**UNIT 1**

**AI Case Study1:**

**Kroger: How This U.S. Retail Giant Is Using AI And Robots To Prepare For The 4th Industrial Revolution.**

13 July 2021

[Kroger](https://www.thekrogerco.com/), one of America’s largest grocery chains, has decided to embrace technology to help it survive and thrive in the [4th industrial revolution](https://www.bernardmarr.com/default.asp?contentID=966). With 2,782 grocery stores under nearly two dozen names in 35 states, Kroger plans to leverage its data, shopper insights and scale to help it remain a leader in the marketplace of the future. According to a study by the [Food Marketing Institute](https://www.fmi.org/digital-shopper/), online grocery is expected to account for 20% of all grocery retail by 2022 and reach $100 billion in consumer sales, so Kroger and its competitors are smart to figure out ways to use technology to their advantage.

**Restock Kroger Initiative:**

In the fall of 2017, Kroger unveiled an audacious three-year $9 billion plan called [Restock Kroger](https://ir.kroger.com/Cache/1500103932.PDF?O=PDF&T=&Y=&D=&FID=1500103932&iid=4004136) with the goal to build out its e-commerce, digital and omnichannel businesses and redefine the customer experience. The grocer already delivers 3 billion personalised recommendations each year, but they will enhance the personalization efforts to “create different experiences for customers.” Not only will shoppers receive useful content digitally, but also “inspiration” through product-related content and recipes. The expansion of Kroger’s Scan, Bag, Go pilot programme that allows shoppers to scan products as they shop with their smartphone is also part of the Restock Kroger initiative. After being tested in 20 stores, it should be unveiled to 400 stores by the end of 2018. Additional investment in [Internet of Things (IoT)](https://www.bernardmarr.com/default.asp?contentID=964) sensors, machine learning, and artificial intelligence will be made to increase the efficiency of Kroger’s operations.

**Delivery by autonomous vehicles:**

Today, we can get groceries delivered, but Kroger is testing the delivery of the future—[grocery delivery by an autonomous vehicle](https://www.usatoday.com/story/money/2018/06/28/kroger-test-grocery-delivery-using-driverless-vehicles/741371002/). Kroger partnered with[Nuro](https://nuro.ai/), a Silicon Valley company that specialises in autonomous vehicles for delivery, on its pilot programme. Customers can use Kroger’s ClickList ordering system and Nuro’s.

**Automated warehouses:**

A partnership between Kroger and British online-only grocer [Ocado](https://www.ocado.com/webshop/startWebshop.do" \t "_blank) is expected to help Kroger automate its warehouses and use artificial intelligence to bolster its bottom line. Ocado claims to have the world’s most sophisticated automated grocery warehouses and has worked with Uber and Instacart to test delivery options, and it’s this know-how that Kroger aims to leverage with its investment. The companies announced they would [open three new warehouses](https://techhq.com/2018/05/kroger-finally-realizes-it-needs-tech-to-survive/) that Ocado will operate followed by another 17 in the next three years. Ocado’s warehouses are run by robots that are powered by machine learning algorithms to navigate around the warehouse and pick products for orders. With this investment and access to Ocado’s technology, Kroger will get products to stores more efficiently.

**Marketing gets a boost from analytics:**

Kroger’s in-house analytics firm[84.51 deployed Kroger Precision Marketing](https://consumergoods.com/kroger-using-data-technology-restock-future) that uses customer purchase data from Kroger’s 60 million shopper households to launch marketing campaigns across a digital spectrum. This helps enhance personalization for customers, but also allows product manufacturers excellent opportunities to market to their ideal customers on Kroger. Com, branded digital media and the MyMagazine Sharing Network.

**Machine learning:**

84.51 has made it a priority to [enable and embed machine learning](https://www.forbes.com/sites/tomdavenport/2018/04/02/84-51-builds-a-machine-learning-machine-for-kroger/#3b0c97f464e1) into Kroger’s operations where a “machine learning machine” can build and deploy a lot of models with very little human intervention in a project called Embedded Machine Learning. With a mission to “enable, empower and engage” machine learning within the organisation, this was a sophisticated approach to machine learning with Solution Engineering, Model Development and Model Deployment as three phases to machine learning methodology.

**Smart shelves:**

When a Kroger customer walks down the aisle with the Kroger app open, sensors identify the shopper and provide personal pricing and highlight products the customer might be interested in via[smart shelves technology.](https://www.retailwire.com/discussion/will-smart-shelves-ever-be-smart-enough-for-kroger-and-other-retailers/)

With this commitment to artificial intelligence, machine learning, and smart technology, Kroger seems on the right track to staying competitive for the 4th industrial revolution.

UNIT -2

CASE STUDY

4th Industrial Revolution using AI, Big Data and Robotics

**What is the Fourth Industrial Revolution?**

Industry 4.0 is the fusion of the real world with the virtual world. This digital revolution is marked by technology that takes advantage of Big Data and Artificial Intelligence (AI) to nurture automatic learning systems. Manufacturers in today’s marketplace seek to achieve business intelligence through the compilation, analysis and sharing of data across all key functional domains in order to achieve production excellence.

**But how did this lead to the fourth industrial revolution?**

The interconnection between systems and computers and the ability to analyse large amounts of data have made possible the existence of intelligent machines that can make informed decisions without any human involvement. The Internet of Things (IoT) has been connecting elements for many years, but the value extracted from the data through the Big Data has taken the term to a new level: The Internet of Systems.

**What is the Role of AI？**

Artificial intelligence is the development of technology to replicate and improve upon human intelligence. Artificial intelligence can be classified into three sub-categories:

Artificial Narrow Intelligence: AI that can perform a singular simple task such as voice recognition

Artificial General Intelligence: AI that can perform multiple tasks across a number of different areas

Artificial Super Intelligence: AI that has the ability to produce “intelligence” beyond that of human capability

Today, AI is of particular importance to some of the biggest tech companies in the world including Alphabet, Baidu, Microsoft, Facebook & Tesla. Each of these companies has their own ambitions as to how they will utilize AI to deliver the most utility for their business. The AI focus of each company tends to differ which will result in multiple AI applications across a number of industries, all of which will ultimately have a great impact on human’s lives.

**What is the Role of Big Data?**

In Industry 4.0, big data analytics plays a role in a few areas including in smart factories, where sensor data from production machinery is analyzed to predict when maintenance and repair operations will be needed. Through application of it, manufacturers experience production efficiency, understand their real-time data with self-service systems, predictive maintenance optimization, and production management automation.

Big data analytics reduces breakdowns and unscheduled downtime by about 25 percent.Big data analytics is crucial to real-time performance, supply chain optimization, price optimization, fault prediction, product development, and smart factory design.

**What is the Role of Robotics?**

Robotics and Artificial Intelligence are destined to be inherently intertwined. A majority of early robotics were “pre-programmed” to produce a pre-determined physical series of movements for manufacturing or transportation. While this is still efficient in some circumstances, robotics that leverage Artificial Intelligence can improve upon original, basic programming to be able to continuously increase efficiency. For example, an “Intelligent Robot” that manufactures a range of products from multiple inputs can over time develop and execute a production schedule that is multiple times more efficient than original programming.

UNIT 3

Case Study 3

Machine Learning At Google: The Amazing Use Case Of Becoming A Fully Sustainable Business.

Adobe Stock

 ADOBE STOCK

The company has been fully carbon neutral since 2007 and ten years later they are hoping they have achieved the next major goal – drawing every watt of energy they use for their business operations from renewable sources.

Kate E Brandt, their lead for sustainability, spoke to me about some of the ways they have been tackling this ambitious challenge while she was visiting London to speak at the [Economist Sustainability Summit 2018](https://events.economist.com/events-conferences/emea/sustainability-summit-2018).

She told me “We set a goal in 2012 that we wanted to purchase 100% renewable energy for our operations – so it’s a longstanding commitment.

“We are completing our final calculations but all our indicators point to us having achieved that in 2017 – but stay tuned!”

Of course, Google being pioneers of machine learning and deep learning means they have some formidable technology available to them to achieve this. As you would expect, it has been deployed across a wide variety of use cases in order to achieve their aims.

With data centers accounting for 2% of the world’s global energy usage, creating efficiencies across its own network of 14 major hubs has been a priority for Google.

The challenge here is that the hugely complex nature of the equipment means there are literally billions of possible configurations of servers, chillers, cooling towers, heat exchangers and control systems. Knowing which configurations will lead to the optimum level of Power Usage Effectiveness (PUE) – the metric used by Google to rate energy efficiency in data centers – is insanely complex for human beings to work out. Even a team of highly trained Google data center engineers.

But they took it as far as they could – building their own centers from the ground up so as to have maximum control over the variables at play, and custom-designing components to be free of extraneous, resource-sapping features common in off-the-shelf components.

Google – specifically, one engineer named Jim Gao - then turned to machine learning, the same technology which powers its image recognition and translation applications used by millions worldwide, to take things a step further.

Brandt says “So Jim took a machine learning course online, and got to thinking that it was really an interesting idea for optimizing data center cooling.

“One thing he told me which makes it so powerful as a tool – if you think about 10 devices each of which have 10 settings, that’s 10 billion potential configurations, and not something that the human mind can optimize.

“But once he was able to train this algorithm to see patterns across the various systems and how they impacted the cooling infrastructure, he was able to see that there was a tremendous opportunity.”

[Machine learning](https://www.bernardmarr.com/default.asp?contentID=1140) basically involves feeding complex algorithms, designed carry out data processing tasks in a similar way to the human brain, with huge amounts of data. The result is computer systems which become capable of learning.

The outcome of a pilot conducted by Jim and his team was a further 40% reduction in the overall amount of energy used for cooling the data center.

“It really shows how we’re able to use this technology across a complex system that’s already highly optimized, and see tremendous results. It highlights what’s so exciting about the potential of machine learning,” Brandt says.

Reducing the amount of waste going into landfill is another environmental priority for Google, and Brandt tells me that currently, they have achieved a “landfill diversion rate” of 86% in their global data centers - meaning just 14% of waste products are not recycled, composted or reused in some way.

This involved taking an aggressive look at every aspect of operation right down to the treatment of food waste from the company restaurants. Google employees are fed three meals a day from 200 cafes and 1,000 self-service eateries. Inevitably this resulted in a certain amount of food going to waste through spoilage or miscalculating demand.

Through a partnership with food data specialists [LeanPath](https://www.leanpath.com/%22%20/t%20%22_blank" \t "_blank), “smart” scales equipped with cameras to precisely measure the amount of food going to waste – either in the kitchen or after being served and left on plates.

All this data is then analyzed to gain an overall understanding of where food is being overproduced and going to waste. The system is credited with cutting the amount of food waste produced by the business by 3 million lbs (pounds) since it was introduced in 2014.

Conclusion:

Brandt says “Sustainability provides us with both challenges and opportunities – we are very focused on the idea of the ‘circular economy’ and have really been looking at everything we do as a company, to support a shift in the company and change our relationship with natural resources.

**UNIT 4**

**Case Study**

**BBC is Lunching an interactive radio show for Echo**

The future of entertainment is here. The BBC, in collaboration with Rosina Sound, is working on an interactive radio play for artificial intelligence-enabled home chatbots, [like Amazon’s Echo](https://venturebeat.com/2017/10/04/amazon-launches-alexa-and-echo-by-invitation-in-india-japan-coming-later-this-year/" \t "_blank) and Google Home.

The production will be the first of its kind, and the futuristic, high-tech play is slated to be released [by the end of the year](https://www.theverge.com/2017/9/6/16261348/bbc-radio-plays-interactive-stories-audio-drama-google-home-amazon-alexa-echo).

The play’s the thing:

The story, called *The Inspection Chamber*, will work similarly to choose-your-own-adventure books and games in which users can influence the direction of the story through the choices they make.

The creators of *The Inspection Chamber* are seeking to take that idea a bit further, however, to make listeners feel like they’re actually*in* the story.

The narrator will ask you, the listener, questions throughout the play. Your answers to those questions will change the outcome of the narrative.

The questions are designed so the listener doesn’t have to step out of the story to consider their decision. Instead, they’re meant to feel like a character interacting with the other characters in the play.

The creators said they took inspiration from games like The Stanley Parable and [Papa Sangre](https://en.wikipedia.org/wiki/Papa_Sangre), and from authors such as Franz Kafka and Douglas Adams. The story became, [in the creators’ own words](https://www.imore.com/bbc-brings-interactive-radio-plays-alexa-google-home" \t "_blank), “a comedy science-fiction audio drama.”

**The technology:**

The sci-fi elements are a natural fit for the medium through which the story will be presented. The show’s creators say they’ve built a “story engine” that lets the play work on a variety of different voice devices.

*The Inspection Chamber* will first arrive on Amazon Echo and Google Home, but the BBC is looking into other devices, like [Apple’s HomePod](https://venturebeat.com/2017/06/05/apple-unveils-homepod-its-answer-to-the-amazon-echo-and-sonos/) and Microsoft and Harman Kardon’s [Invoke speaker](https://venturebeat.com/2017/05/08/get-ready-for-cortana-powered-amazon-echo-clones/), as well.

**Merging art and technology**

The plot of *The Inspection Chamber* had to conform to certain limitations of the technology used to share it. For example, Amazon’s Alexa [requires users to speak every 90 seconds](https://www.forbes.com/sites/bernardmarr/2017/09/29/bbc-to-launch-ai-enabled-interactive-radio-show-for-amazon-echo-and-google-home-chatbots/2/#47a128c14daa), and the device only understands a limited number of phrases. The writers had to come up with ways to incorporate these phrases and time requirements into the story without making it feel forced.

**Conclusion:**

Thanks to their many virtues, physical books and theater productions may never go completely out of style. But new technologies are creating interesting possibilities in terms of plot, user experience, and more is launching an interactive radio show for Echo

**UNIT 5**

**Case Study 5 :**

The Amazing Ways How Wikipedia Uses Artificial Intelligence.

The Wikipedia community, the free encyclopedia that is built from a model of

openly editable content, is notorious for its toxicity. The issue was so bad that

the number of active contributors or editors—those that made one edit per

month—had fallen by 40 percent during an eight-year period. Even though there’s

not one solution to combat this issue, Wikimedia Foundation, the nonprofit that

supports Wikipedia, decided to use artificial intelligence to learn more about the

problem and consider ways to combat it.

**Collaboration with Wikimedia Foundation and Jigsaw to Stop Abusive**

**Comments**

In one effort to stop the trolls, Wikimedia Foundation partnered with Jigsaw (the  tech incubator formerly known as Google Ideas) on a research project called Detox  using machine learning to flag comments that might be personal attacks. This  project is part of Jigsaw’s initiative to build open-source AI tools to help combat  harassment on social media platforms and web forums. The first step in the project was to train the machine learning algorithms using  100,000 toxic comments from Wikipedia Talk pages that had been identified by a  4,000-person human team where every comment had ten different human  reviewers. This annotated dataset was one of the largest ever created that looked at  online abuse. Not only did these include direct personal attacks, but also thirdparty and indirect personal attacks ("You are horrible." "Bob is horrible." "Sally  said Bob is horrible.") After training, the machines could determine a comment  was a personal attack just as well as three human moderators. Then, the project team had the algorithm review 63 million English Wikipedia  comments posted during a 14-year period between 2001 to 2015 to find patterns in  the abusive comments. What they discovered was outlined in the Ex Machina:

Personal Attacks Seen at Scale paper:

• More than 80% of all comments characterized as abusive were made

by more than 9,000 people who made less than five abusive comments

in a year rather than an isolated group of trolls.

• Nearly 10% of all attacks were made by just 34 users.

• Anonymous users made up 34% of all comments left on Wikipedia.

• More than half of the personal attacks are being carried out by

registered users although anonymous users were six times more likely

to launch personal attacks. (There are 20 times more registered users

than anonymous users.) Now that the algorithms have created more clarity about who is contributing to the  community’s toxicity, Wikipedia can figure out the best way to combat the  negativity. Although human moderation is likely still needed, algorithms can help  sort through the comments and flag those that require human involvement.

**Objective Revision Evaluation Service (ORES System)**

Another reason for the significant decline in editors to Wikipedia is thought to be  the organization’s complex bureaucracy as well as its harsh editing tactics. It was  common for first-time contributors/editors to have an entire body of work wiped  out with no explanation. One way they hope to fight this situation is with the  ORES system, a machine that acts as an editing system powered by an algorithm  trained to score the quality of changes and edits. Wikipedia editors used an online  tool to label examples of past edits, and that was how the algorithm was taught the  severity of errors. The ORES system can direct humans to review the most  damaging edit and determine the caliber of mistakes—rookie mistakes are treated  more appropriately as innocent.

**AI to Write Wikipedia Articles**

Well, AI can do "OK" writing Wikipedia articles, but you have to start somewhere,  right? A team within Google Brain taught software to summarize info on web  pages and write a Wikipedia-style article. It turns out text summarization is more  difficult than most of us thought. Google Brain's efforts to get a machine tosummarize content is slightly better than previous attempts, but there is still work  to be done before a machine can write with the cadence and flair humans can. It  turns out we're not quite ready to have a machine automatically generate Wikipedia  entries, but there are efforts underway to get us there. While the use cases for artificial intelligence in the operations of Wikipedia are  still being optimized, machines can undoubtedly help the organization analyze the  vast amount of data they generate daily. Better information and analysis can help  Wikipedia create successful strategies to troubleshoot negativity from its  community and recruitment issues for its contributors

**UNIT 6**

**Case Study 6 :**

**The Amazing Ways Samsung Is Using Big Data, Artificial Intelligence And**

**Robots To Drive Performance**.

Until recently, Samsung was considered to be lagging behind its competitors

in terms of artificial intelligence (AI) research and development, but the company's current strategy implies that it is devoted to narrowing the gap and even contending for first place. Samsung is the world's biggest provider of data storage products, with its equipment producing and storing 70 percent of the world's data. Samsung is the world's largest consumer electronics manufacturer by  revenue, having surpassed Apple and selling 500 million connected devices  per year. Samsung appears to have gone all out in preparing for the fourth  industrial revolution, from industry gatherings to setting goals with AI at the  forefront to updating products to use artificial intelligence.

**Bringing innovators together :**

Samsung began 2018 with the goal of becoming a leader in artificial intelligence by hosting the Artificial Intelligence (AI) Summit, which brought together  300 university students, technical experts, and leading academics to discuss  ways to accelerate AI research and develop the best commercial AI applications. On Samsung's AI research team is Dr. Larry Heck, a world-renowned AI and voice recognition expert. Dr. Heck stressed the importance of collaboration within the AI sector at the summit in order for customers to have more confidence and adoption of AI and for AI to develop. Samsung announced intentions to hold additional AIrelated events as well as the establishment of a new AI Research Center dedicated to AI development and research. Samsung's artificial intelligence expertise will be bolstered by the research facility

**Bixby: Samsung’s AI Assistant :**

With the Samsung Galaxy S8, Bixby, Samsung's artificial intelligence system

designed to make device interaction easier, made its debut. 2.0 is a "major

leap forward for digital assistants," according to the current edition. Bixby 2.0

expands the AI system's reach to include TVs, refrigerators, washers,

smartphones, and other connected devices. It's also open to developers, increasing  the chances of it integrating with other products and services. Bixby is aware of its  surroundings and understands spoken language in order to assist users in  interacting with increasingly complicated equipment. To compete with Google  Home and Amazon Alexa, Samsung plans to release a Bixby speaker.

**Samsung to add AI to all devices by 2020 :**

Samsung said at CES 2018 that artificial intelligence capabilities would be

included in every product company produces by 2020. It merged all smart

programmes into a new Smart Things app as part of this plan, making it easy to  connect and control all devices. By 2020, all Samsung gadgets will not only be  Internet of Things ready, but they will also feature AI. "Samsung's primary

strategic initiatives are AI and machine learning," said Young Sohn,  President and Chief Strategy Officer at Samsung Electronics.

**AI technology based on machine learning to upscale images :**

Samsung Electronics was the first company to show off 8K AI technology

for televisions. The system analyses content and upscales low-resolution photos to  8K visual quality automatically. This innovation addresses the current issue of  high-resolution content being available for usage on screens with superhigh resolutions. All images can now be converted to 8K, which is the greatest  resolution currently available in digital television.

**Samsung’s AI robot :**

Another innovation out of Samsung Electronics is Saram, Korean for human, a

humanoid robot now out of development that’s packed with AI. So far, Samsung  has used the technology in its own factory with an AI robot arm, but experts expect  to see the company commercialize its robots, although that hasn’t happened yet. Sources confirm that Samsung has completed vertical walking robot technology  which would allow Saram to be stable and walk across a variety of surfaces.  Investments in other robot companies and the fact that robotics has been a longterm research project for Samsung seem to point to Samsung introducing its own  commercial robot in the very near future. With its reputation and success with Android, appliances and home electronics and  its earlier lessons with AI and a resolute strategy toward AI growth and excellence,  the future looks promising for Samsung to close the gap between itself and  competitors in the race to be prepared for the 4th industrial revolution and innovations from big data, artificial intelligence and robotics.