAL
PATH.IO


milton keynes council



PETE MARLAND
LEADER OF THE COUNCIL
IN MILTON KEYNES

Milton Keynes Council's Message

"Milton Keynes has a culture of innovation that has been central to creating what is now one of the UK's top performing economies. We have an ambition to grow and attract more jobs in high-tech and innovation-led businesses so we can compete successfully with other global city economies. This timely report is a valuable contribution to our thinking about how Milton Keynes' growing strengths in AI, robotics and smart city technologies can be at the heart of our future success"

EXECUTIVE SUMMARY

The fourth industrial revolution will see Milton Keynes elevating itself as a digital skills and business scale-up leader in the UK. Artificial intelligence (AI) can drive the sustainable growth at the heart of the Milton Keynes vision to be the smartest, most collaborative and data driven city in the UK.

This report, created by Milton Keynes Council and NeuralPath.io focuses on three key areas where Milton Keynes is the clear leader in the UK for AI innovation:



Artificial Intelligence
driving business growth



Milton Keynes
"The Connected City": a Test -
Bed for AI Innovation



5G & Edge Computing:
Creating commercial
opportunities for AI



DEFINING AI

AI is a rapidly evolving technology that simulates human behaviour.

The most commonly used application of AI in businesses today is machine learning; machines are provided data and learn to process it themselves, performing cognitive functions similar to those of the human brain.

Machine learning techniques include the processing of data for computer vision, natural language processing and predictive modelling.

AI: DRIVING BUSINESS GROWTH IN MILTON KEYNES

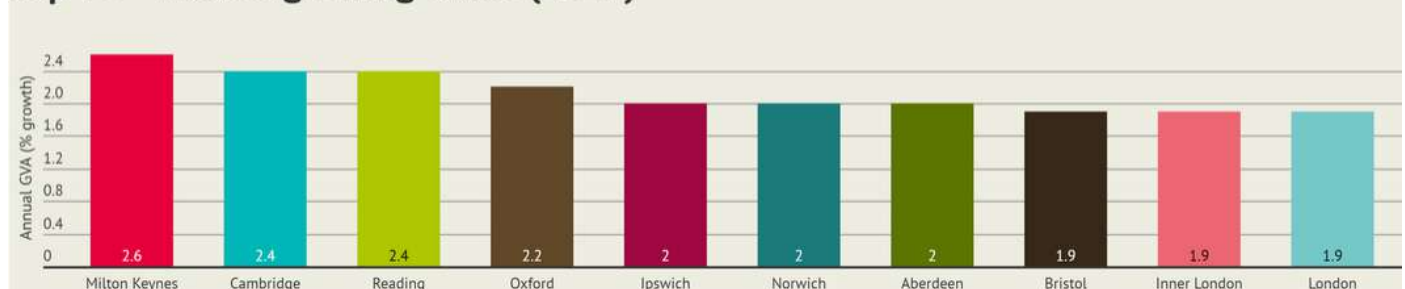


Milton Keynes (MK) is the UK's most economically successful new town, with an economy worth over £12 billion. In 2017, the annual Gross Value Added (% growth) in Milton Keynes was 2.6%, higher than all other UK towns or cities, and it is one of the top two most productive UK economies outside London. More than half of the enquiries to business support service Invest Milton Keynes are from companies looking to expand.

MK attracts major corporations and has a reputation for pioneering cutting-edge technologies; putting data, robotics, AI, internet of things (IoT) and 5G at the heart of its vision to be one of the UK's leading smart cities.

Milton Keynes is also one of the fastest-growing cities in the UK. Its location at the heart of the Oxford to Cambridge Arc - and ever-growing, readily-available talent pool - make it perfectly poised to achieve its technology vision.

Top 10 - fastest growing cities (2017)



2019 MILTON KEYNES AI HIGHLIGHTS

AI INVESTMENT

- Santander announces **£150m** investment in new innovation centre in Milton Keynes
- Puts machine learning at the heart of the bank's strategy

5G INNOVATION

- 5G test-bed network announced
- Emphasis on driving AI innovation and commercial investment

LEADING EDGE INNOVATION

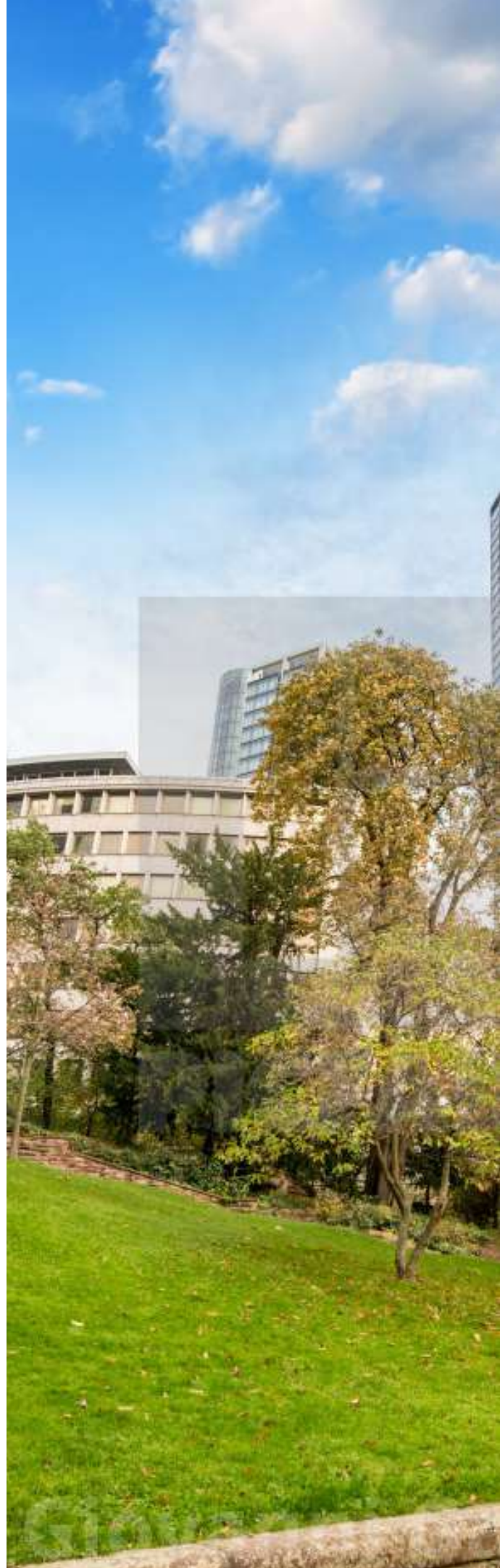
- AI-powered robot delivery service launched
- City-wide sensors using machine learning to predict and react to incidents.
- CityFibre provides gigabit-broadband connectivity within reach of thousands of Milton Keynes homes
- Robot-run café trialled

ATTRACTING AI COMPANIES

- AI 'scale up' business Aimi moves head quarters from London to Milton Keynes to access local AI talent

SCIROC

- MK hosts the European Robotics League festival
- Showcases the latest Robotics and Artificial Intelligence developments



MK FUTURES 2050

The MK Futures 2050 Commission was set up as a way of thinking about the future of the city, helping to create a long term vision for the way Milton Keynes should grow and prosper over the coming decades. The recommendations from the commission created the MK Futures 2050 Programme; which recognises the importance of inclusive growth, to make sure that benefits are shared across the whole community – not just those living in certain areas or working in newly created jobs.

Milton Keynes Council has an ambition for a greater Milton Keynes population of 500,000 combined with a sustainability strategy. Education and mobility are fundamental to the future prosperity of the city. To deliver the vision for MK in 2050, Six Big Projects have been established.

The Six Big Projects are a portfolio of linked projects and there are commercial AI opportunities aligned with each of them:

- 01 Growth and Strategy**
- 02 MK:U new university for Milton Keynes**
- 03 Learning 2050**
- 04 Smart, Shared and Sustainable Mobility**
- 05 Renaissance: CMK**
- 06 The Creative and Cultured City**

COMMERCIAL USE OF AI

The largest corporations in Milton Keynes are innovating and delivering extensive and highly impactful artificial intelligence applications: *Network Rail, Santander, Mercedes Benz, Home Retail Group, Volkswagen Financial Services, Ingram Micro, Scania, Tech Mahindra, Domino's Pizza Manufacturing, Red Bull Racing, Rightmove Group, Xero, Papa John's Pizza UK, Avon, BP Retail & Chargemaster, Honda R&D Europe, SAI Global UK, Seat UK.*

“Santander is deeply proud of our connection to Milton Keynes, with our commitment shown by our recent investment of £150 million in a world-class new headquarters here. It provides a pipeline of talent and fantastic development opportunities for our staff in data science, artificial intelligence and cyber security.”

NATHAN BOSTOCK
UK CEO, SANTANDER

Milton Keynes Enterprises' use of, and ambitions for Artificial Intelligence include:

Network Rail: Real time, automated issue identification for rail infrastructure

Santander: Advanced customer service virtual assistants, credit and loan optimisation, risk analysis, fraud detection

Mercedes Benz: Personalised route guidance, autonomous driving

VW Financial Services: Boosting operational efficiencies, quality control, enhancing customer experience and marketing

Ingram Micro: AI and IoT powered distribution models, cyber security

Scania: Interrogating centralised, unstructured knowledge for issue resolution, autonomous logistics

HumanDrive: Automation vehicle technology, partnering with Nissan and Hitachi



BUSINESS SPOTLIGHT

Milton Keynes is home to **Connected Places Catapult's** elite technology and innovation centre, which provides world-class facilities for innovative enterprises working to improve transport systems; including cutting-edge IT, modelling rooms and collaboration spaces.

There is a wealth of start-up and scale-up businesses in Milton Keynes that are leveraging the local talent pool and the appetite for AI investment and innovation in the area. A few examples include:



Immense.ai: *The Simulation Platform for Future Mobility Systems.*

Immense uses advances in data science, machine learning and compute technologies, alongside great science and domain expertise to empower decision-makers. Immense's platform provides businesses with mobility intelligence and insight, enabled by powerful digital worlds, activity-based multi-agent simulation and advanced data analytics



Briteyellow: *A vision to map the world's indoor places*

Briteyellow uses a combination of mixed reality (AR, VR) platforms and artificial intelligence to provide a complete end to end solution for positioning, navigation, and tracking, that is leading edge, cost effective, and adaptive to its environment. They are one of the local companies looking to leverage the new 5G network to provide faster, more accurate mapping and navigation.

“ We see a world where life is enhanced through virtual and augmented reality, spaces are smart, and operators have access to a more complete knowledge and understanding of their places. ”

FREDI NONYELU
CEO, BRITEYELLOW



IPsoft makes it possible to transform business performance through the employment of digital labour. Every day they automate thousands of IT and business processes for enterprises across a wide range of industries.

Local business IPsoft has created The Most Human AI™ for the Enterprise with a ground-breaking new avatar, Amelia, which delivers the best elements of human interaction – conversation, expression, emotion and understanding – driving deeper connections and greater business value.



Milton Keynes based **Celaton**'s machine learning platform helps major companies to process content and information from mail, social media, fax, post paper and other electronic data streams. Clients benefiting from Celaton's technology and AI expertise include ASOS, Carphone Warehouse and TalkTalk. Celaton has received over £2.5m of funding.



Robotazia is a restaurant and event space with a robot themed visionary and sensory experience. It's the first and only purpose designed venue in the UK to utilise robots for waitressing in sci-fi surroundings, and a test centre for new telepresence reception robots that utilise 5G in a real life environment. Their underlying ethos is repurposing and recycling, demonstrated by their astounding robot creations and interior fittings created from discarded and waste materials. They have provision for robot related workshops, themed parties and events plus a stage area for robot demonstrations, talks and entertainment.

MILTON KEYNES JOB MARKET

More than 7.5 million people live within a one-hour drive from Milton Keynes – making it a popular location for highly skilled talent, and one of the most productive cities in the UK.

Around 5% of all IT roles in Milton Keynes posted relate to AI, and advertisements with machine learning or data science requirements have been increasing over the past 12 months. This is representative of the job market more widely in the UK, with requests having grown by 93.7% in the last three months compared to the same period of the previous year.

“Milton Keynes has overtaken Cambridge as the UK's fastest-growing town or city economy.”

**IRWIN MITCHELL
CENTRE FOR ECONOMICS AND
BUSINESS RESEARCH (CEBR)**

MOST SOUGHT AFTER AI-RELATED SKILLS

Over the past six months, most AI jobs advertised have been for technical roles with experience in modelling languages (Python and R) and specific database languages (SQL). Strategic roles have started to be promoted in the last three months, suggesting organisations have historically either upskilled internally or developed AI solutions with little strategic direction. Recent changes suggest either a change in focus or, as with other AI roles, retention can be a challenge due to demand and higher salaries elsewhere.





“ We use the latest AI and data science to manage information and create insights for businesses. Milton Keynes is an entrepreneurial, innovative and digitally enabled city and we are delighted to make it our new home. ”

**STEVE SALVIN
CEO OF AIIMI**

There are over 1,000 people in Milton Keynes with direct artificial intelligence or machine learning skills, plus over 6,000 software engineers and 4,000 data engineers living in Milton Keynes, giving huge potential for organisations looking to access these skills. Milton Keynes is investing heavily in educating the next generation of talent for emerging technologies. Cranfield University is pioneering innovation in this sector, with investments into MKU, a new city centre university. Milton Keynes College is also playing a major role with its new Institute of technology in Bletchley.

“ Between Cranfield University, Milton Keynes University (MK:U) and the Institute of Technology (IoT), we are creating opportunities and a wonderful pool of talent within Milton Keynes and beyond. ”

**DR JULIE MILLS OBE
CEO, MILTON KEYNES COLLEGE**

MILTON KEYNES THE 'CONNECTED CITY' A TEST-BED FOR AI INNOVATION

VISIBLE AND INCLUSIVE AI IN MILTON KEYNES



The introduction of **Starship autonomous delivery bots** for mainstream use over two years ago was met with wonder and excitement from children, and relief from vulnerable and less physically able people. **Milton Keynes now has the world's largest fleet of autonomous robots.** The delivery robots use sensors, cameras and radar to navigate the streets; artificial intelligence and pre-mapped locations help the bots to know where they are.

The **SciRoc** robotics competition, held in a public shopping centre also gained great publicity and excitement. The SciRoc challenge is the world's first robot competition integrating real time smart city data, where robots faced a series of challenges including serving coffee, picking and packing items in a supermarket, providing emergency medication, opening a door and using an elevator.





UK Autodrive pod trials in Milton Keynes enabled the world's first demonstration of multi-CAV vehicles completing an end-to-end journey in the UK. Milton Keynes Council has been working with Aurigo and other innovative companies to test out a new first/last mile transport solution for local people, shoppers and visitors to Milton Keynes.

Patients at Milton Keynes hospital are having their surgery performed by a **Robotic Surgery Arm**. The robotic arm technology is used to perform keyhole or laparoscopic surgery for a range of colorectal procedures. Milton Keynes is the first hospital in the UK to use the robot arm which has been hailed by doctors as a leap forward in surgical precision.



The **MKAI COVID-19 virtual hackathon** brings together data scientists, innovators and idea makers from Milton Keynes to develop solutions for responding to the coronavirus outbreak. The programme aims to crowdsource technology solutions to help people overcome the instabilities and uncertainties they are facing.

“

Innovative robotic systems are set to play a vital part in delivering world-leading surgical care across the NHS and I am delighted that the team at Milton Keynes will be some of the first in the world to be routinely using this technology.

”

PROFESSOR JOE HARRISON
CEO, MILTON KEYNES UNIVERSITY HOSPITAL NHS
FOUNDATION TRUST

CORPORATE, ACADEMIC AND GOVERNMENT COLLABORATION

Several universities with AI schools and departments operate in the city and nearby, including The Open University, Cranfield University, The University of Buckingham and The University of Bedfordshire. Milton Keynes College also provides foundation degree level teaching. The universities work with local businesses and MK Council to trial projects, produce innovation and create knowledge transfer partnerships.

THE OPEN UNIVERSITY

The OU is a pioneer for creating and sharing knowledge, resources and data with corporates through:

- Research Partnerships
- Knowledge Transfer Partnerships
- Internships

The OU has formed a partnership with the Institute of Coding to promote the development of machine learning coding skills. It creates DataHubs for open access to city-wide data and the Open University Knowledge Media Institute to support the development of Smart Cities, Blockchains, Citizen Science, AI, Makers and Smart Energy.

“Milton Keynes is a shining example of a self-contained high-tech city where Citizens are always ready to experiment and adopt new technologies.”

JAGDISH MITRA
CHIEF STRATEGY AND MARKETING OFFICER,
TECH MAHINDRA





CRANFIELD UNIVERSITY

Cranfield University, positioned just 10km from Milton Keynes, has been developing AI capacity through a number of related initiatives:

- **£67m Digital Aviation Research and Technology Centre (DARTeC)** is a UK national facility to research the impact of digital technologies (AI, big data) on the aviation industry. DARTeC will underpin future UK aviation excellence and AI transformation, with the majority of its work either developing AI methods or using it in the form of data analytics and automation.
 - **Centre for Autonomous and Cyberphysical Systems** has launched a new Applied AI MSc, supported by BAE Systems; one of the first in the UK to teach how AI can support key engineering industries such as aerospace, logistics, defence, and automotive. The MSc and its short courses are ideal for up-skilling professionals and new graduates in AI for technology.
- The centre has recently appointed 2 new Professorships in AI and Autonomy, and is actively expanding the research and teaching capacity in this area.
- AI enabled autonomous driving project with **Nissan HumanDrive** completed the longest autonomous journey (230 miles) in the UK. Cranfield University has a fully sensed test environment for both ground automation and air automation – accelerating the research to test autonomous systems for logistic delivery and smart cities.
 - **Urban Observatory** is part of the UK-wide £138m investment in UK infrastructure and city capability research, with a focus on urban air pollution monitoring. A wide range of sensor data and meteorological data is available with AI algorithms to inform public health and green technology investment.

- **Knowledge Transfer Partnerships (KTPs)** are an important pathway for Cranfield University, with over a dozen active partnerships with UK SMEs, translating its world-leading research into high impact industrial applications.
- **A Beyond Visual Line-of-Sight (BVLOS)** corridor for unmanned autonomous drones is being developed.

“

I'm really excited about the possibilities of utilising the unprecedented quality and volume of urban data which is available to understand the urban science of Milton Keynes - why it's a success and how it impacts the regional and national economy. AI is a transformative technology that will enable us to achieve this.

”

WEISI GUO
CHAIR OF HUMAN MACHINE INTELLIGENCE
AT CRANFIELD UNIVERSITY



INSTITUTION IN DEVELOPMENT

MK:U

MK:U, a new city centre university, will have around 10,000 students within a decade of opening, studying a range of technology, engineering and science-focused courses, producing highly skilled, employable graduates. MK:U will be different by design, completely transforming how we think about higher education. MK:U will be a destination for continuous engagement, enabling outreach into the local community.


MK:U offers a once-in-a-lifetime opportunity for partners and sponsors to work together to create something powerful and unique – a new model university for the 21st century. The curriculum will adapt to the needs of employers in real time, as change moves ever faster and those needs evolve, focusing on new technologies, including smart cities, autonomous vehicles, robotics, AI, digital and cyber.

Milton Keynes is not just home to 5,000 Santander staff, working in areas including cybersecurity and artificial intelligence, it is at the heart of the Oxford-Cambridge arc. From financial technology to pharmaceuticals, this region is a global centre of innovation, all of it underpinned by the digital skills which MK:U will teach.

It is already home to universities ranked one and two in the world, plus world-class postgraduate provision at Cranfield. MK:U will be a key force leveraging the astonishing potential of the arc, a potential perhaps greater than any other region in Europe.

NATHAN BOSTOCK
CEO, SANTANDER UK





Milton Keynes College

The Institute of Digital Technology
at Bletchley Park

INSTITUTE OF DIGITAL TECHNOLOGY AT BLETCHLEY PARK

Milton Keynes College will launch an **Institute of Digital Technology at the historic Bletchley Park** site, home of the famous war time codebreakers. The plan will bring significant investment into Bletchley and Milton Keynes, as well as world leading brands such as Microsoft, KPMG, McAfee and Cranfield University. The IoT will provide an inclusive centre for technical qualifications, apprenticeships and training to plug the growing gap between demand and supply for key technical and digital roles, including cyber security.

The IoT is funded by a grant of £28 million from a government project designed to raise standards in scientific and technical subjects. It is aimed primarily at colleges and will create a pipeline of highly technically skilled young people for business and industry.

1,000 students a year are expected to benefit from the Institute and significant sponsorship is expected from companies keen to be associated with such a forward looking and prestigious project.

CONNECTIVITY

Milton Keynes is being transformed into one of the best digitally connected areas on the planet as CityFibre invests £40m+ in a new full fibre network throughout Milton Keynes. The network will provide lightning-fast digital connections to everyone and everything – from homes, to schools, workplaces and even traffic lights and CCTV cameras.

“ Full fibre is going to play a huge role in Milton Keynes, both now and for generations to come. It will give our businesses the digital firepower they need to compete on a global stage, while ensuring our households and local services can reap the benefits of gigabit-capable broadband and the innovations it can support.

PETE MARLAND
LEADER OF MILTON KEYNES COUNCIL

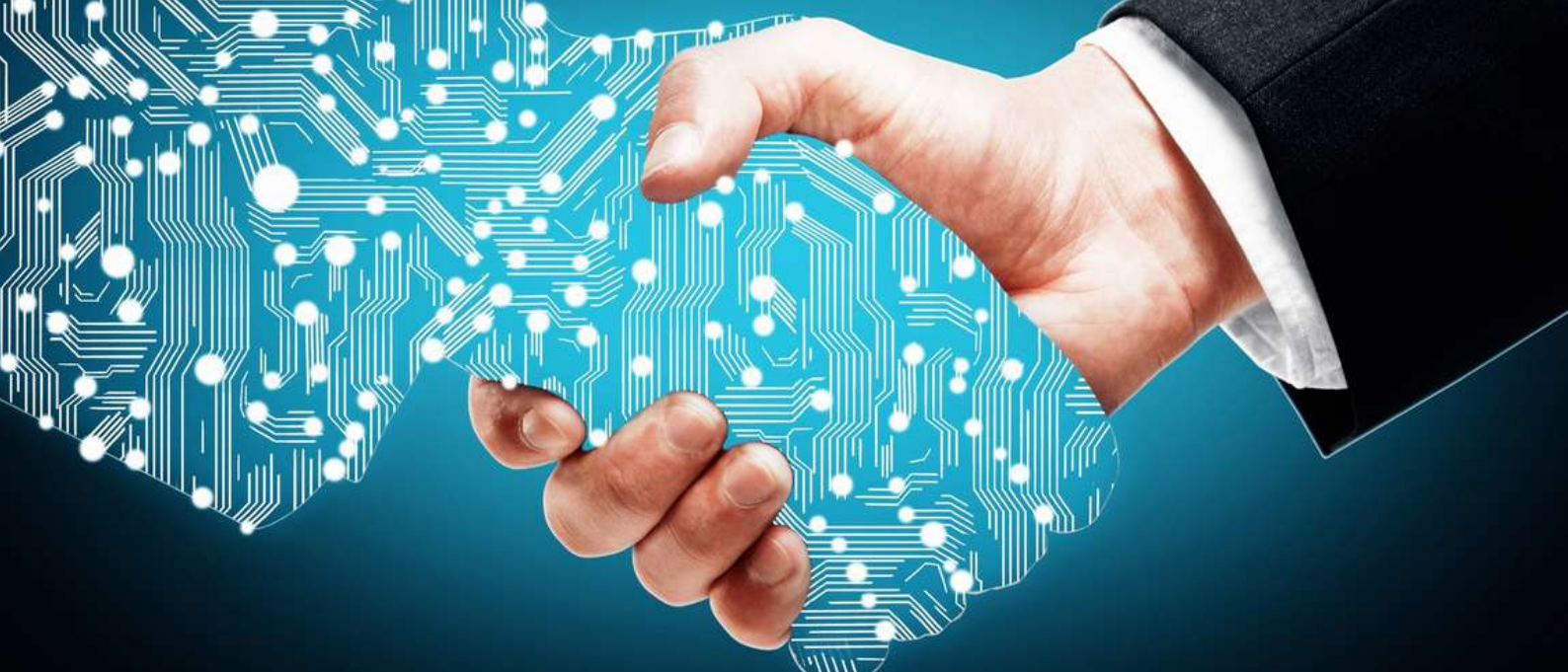
A full-fibre connection (FTTP) - with no copper – the new network can offer average speeds of 1 gigabit per second (1,000 Mbps). It could potentially offer speeds in terabits per second in future. It uses a network of fibre optic cables to deliver high-speed data over greater distances. The data travels down the cables literally at the speed of light. This means faster download speeds and a more reliable connection to the internet.

“ Growing the digital economy is at the heart of our 2050 Futures strategy for Milton Keynes. This event is very timely as we have a number of exciting new initiatives coming forward, including the MK:U project and 5G infrastructure trials linked to new mobility services.

GEOFF SNELSON
DIRECTOR OF STRATEGY AND FUTURES
AT MILTON KEYNES COUNCIL

“ Advanced full fibre networks play a critical role in future-proofing cities’ by providing the capacity and backhaul connectivity required to support Internet of Things products and 5G mobile services. Milton Keynes is clearly a leading destination for technological innovation.

GREG MESCH
CEO OF CITYFIBRE



COLLABORATION CASE STUDIES



VIVACITY LABS AND MILTON KEYNES COUNCIL

Sensors at scale: 2,500 cameras across Milton Keynes prevent traffic bottlenecks by giving priority to emergency vehicles, public transport and cyclists.



While current traffic light systems rely on sequencing, the new technology, developed in collaboration with Vivacity Labs, uses artificial intelligence to detect incidents and dynamically respond. The system helps to protect vulnerable road users, such as cyclists, by giving priority at lights or altering signs to direct traffic away from congestion. This smart system uses computer vision to identify everything that moves in the city. Sensors send data three times a minute to a central data hub, and neural networks then predict changes in traffic flow, air quality and other metrics.

This is the first comprehensive city-wide sensor system in the UK and remains one of the most advanced due to its ability to dynamically and autonomously respond to incidents. The project's success prompted Vivacity Labs to relocate its sensor assembly to Milton Keynes.

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UK AUTODRIVE CONSORTIUM

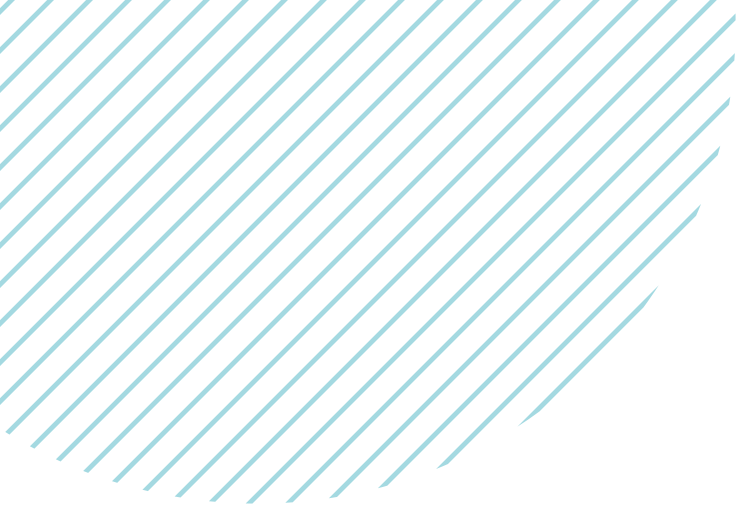
The UK Autodrive project was an ambitious three-year trial of connected and autonomous vehicle technology (CAV). The UK Autodrive consortium was made up of 15 leading organisations, including cutting-edge technology and automotive businesses, forward thinking local authorities and world-class academic institutions.

The UK Autodrive consortium carried out on-road trials in Milton Keynes. The programme also trialled a fleet of lightweight, self-driving ‘pods’ from Aurrigo for use on pavements and other pedestrianised areas. In addition to leading the way in developing and showcasing the latest technology, UK Autodrive has investigated other important aspects of autonomous driving – including safety and cyber-security, legal and insurance issues, public acceptance and customer interaction, and the potential business models for turning autonomous driving systems into a widespread reality. Helping businesses, academic and government communities to take positive steps forward, the project has also delivered a number of papers and studies on the following topics such as Public engagement / Feasibility studies: examining the significant implications and challenges of introducing autonomous vehicles from a technical, social and economic perspective.

- **Legal and insurance:** supporting thinking and develop the legal framework for the wider roll-out of autonomous mobility.
- **Safety and security:** exploring mass CAV deployment, identifying weaknesses in the operating system and infrastructure, and providing solutions.

Consortium partners included:





MK: 5G

The **5G in Milton Keynes** project is an exciting new testbed in the Milton Keynes area, including the deployment of dedicated 5G infrastructure and the creation of a data hub facility.

The 5G mobile network is designed exclusively for research and development purposes and will cover central MK including key sites (such as the Stadium, Bletchley & CMK rail stations, Hospital, Universities), key junctions on the M1 and a number of rural communities.

The testbed will focus on trialling applications across three core themes: *Mobility, Health* and *Energy*. Several trials are already planned across each theme and extensive datasets will be stored in the data hub. This is the first stand-alone 5G network in the UK, rather than a combination of 4G/5G.

Uniquely, it is owned and operated by the city – the only one in the UK like this - and the city is encouraging companies to use and benefit from this opportunity commercially.





AI IN THE MILTON KEYNES COMMUNITY

MKAI

MKAI is the community for Artificial Intelligence in Milton Keynes. The organisation hosts AI Expert Forums each month for the tech community in Milton Keynes to grow their AI knowledge, skills and network. Each Forum has three streams of content:



Inspiring keynote speakers on the most pressing AI topics of the day.



Machine learning and coding workshops



AI Practitioner round-table discussions

There is networking to encourage collaboration and recruitment, and an AI Open Mic session to share success or ask for specific requests in the community.

MKAI in Numbers



1,000

AI experts
in the MKAI
community



150+

Attendees
at each MKAI
monthly event



35

Internal
Champions support
the AI community



5

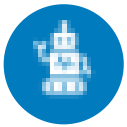
AI Leaders make up
the MKAI Steering
Group Board

MKAI

There are also a number of AI associated technologies meetups in Milton Keynes including:



**Internet of Things (IoT) Meetup:
275 Members**



**Robotics Process Automation
(RPA) Meetup: 225 Members**



**Google Developers Meetup:
375 Members**



**Made in MK: Strong networking
community: 300 Members**



**MK Geek Night: Creative and
developer community events**

There are monthly *AI Frenzies* held at the Barclays Eagle Lab at Cranfield University, attracting big name academic speakers and AI innovators from industry.



TECH ECO-SYSTEMS AND START-UP HUBS IN MILTON KEYNES

01

Grant Thornton Collaborative
Workspace

02

NatWest Entrepreneur
Accelerator

03

InnovateMK in partnership with
Tech Mahindra

04

Barclays Eagle Lab

05

Connected Places Catapult 5g
innovation Hub

06

Nissan Innovation Incubator

INFLUENCERS

The city is proud that **Bernard Marr**, the most followed AI Leader on LinkedIn, lives and works in Milton Keynes. He is a regular speaker at the 123 Internet Group Annual MK Digital Summit, a supporter of AI in Milton Keynes, recognised as a world leader in AI innovation.





MILTON KEYNES ENCOURAGES AI INNOVATION

With robot deliveries, driverless cars, city-wide IoT, full-fibre trials, wireless bus charging and dockless bikes – Milton Keynes is consistently chosen as the location for forerunners in tech, attracting other innovative businesses and winning its reputation as the *Silicon Valley of Europe*. The city's council works hard to promote Milton Keynes as an incredible place to live, work and invest in. From attending developer events to providing free ongoing support through *Invest Milton Keynes* and cementing the city's reputation for tech by its own (and country-first) use of AI in the planning process. The city works closely with and promotes engagement with *SEMLEP* (South East Midlands Local Enterprise Partnership) for commercial funding.

The city is looking to create significant jobs growth by 2050 that are high-tech and innovation-led, and has a strong interest in growing AI jobs and skills in the area. With strong local leadership and control, there is the interest in and flexibility to create new mechanisms and delivery models, and encourage partnership working.

Milton Keynes is an action taker with dynamic, tech-savvy leadership. An implementation led city that wants to test and trial innovation that has real-world value. There is a healthy appetite for risk and test-and-fail techniques from the city and its partners, as the city is universally keen to trial new technology. Milton Keynes is recognised for developing cutting edge use-cases of how AI could be deployed.

5G AND EDGE COMPUTING

CREATING COMMERCIAL OPPORTUNITIES TO BENEFIT FROM AI

In five years, Statista estimate there will be approximately 75 billion connected devices, averaging nine per person across the globe. We'll see a world of constant and dynamic interaction between devices and people.

Blended solutions with AI, 5G, IoT and edge computing are integral to a smart city strategy. Data will be processed closer to where it is generated with near real-time analytics and machine to machine interactions. Intelligent traffic control systems will have potential for reduced congestion, smart grids, reduced pollution, and enhanced emergency services.

Smart cameras with object detection and continuous monitoring will warn emergency services what they face before they arrive. Healthcare systems and treatment pathways will be transformed through wearables and mobile, real-time analytics. Residential and office buildings will become more energy efficient with automated windows and optimised heating systems. Smart spaces will enhance targeted retail interactions whilst customers walk past.

Milton Keynes is leading by rolling out 5G, encouraging AI, IoT and edge computing companies to join the consortium, and have access to the data-hub and achieve funding. The city recognises that AI innovation is essential to achieve its smart city aims.

“ Applications of AI combined with 5G will enable the digital transformation of Milton Keynes as a smart city. To benefit from 5G, machine learning is essential to make sense of data. 5G networks enable not only faster speeds and reduced latency but also much greater traffic capacity (1,000 times the volume of mobile data compared to 4G). ”

IMTIAZ ADAM
FOUNDER, DEEP LEARN STRATEGIES
SPEAKER, WORLD ECONOMIC FORUM

MK:5G DATA EXCHANGE

In keeping with prior innovation in Milton Keynes, the 5G rollout is aimed directly at the city centre, making this incredible technology visible to the public. Milton Keynes intends the MK:5G Data Exchange to be the best 5G data exchange programme in the world. It is the place for external and internal partners to provide and access all MK:5G data, offering economies of scale and lowering the barrier to participation.

The 5G Data Exchange is impressive, and ideal for use by AI businesses, particularly those with expertise in big data and computer vision:

- A single centralised platform for MK:5G data.
- Builds on BT/OU MK Data Exchange, developed in MK:Smart

- Browsable, searchable catalogue of data feeds.
- Easy to find, subscribe to and use - data feed.
- Easy to register and provide a (public or private) data feed.
- Consistent approach to accessing/providing data.
- Uniform API for both reading and writing data.
- Returns XML, JSON or CSV formatted data.
- Built-in access control.
- Data visualisation.
- Video storage and analytics capability.

Interest has been expressed from a number of enterprises to utilise the technology, including Red Bull Racing who are exploring how 5G will optimise site operation, manufacturing and logistics capabilities. Red Bull Racing is building a high-tech campus, and in a potential collaboration with Cranfield University and MK Council will deliver opportunities to get Formula1 technology into the real world. There is a consideration to build one of the world's first drone corridors from Cranfield University to Red Bull Racing's innovation centre.

5G projects will deliver high-value employment opportunities and further strengthen our area's business strengths, creativity and skills capabilities to compete on a world stage. We are particularly looking for projects that will support the Government's Grand Challenges on Clean Growth and the Future of Mobility.

DR. OLIVER KIRSCH

SENIOR TECHNOLOGY STRATEGY ANALYST, CONNECTED PLACES CATAPULT

MK:5G CONSORTIUM PARTNERS INCLUDES:



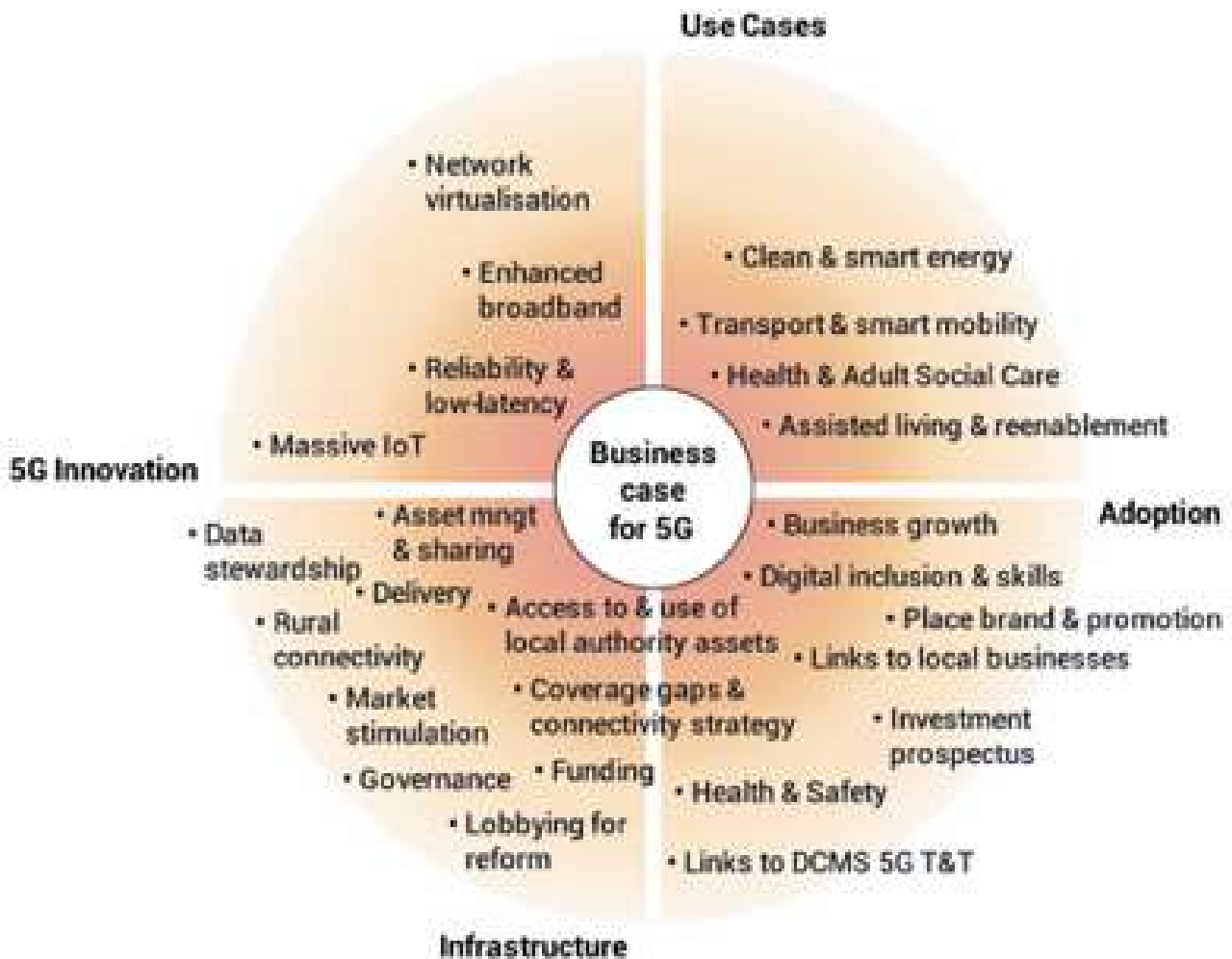
The 5G network in Milton Keynes will use the Westcott 5G SA Core Network. This offers a unique facility to test and develop new services and products by accessing the latest wireless applications service equipment and satellite data without the need to invest in expensive infrastructure. This allows AI businesses to rapidly prototype and commission new services and applications under representative real-world conditions.

MILLBROOK AND CAV NATIONAL TESTBED

Millbrook Technology Park and proving ground is home to an increasing number of vehicle technology companies, each benefiting from having immediate access to Millbrook's tracks and 5G-enabled test facilities.

Milton Keynes is part of the national network of testbeds for UK Connected Autonomous Vehicle (CAV) development. The initiative managed by ZENZIC (the UK national testbed coordination company), established by UK Government in 2018, identified the corridor from the West Midlands through Milton Keynes to London as the national testbed area. This will focus current and future UK investment into CAV development. Specifically, MK has co-operated with Millbrook to establish a private 5G test capability at their site close to MK. This collaboration will continue as MK deploys the capability in the real-world, city environment.

MK:5G is innovating with commercial use cases as follows:





SUMMARY

MILTON KEYNES IS IN A UNIQUE POSITION

Tech Nation suggests companies are starting to realise there are viable alternatives to London. Milton Keynes is in a unique position; with citizens embracing the innovative use of AI technologies being developed, a large talented native workforce, great transport and further education links, and proximity to world-renowned research centres - Cambridge, Oxford and London. It's clear that the larger organisations working on AI in Milton Keynes have leveraged this, and Milton Keynes has the resources to accommodate more organisations looking to bring innovative technology to fruition.

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A thriving economy that includes key players within the scientific, professional, retail and technical sectors, Milton Keynes offers SMEs a great chance to thrive with a 41.91 % five-year survival rate.

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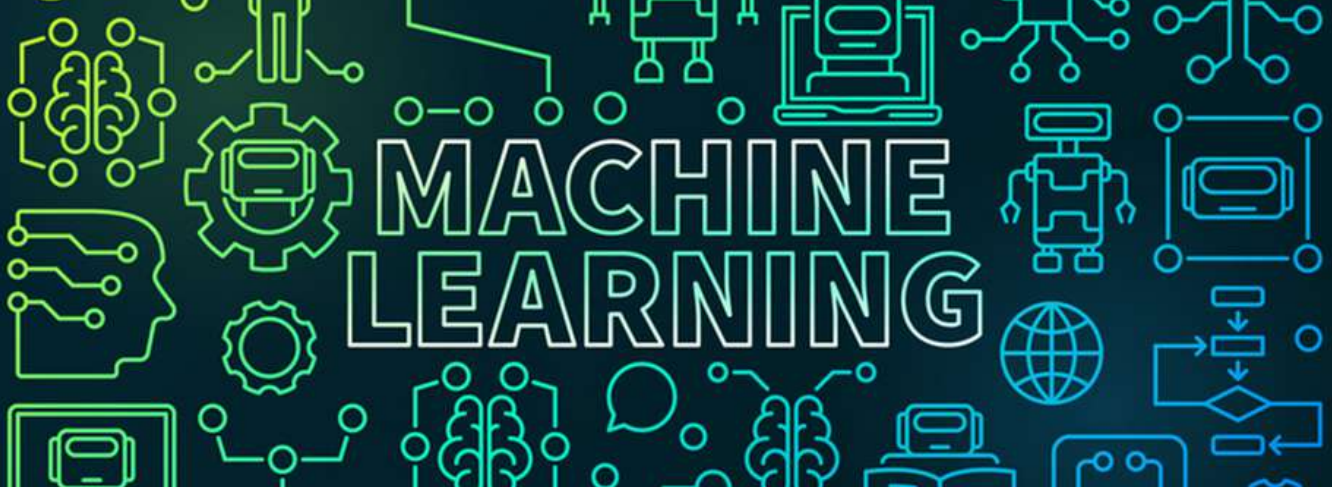
PAYMENTSSENSE REPORT 2020

We are in the midst of the fourth industrial revolution, where digital technologies are embedded in all areas of our lives – making us almost completely dependent on them. We are combining technology with ethics, humanity and purpose to create a better world, as well as increasing profits, efficiency and productivity. Careers as we know them today will morph into new ways of working. 65% of children entering the school system today will end up in jobs that don't exist yet. Smart cities will generate an unparalleled level of big data and require highly complex systems of communication between IoT devices, many of which will have AI embedded in them. Milton Keynes is elevating itself as a leader in the UK, paving the way by combining these technologies with a clear sense of purpose to enrich lives and providing a culture of creativity and sustainability.

REPORT PARTNERS

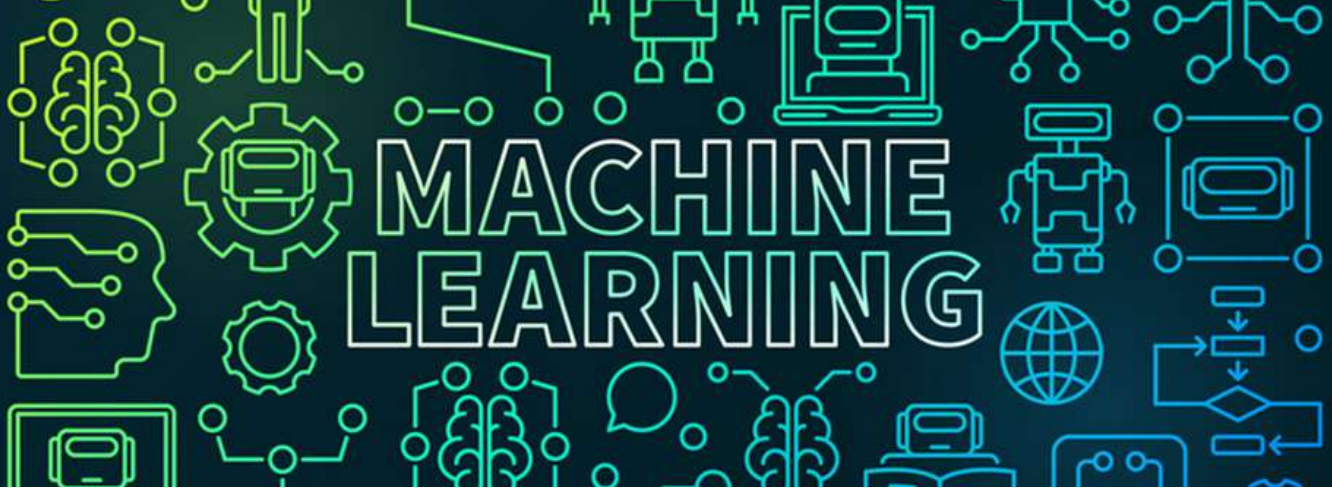
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TERMINOLOGY - CHOOSING THE RIGHT MACHINE LEARNING TECHNIQUE

Machine Learning Techniques	Description	Examples of Machine Learning Technique
Classification	Learns the characteristics of a given category, allowing the model to classify unknown data points into existing categories	<ul style="list-style-type: none"> • deciding if a consignment of goods undergoes border inspection • deciding if an email is spam or not
Regression	Predicts a value for an unknown data point	<ul style="list-style-type: none"> • predicting the market value of a house from information such as its size, location, or age • forecasting the concentrations of air pollutants in cities
Clustering	Identifies groups of similar data points in a dataset	<ul style="list-style-type: none"> • grouping retail customers to find subgroups with specific spending habits • clustering smart-meter data to identify groups of electrical appliances, and generate itemised electricity bills
Ranking	Trains a model to rank new data based on previously seen lists	<ul style="list-style-type: none"> • returning pages by order of relevance when a user searches a website
Dimensionality Reduction or Manifold Learning	Narrows down the data to the most relevant variables to make models; more accurate, and possible to visualise the data	<ul style="list-style-type: none"> • used by data scientists when evaluating and developing other types of machine learning algorithms



COMMON APPLICATIONS OF MACHINE LEARNING

Machine Learning Techniques

Natural language processing (NLP)

Computer vision

Anomaly detection

Time-series analysis

Recommender systems

Description

Processes and analyses natural language, recognising words, their meaning, context and the narrative

The ability of a machine or program to emulate human vision

Finds anomalous data points within a data set

Understanding how data varies over time to conduct forecasting and monitoring

Predicts how a user will rate a given item to make new recommendations

Examples of Machine Learning Technique

- converting speech into text for automatic subtitles generation
- automatically generating a reply to a customer's email
- identification of road signs for self-driving vehicles
- face recognition for automated passport controls
- identifying fraudulent activity in a user's bank account
- conducting budget analyses
- forecasting economic indicators
- suggesting relevant pages on a website, given the articles a user has previously viewed