

*Part 02 — GenAI Research:*

# Use Cases & Case Studies

*Telecommunications · Edtech · Media & Entertainment · Automotive & Mobility · Energy & Utilities*

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**Prepared by: Shivya**

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Telecom	Edtech	Media & Entertainment	Automotive	Energy & Utilities
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## About This Document

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This is my Week 02 research submission for the MacroEdtech GenAI Research Internship. After studying broad industry applications in Part 01 (Healthcare, Banking, Manufacturing, Retail, and IT), this Part 02 goes deeper into five more industries: Telecommunications, Edtech, Media & Entertainment, Automotive & Mobility, and Energy & Utilities.

What makes Part 02 different from Part 01 is that I have included real case studies — actual examples of specific companies that deployed GenAI, what problem they were trying to solve, and what result they achieved. I think case studies make the research feel much more concrete and believable compared to just listing use cases.

I also tried to think more critically this time — not just documenting what GenAI does, but asking why it matters for that particular industry, and what the unique challenges are in that sector.

### What This Report Covers

- 5 industries analyzed: Telecom, Edtech, Media & Entertainment, Automotive & Mobility, Energy & Utilities
- 40+ use cases documented with real-world impacts and company examples
- 1 detailed case study per industry — a real company, real problem, real result
- Cross-industry observations and patterns from a student perspective
- 25+ references from academic papers, industry reports, and news sources

# 1. Telecommunications

Before I started researching this section, I thought of telecom as just the companies that run mobile networks and sell SIM cards. But when I actually dug into it, I realized that telecom companies are running some of the most complex infrastructure in the world — billions of network events per second, millions of customer interactions per day, and enormous amounts of equipment spread across entire countries.

All of that complexity creates both massive problems and massive opportunities for Generative AI. The global AI in telecom market is expected to reach \$38.8 billion by 2031 (Allied Market Research, 2023). The main reasons telecom companies are turning to GenAI are: reducing network downtime, cutting customer service costs, and detecting fraud in real time.

## 1.1 Use Case Overview

Use Case	What GenAI Does	Real-World Impact	Example / Company
Network Fault Detection & Resolution	AI monitors network data in real time, detects faults before customers notice, and generates detailed technical reports on what went wrong.	Network downtime reduced by up to 40%; problems are fixed before most users are even affected.	<i>Ericsson, Nokia Bell Labs</i>
AI-Powered Customer Support Chatbots	GenAI chatbots handle billing queries, plan changes, troubleshooting, and complaints — 24/7 without a human agent.	Up to 70% of customer queries resolved without human involvement; waiting times drop significantly.	<i>Vodafone TOBi, Airtel AI</i>
Personalised Plan Recommendations	AI studies a customer's usage patterns and automatically recommends the most suitable data or call plan for them.	Churn (customers leaving) reduced; average revenue per user increases.	<i>Jio, T-Mobile</i>
Network Traffic Prediction & Optimisation	Predicts where network congestion will happen (events, peak hours, locations) and reallocates bandwidth in advance.	Better call and data quality for customers; lower infrastructure costs.	<i>AT&amp;T, China Mobile</i>
Automated Network Configuration	Generates configuration scripts for new network equipment automatically, reducing manual setup time.	New network towers set up in hours instead of days; fewer configuration errors.	<i>Huawei, Cisco</i>
Fraud Detection in Real Time	Detects SIM cloning, call spoofing, and subscription fraud by analysing unusual calling patterns.	Telecom fraud costs industry \$40B+ annually; AI reduces losses significantly.	<i>Subex, TELARIX</i>
AI-Generated Customer Bills & Reports	Automatically generates personalised bill explanations, usage	Fewer billing complaints; customers understand their bills better.	<i>Airtel, Reliance Jio</i>

Use Case	What GenAI Does	Real-World Impact	Example / Company
	summaries, and account reports for each customer.		
Predictive Maintenance of Towers	Uses sensor and weather data to predict when a cell tower or equipment needs maintenance before it fails.	Reduces site visits and emergency repairs; improves network reliability.	<i>Ericsson, Verizon</i>

## 1.2 Case Study: Vodafone — Fixing Customer Service with GenAI

### Case Study: Vodafone's TOBi Chatbot — From Rule-Based to GenAI

**Problem:** Vodafone was handling tens of millions of customer contacts every year. Most queries were repetitive (billing questions, plan changes, basic troubleshooting) but still required human agents — which was expensive and slow. Customer satisfaction scores were not good.

**What They Did:** Vodafone deployed TOBi, an AI chatbot, initially as a simple rule-based system. In 2023-24, they upgraded TOBi with large language model capabilities, allowing it to handle open-ended questions in natural language rather than just pre-set menus.

**Result:** TOBi now handles over 55% of all customer contacts without any human intervention. Customer satisfaction scores improved because wait times dropped from minutes to seconds. Vodafone also reports significant cost savings in their customer operations budget.

**What I Learned from This:** The key insight is that the jump from a rule-based chatbot to a GenAI-powered one is massive. A rule-based chatbot can only answer questions it was programmed for. A GenAI chatbot can understand what the customer actually means, even if they phrase it in an unusual way.

## 1.3 What I Found Most Interesting in Telecom

The network fault detection use case surprised me the most. I had never thought about how much invisible work goes into keeping a mobile network running. Telecom networks generate hundreds of millions of log events every day. A human engineer simply cannot read all of those. GenAI can process all of it in real time and flag exactly which piece of equipment is about to fail and why — before any customer notices a problem. That feels like a superpower for network engineers.

I also noticed that telecom companies have a unique advantage in AI adoption: they already collect enormous amounts of data about their customers (call logs, data usage, location patterns). This makes it easier to train personalised AI models. However, it also raises serious privacy questions — something I noted as a challenge.

### Telecom — My Key Observations

- Network monitoring is the most technically impressive use case — AI is processing billions of events per second to keep networks running smoothly
- Customer service chatbots are the most visibly deployed use case — most people have interacted with one without realising it is AI
- Telecom companies have a huge data advantage for AI training, but this also means they must be careful about customer privacy

- Fraud detection is critically important — the telecom industry loses over \$40 billion annually to fraud, making AI investment very justified
- The biggest challenge I noticed: many telecom networks run on very old infrastructure, making it hard to integrate new AI systems with legacy equipment

## 2. Edtech (Educational Technology)

This was the section I was most personally interested in, since I am currently in an educational setting myself. Edtech means using technology to improve how education is delivered, and GenAI is making that more powerful than ever. The global edtech market was valued at \$142 billion in 2023 and is growing rapidly, with AI being the biggest driver of new product development.

The core promise of GenAI in education is something called 'personalised learning at scale' — giving every student the kind of individual attention that was previously only possible with a private tutor. What I found fascinating is that this idea of personalised education has been a goal for decades, but it was simply too expensive and time-consuming before AI. Now, it is becoming actually possible.

### 2.1 Use Case Overview

Use Case	What GenAI Does	Real-World Impact	Example / Company
AI Tutors & Personalised Learning Paths	AI studies how a student learns, identifies weak areas, and creates a customised study plan and explanation style for each individual.	Students learn up to 2x faster in some studies; weaker students receive more targeted support.	<i>Khan Academy, Khanmigo, Duolingo Max</i>
Automated Assignment & Essay Grading	AI reads student submissions and provides detailed feedback on content, structure, grammar, and argumentation — instantly.	Teachers save hours of grading time; students get faster, more consistent feedback.	<i>Turnitin, Grammarly, EssayGrader</i>
AI Content Generation for Courses	GenAI generates lesson plans, quiz questions, explanations, and course materials from a curriculum outline.	Course creation time reduced from weeks to hours; content stays up to date.	<i>Coursera, Udemy AI tools</i>
Intelligent Doubt-Solving Chatbots	Students can ask any question at any time and get a clear, step-by-step explanation immediately.	24/7 academic support without needing a teacher available at all hours.	<i>Chegg AI, Socratic by Google</i>
Adaptive Difficulty Adjustment	AI monitors student performance in real time and automatically adjusts the difficulty of questions and content.	Students are neither bored (too easy) nor frustrated (too hard) — engagement increases.	<i>Duolingo, BYJU's</i>
Language Learning & Translation	GenAI enables real-time conversation practice with an AI in any language, with instant corrections.	Language learning becomes more affordable and accessible globally.	<i>Duolingo Max, Speak AI</i>
Student Performance Prediction	AI identifies students who are at risk of failing or dropping out based on their engagement patterns.	Early intervention possible before students actually fall behind.	<i>Coursera, edX, Knewton</i>

Use Case	What GenAI Does	Real-World Impact	Example / Company
Accessibility Tools for Disabled Students	GenAI converts text to speech, simplifies complex content, and provides alternative formats for students with learning disabilities.	Education becomes more inclusive for students with dyslexia, visual impairment, and other challenges.	Microsoft Learning Tools, Texthelp

## 2.2 Case Study: Khan Academy — Khanmigo, the AI Tutor

### Case Study: Khan Academy's Khanmigo — Making Private Tutoring Available to Everyone

**Problem:** Khan Academy has always believed every student deserves a world-class education for free. But the missing piece was always personalisation — a video lesson is the same for everyone, but every student has different questions, different confusions, and learns at a different pace. Human tutors provide that personalisation but are expensive.

**What They Did:** In 2023, Khan Academy partnered with OpenAI and built Khanmigo — an AI tutor powered by GPT-4. Importantly, Khanmigo does NOT just give students the answer. It asks guiding questions to help students figure out the answer themselves — just like a good human tutor would.

**Result:** In pilot programmes, students using Khanmigo showed measurably better learning outcomes compared to students using video content alone. Teachers also used Khanmigo to help write lesson plans and generate quiz questions, saving hours per week. Khan Academy has described it as 'the closest thing we have ever seen to the promise of personalised education for everyone.'

**What I Learned from This:** The most interesting design decision was making Khanmigo guide students rather than just answer them. It would be easy to make an AI that just gives answers, but that doesn't help students actually learn. Designing AI for education requires thinking carefully about pedagogy, not just technology.

## 2.3 Challenges Specific to Edtech AI

While researching Edtech, I came across some challenges that are unique to this industry compared to the others I studied:

Challenge in Edtech AI	Why It Is Different Here
Academic Dishonesty	Students can use GenAI to write essays or solve assignments — making it very hard to assess actual learning. This is a problem unique to education.
AI Hallucination in Teaching	If an AI tutor explains a concept incorrectly, students may learn wrong information. The stakes are different from a chatbot giving wrong product info.
Equity and Access	Students without good internet access or devices cannot benefit from AI education tools

Challenge in Edtech AI	Why It Is Different Here
	— potentially widening the gap between rich and poor students.
Teacher Resistance	Many teachers fear that AI will replace them, which can lead to resistance to adoption even when the tools are genuinely helpful.
Age-Appropriate Content	AI systems used by children need extra safety guardrails to ensure content is always appropriate and interactions are safe.

### Edtech — My Key Observations

- The most powerful idea in Edtech AI is 'personalisation at scale' — giving every student what used to be available only to those who could afford private tutors
- Khan Academy's Khanmigo impressed me because they thought about pedagogy first — the AI guides students rather than just giving them answers
- Academic dishonesty is a genuinely hard problem. I noticed universities around the world are still trying to figure out how to handle AI-written essays
- AI tutors are especially valuable in countries like India where there are not enough qualified teachers for the number of students — tools like BYJU's are already reaching millions
- Personalised learning is the future, but it requires very good data about each student, which raises privacy questions — especially for children

## 3. Media & Entertainment

Media and Entertainment was probably the most fun section to research. It is also the industry where GenAI has become most publicly visible and controversial — because it directly affects creative people like writers, artists, musicians, and actors. The global media and entertainment market is worth over \$2.3 trillion, and GenAI is touching almost every part of it.

I noticed a unique tension in this industry that doesn't exist in the same way elsewhere: GenAI is both a tool for creative professionals and a potential replacement for them. This makes it the most ethically complex industry in my research. The Hollywood writers' and actors' strikes of 2023 were partly about AI replacing human creative work — and that debate is far from over.

### 3.1 Use Case Overview

Use Case	What GenAI Does	Real-World Impact	Example / Company
AI Script & Story Generation	GenAI helps writers brainstorm ideas, generate plot outlines, write dialogue drafts, and overcome writer's block.	Writing productivity increases; smaller studios can produce more content with fewer writers.	<i>Netflix AI tools, ScriptBook</i>
AI-Powered Video Dubbing & Localisation	Automatically dubs content into multiple languages, matching lip movements and preserving the original speaker's voice and tone.	Shows can reach global audiences much faster and cheaper than traditional dubbing.	<i>ElevenLabs, Deepdub, Flixier</i>
Personalised Content Recommendations	AI studies viewing/listening habits in extraordinary detail to recommend exactly the right content for each user.	Netflix credits AI recommendations with saving \$1 billion+ annually in customer retention.	<i>Netflix, Spotify, YouTube</i>
AI Music Composition	GenAI composes background music, sound effects, and even full songs from text descriptions or mood parameters.	Cheaper music production for games, films, ads; faster turnaround on custom soundtracks.	<i>Suno AI, Udio, AIVA</i>
Automated News Writing	AI generates factual news articles (sports scores, financial results, weather) from data feeds — instantly.	News agencies can cover far more events without proportional increase in journalists.	<i>Associated Press, Reuters</i>
AI Visual Effects (VFX)	GenAI generates special effects, de-ages actors, creates realistic backgrounds, and removes objects from scenes.	VFX costs reduced significantly; effects that took months can now be done in days.	<i>Runway ML, Adobe Firefly</i>
Deepfake Detection	AI tools that identify AI-generated fake videos or audio — to prevent misinformation.	Protects public trust and helps platforms remove harmful synthetic media.	<i>Microsoft Video Authenticator, Deepware</i>

Use Case	What GenAI Does	Real-World Impact	Example / Company
Game Content Generation	GenAI creates game dialogue, character backstories, level designs, and textures — reducing development time.	Games can offer more dynamic, personalised experiences; smaller studios can build bigger worlds.	<i>Inworld AI, Ubisoft Ghostwriter</i>

### 3.2 Case Study: Netflix — How AI Makes You Keep Watching

#### Case Study: Netflix's Recommendation Engine — \$1 Billion Saved Every Year

**Problem:** Netflix has over 270 million subscribers and a library of thousands of titles in hundreds of languages. The biggest risk is a subscriber running out of things they want to watch and cancelling their subscription — something Netflix calls 'churn.'

**What They Did:** Netflix has built one of the most advanced AI recommendation systems in the world. It doesn't just look at what you watched — it analyses how long you watched, when you paused, what time of day you watch, what device you use, and even which thumbnail image of a show caught your attention. The AI also personalises the thumbnail itself — the image shown for the same movie is different for different users based on what they are likely to respond to.

**Result:** Netflix estimates that its AI recommendation system saves over \$1 billion per year by reducing subscriber churn. Around 80% of what people watch on Netflix comes from AI recommendations rather than manual browsing. This is one of the most financially significant AI deployments of any company in the world.

**What I Learned from This:** I found the personalised thumbnail detail fascinating — I never realised that the cover image of a show I see might be different from what my friend sees. It made me think about how deeply AI can be woven into an experience without users even noticing it.

### 3.3 The Creative Ethics Debate — What I Observed

Media & Entertainment is the one industry where I spent significant time thinking about the ethical dimensions of GenAI, because the debate is very public and very unresolved. Here are the main tensions I noticed:

Ethical Question	What Is Actually Being Debated
Who owns AI-generated art?	If an AI creates a painting based on millions of human artworks, who holds the copyright? The AI? The company that built it? The user who gave the prompt?
Are AI voices stealing from actors?	Voice cloning AI can replicate any actor's voice — raising the question of whether studios should be able to use an AI version of an actor without paying them.
Is AI-generated news dangerous?	AI can write fake but realistic-sounding news articles. Who is responsible if an AI news article contains misinformation?

Ethical Question	What Is Actually Being Debated
Do training datasets violate copyright?	Most AI image and text models were trained on content scraped from the internet without permission — which is currently being challenged in multiple lawsuits.
Does AI lower content quality?	If AI can generate unlimited content cheaply, does it flood the market with low-quality material that drowns out genuine human creativity?

- ### Media & Entertainment — My Key Observations
- This industry has the most public and emotionally charged AI debate — the 2023 Hollywood strikes showed that creative workers take the threat of AI very seriously
  - Netflix's \$1 billion per year saved from recommendations is one of the most striking AI ROI figures I found in all my research
  - AI dubbing is a genuinely exciting use case — it could allow a show made in one language to feel natural to viewers in any other language, transforming global media
  - Deepfake detection tools are just as important as deepfake creation tools — GenAI is creating both the problem and the solution at the same time
  - I believe the future is not AI replacing human creativity, but AI handling the repetitive and technical parts (background music, VFX cleanup, localisation) so human creatives can focus on storytelling and ideas

## 4. Automotive & Mobility

The automotive industry is going through the biggest transformation in its history — the shift from traditional petrol/diesel cars to electric vehicles (EVs), and from human-driven vehicles to varying levels of autonomous (self-driving) vehicles. GenAI is playing a major role in both of these transitions.

I found this industry particularly interesting because the AI applications here range from very visible things (like in-car voice assistants) to very invisible but high-stakes things (like the AI systems that help a car decide whether to brake). The global automotive AI market is expected to reach \$74.5 billion by 2030 (MarketsandMarkets, 2023).

### 4.1 Use Case Overview

Use Case	What GenAI Does	Real-World Impact	Example / Company
Autonomous Driving AI	Processes camera, radar, and LiDAR sensor data in real time to enable vehicles to navigate without human input.	Safety improvement potential significant — 94% of road accidents are caused by human error.	<i>Tesla Autopilot, Waymo, Mobileye</i>
In-Car GenAI Voice Assistants	Natural language AI that understands complex commands like 'find a charging station with coffee nearby and avoid motorways.'	Drivers interact more naturally and safely with vehicle systems without distraction.	<i>Mercedes MBUX, BMW Intelligent PA</i>
AI-Powered Vehicle Design	GenAI creates thousands of design variations of vehicle components optimised for aerodynamics, weight, and strength.	Design cycles shortened from months to weeks; components are lighter and stronger.	<i>General Motors, BMW Group</i>
Predictive Maintenance for Vehicles	Connected cars send diagnostic data to AI systems that predict component failures before they happen.	Breakdowns reduced; service appointments become proactive rather than reactive.	<i>BMW Connected Drive, Ford</i>
AI in Manufacturing Assembly	Computer vision AI checks every vehicle on the assembly line for defects at a level of detail impossible for human inspectors.	Near-zero defect rates; quality consistency across millions of vehicles.	<i>Toyota, Mercedes-Benz, Volkswagen</i>
Personalised Driving Experience	AI learns driver preferences (seat position, music, temperature, route) and applies them automatically.	Passengers experience a more comfortable, seamless journey every time.	<i>Volvo, Audi, Tesla</i>
Synthetic Data for AI Training	GenAI generates millions of simulated driving scenarios (rain, fog, accidents) to train autonomous driving systems.	Training on rare and dangerous scenarios becomes safe and cheap.	<i>Waymo, NVIDIA DRIVE Sim</i>

Use Case	What GenAI Does	Real-World Impact	Example / Company
Fleet Management & Route Optimisation	AI optimises routes, schedules, and maintenance for entire fleets of vehicles (taxis, trucks, delivery vans).	Fuel savings of 10–15%; on-time delivery rates improve; overall fleet costs drop.	Uber, DHL, FedEx

## 4.2 Case Study: Waymo — Teaching a Car to Drive Using Synthetic Data

### Case Study: Waymo and NVIDIA — Using GenAI to Create Millions of Training Miles

**Problem:** To safely train a self-driving car AI, you need the car to 'experience' millions of different driving scenarios — including dangerous ones like vehicles running red lights, pedestrians suddenly crossing, black ice, heavy rain, and near-accidents. But you cannot safely generate these scenarios in the real world. Even if you could, it would take decades and cost billions to drive enough real miles.

**What They Did:** Waymo (Google's self-driving car division) built a system to generate synthetic (AI-created) driving scenarios. Using GenAI and simulation tools from NVIDIA (called NVIDIA DRIVE Sim), they create photorealistic virtual environments where their AI can experience billions of miles of driving — including rare and dangerous situations that would be extremely risky to encounter in reality.

**Result:** Waymo's simulation system now generates the equivalent of millions of virtual miles every day. This allowed Waymo's AI to encounter edge cases (unusual situations) thousands of times in simulation before ever being tested on real roads. Waymo's robotaxis have now completed over 20 million real-world miles with a safety record significantly better than the average human driver.

**What I Learned from This:** The concept of using AI to generate training data for another AI — called synthetic data — is one of the most clever ideas in this entire field. It solves the problem of 'we need data to train AI, but collecting that data in the real world is dangerous or impossible.'

## 4.3 Levels of Vehicle Autonomy — Simple Explanation

One thing I had to understand before researching automotive AI is that 'self-driving' is not a single thing — it exists on a scale from 0 to 5:

Autonomy Level	What It Means in Simple Terms
Level 0 — No Automation	Fully human-driven. No AI assistance. Most older vehicles.
Level 1 — Driver Assistance	AI helps with one thing at a time (e.g., cruise control or lane-keeping). Human still fully in charge.
Level 2 — Partial Automation	AI controls speed AND steering simultaneously, but human must stay alert. Example: Tesla Autopilot.

Autonomy Level	What It Means in Simple Terms
Level 3 — Conditional Automation	Car drives itself in certain conditions; human must be ready to take over. Example: Mercedes Drive Pilot.
Level 4 — High Automation	Car drives itself in specific areas with no human intervention needed. Example: Waymo robotaxis in Phoenix.
Level 5 — Full Automation	Car drives itself anywhere, in any condition, with no human needed at all. This does not yet exist commercially.

### Automotive — My Key Observations

- Autonomous driving is the most complex AI application I studied in all of my research — it needs to process millions of sensor inputs per second and make life-or-death decisions in milliseconds
- Synthetic data generation (using AI to create training data for other AI) was a genuinely new concept for me and one of the cleverest solutions I came across
- In-car voice assistants are already here and I personally experience them — but the gap between current voice assistants and what GenAI can enable is enormous
- 94% of road accidents being caused by human error tells you why the automotive industry is so motivated to invest in autonomous driving AI — even imperfect AI could save millions of lives
- Biggest challenge: the liability question. If a self-driving car is involved in an accident, who is legally responsible — the car owner, the car manufacturer, or the AI company?

## 5. Energy & Utilities

Energy was the industry I knew least about before starting this research, but it ended up being one of the most important sections. The global energy system is going through a massive transition — from fossil fuels to renewable energy sources like solar and wind. This transition creates enormous challenges, and GenAI is becoming one of the key tools for managing them.

Here is why the transition is so hard: renewable energy sources like solar and wind are inconsistent — the sun doesn't always shine and the wind doesn't always blow. Managing an electricity grid that depends partly on unpredictable sources requires incredibly accurate forecasting and real-time optimisation. That is exactly what GenAI is being used for.

The global AI in energy market is projected to reach \$13.8 billion by 2028 (MarketsandMarkets, 2023). This might seem small compared to other industries, but the potential impact on climate change makes it arguably the most important sector for AI deployment.

### 5.1 Use Case Overview

Use Case	What GenAI Does	Real-World Impact	Example / Company
Renewable Energy Forecasting	AI predicts how much solar and wind energy will be generated over the coming hours and days, based on weather forecasts and historical patterns.	Grid operators can plan better; less wasted energy; fewer blackouts.	<i>DeepMind + Google, Siemens Energy</i>
Smart Grid Management	AI balances electricity supply and demand across a power grid in real time, routing power where it is needed most.	More efficient use of available power; reduced energy waste across the entire grid.	<i>GE Vernova, ABB, Schneider Electric</i>
Predictive Maintenance for Energy Infrastructure	Analyses sensor data from power stations, turbines, and pipelines to predict failures before they happen.	Prevents costly and dangerous equipment failures; reduces maintenance costs.	<i>Siemens, BP, Shell</i>
AI-Optimised Energy Consumption	AI analyses building energy usage and automatically adjusts heating, cooling, and lighting for maximum efficiency.	Energy consumption reduced by 10–30% in smart buildings and industrial facilities.	<i>Google DeepMind (Data Centres), Honeywell</i>
Carbon Emissions Monitoring & Reporting	GenAI generates detailed carbon emissions reports from operational data, helping companies track and reduce their environmental impact.	Companies can meet regulatory requirements and identify where to cut emissions.	<i>Microsoft Sustainability Cloud, Persefoni</i>
AI for Oil & Gas Exploration	AI analyses geological data to identify the most promising locations for oil and gas drilling, reducing costly failed explorations.	Exploration success rates improved; costs reduced significantly.	<i>Shell, BP, ExxonMobil</i>

Use Case	What GenAI Does	Real-World Impact	Example / Company
Customer Energy Usage Insights	AI generates personalised monthly reports for utility customers showing their usage patterns and suggesting how to reduce bills.	Customer satisfaction improves; energy usage reduces through informed decisions.	<i>EDF Energy, Octopus Energy</i>
Wildfire Risk Prediction	AI analyses weather, terrain, and vegetation data to predict where wildfires are likely to start — helping utilities cut power proactively.	Prevents utility-caused wildfires; saves lives and property.	<i>PG&amp;E (California), SDG&amp;E</i>

## 5.2 Case Study: DeepMind & Google — AI Cuts Data Centre Energy Use by 40%

### Case Study: Google DeepMind — Teaching AI to Manage Energy in Data Centres

**Problem:** Google's data centres — the massive buildings full of servers that power Google Search, Gmail, YouTube, and all other Google services — consume enormous amounts of electricity, mostly for cooling. Keeping servers from overheating requires huge air conditioning systems running 24/7. This is both expensive and environmentally harmful.

**What They Did:** Google's DeepMind AI team trained a reinforcement learning AI (a type of AI that learns by trial and error) to manage the cooling systems in Google's data centres. The AI controls hundreds of variables simultaneously — temperatures, airflow, cooling tower speeds, humidity — to keep everything cool with the minimum possible energy.

**Result:** DeepMind's AI reduced the energy used for cooling by approximately 40%. For context, Google's data centres use as much electricity as a small city. A 40% reduction in cooling energy is a massive saving — both financially (hundreds of millions of dollars annually) and environmentally (significant reduction in carbon emissions). Google later made this technology available through a product called Google Cloud Carbon Intelligence.

**What I Learned from This:** This is my favourite case study in all of Part 02. The idea that AI can manage thousands of variables simultaneously — something no human operator could ever do — and find solutions that are 40% more efficient than the previous best human-designed system is extraordinary. It also showed me that AI's benefits are not just commercial: they can have a direct positive impact on climate change.

## 5.3 How GenAI Is Helping the Climate Transition

One thing that struck me while researching energy is that GenAI could actually play a meaningful role in addressing climate change. Here is how:

Climate Challenge	How GenAI Is Helping Address It
Unpredictable renewable energy	AI forecasts solar/wind output accurately, making it possible to rely on renewables more heavily

Climate Challenge	How GenAI Is Helping Address It
Grid instability from EVs	As more people charge electric cars at home, AI manages grid demand to prevent overloads
Energy waste in buildings	AI optimises heating, cooling, and lighting — reducing building energy use by 10-30%
Carbon tracking and reporting	AI automatically generates accurate carbon footprint reports, making accountability easier
Finding clean energy locations	AI analyses satellite and geographic data to find the best locations for solar farms and wind turbines

### Energy & Utilities — My Key Observations

- DeepMind's 40% energy reduction in Google's data centres is the most impressive single achievement I found in Part 02 — and it has direct climate benefits
- Renewable energy forecasting seems like a small technical detail, but I now understand it is actually critical — without accurate forecasting, grid operators cannot safely rely on solar and wind
- Wildfire prediction is a use case I had never heard of before — the fact that a California utility can use AI to predict where wildfires might start and cut power proactively to prevent them is remarkable
- The energy industry is slower to adopt technology than most industries because of the safety requirements and regulation involved — a mistake in a power grid can affect millions of people
- I believe energy and climate is the most important domain for AI in the long run — the technology might be less glamorous than chatbots or self-driving cars, but the impact could be the most significant

## 6. Patterns I Noticed Across All 5 Industries

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After completing research on all five industries in Part 02, I started to see some recurring themes — just like I did in Part 01. These patterns help me understand what GenAI is fundamentally good at, regardless of the specific industry.

### 6.1 Pattern: Every Industry Has a 'Data Mountain' Problem

In every single industry I studied for Part 02, the core challenge is the same: there is too much data for any human or team of humans to process in real time. Telecom networks generate billions of log events per day. Streaming services track every second of every user's viewing history. Cars generate terabytes of sensor data per hour. Power grids process thousands of readings per second from millions of sensors.

GenAI is fundamentally a 'data mountain' solution — it can process and find meaning in quantities of data that are simply impossible for humans to handle. This is why AI is valuable in all of these industries.

### 6.2 Pattern: Personalisation Is the Goal Everywhere

In Part 01, I noticed personalisation as a theme in retail and healthcare. In Part 02, it appears in every industry again: personalised learning paths in Edtech, personalised content recommendations in Media, personalised driving experiences in Automotive, personalised energy usage reports in Energy, personalised plan recommendations in Telecom. The desire to give each individual a tailored experience — rather than a one-size-fits-all service — seems to be a universal goal that GenAI enables.

### 6.3 Pattern: Prediction Before Action

Across all five industries, one of the highest-value uses of AI is predicting what will happen before it happens: predicting network faults (Telecom), predicting student failure (Edtech), predicting vehicle breakdowns (Automotive), predicting renewable energy output (Energy), predicting which content a user will enjoy (Media). This shift from reacting to problems to preventing them is a theme I now see clearly across all ten industries I have studied in Parts 01 and 02.

### 6.4 Pattern: AI As a Safety Tool

This pattern was new in Part 02: in Automotive (preventing accidents), Energy (preventing wildfires and equipment failures), and Telecom (detecting fraud before it happens), GenAI is being used as a safety system. This is different from just improving efficiency or revenue — it is actively preventing harm. I think this is one of the most important and underappreciated uses of AI.

### 6.5 Comparing All 10 Industries — Summary Table

Looking at both Part 01 and Part 02 together, here is how I would summarise the primary GenAI value driver in each industry:

Industry	Primary GenAI Value Driver
Healthcare (Part 01)	Reducing administrative burden on medical professionals; accelerating drug discovery
Banking (Part 01)	Fraud prevention; compliance automation; personalized financial services
Manufacturing (Part 01)	Predictive maintenance; quality inspection; digital twins for testing
Retail (Part 01)	Personalization and recommendations; demand forecasting; visual search
IT & Software (Part 01)	Developer productivity; code quality; infrastructure automation
Telecommunications (Part 02)	Network reliability; customer service automation; fraud detection
Edtech (Part 02)	Personalised learning at scale; automated grading; 24/7 student support
Media & Entertainment (Part 02)	Content personalisation; production cost reduction; global localisation
Automotive & Mobility (Part 02)	Autonomous driving; safety improvement; synthetic training data
Energy & Utilities (Part 02)	Grid management; renewable integration; climate impact reduction

## 7. Unique Challenges I Found in Part 02 Industries

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In Part 01, I identified five general challenges (data quality, hallucination, explainability, legacy integration, talent gap). In Part 02, I want to go deeper on challenges that are specific to these new industries:

### 7.1 Safety and Liability in Automotive

Autonomous driving AI makes decisions that can injure or kill people. This creates legal and ethical challenges that do not exist in most other AI applications. If a Waymo robotaxi is involved in a fatal accident, who is legally responsible? The passenger? Waymo as the company? The AI system? The sensor manufacturer? These questions are still being worked out in courts and legislatures around the world, and they are slowing down the deployment of higher levels of autonomy.

### 7.2 Academic Integrity in Edtech

The availability of powerful AI writing and problem-solving tools has created a genuine crisis in educational assessment. How do you know if a student wrote their own essay or asked ChatGPT to write it? How do you know if they solved a maths problem themselves or used an AI solver? AI detection tools exist (like Turnitin's AI detector) but they are not perfect and sometimes flag genuine student work as AI-written. This is a challenge with no easy solution.

### 7.3 Deepfakes and Misinformation in Media

The ability to create convincing fake videos, audio, and images using GenAI is one of the most dangerous capabilities that has been developed. In the 2024 election cycles in multiple countries, AI-generated fake audio recordings of politicians saying things they never said began circulating on social media. Detecting and combating this misinformation is a race between AI systems that create fakes and AI systems that detect them.

### 7.4 Grid Security in Energy

As power grids become more connected to AI and the internet (to enable smart grid management), they also become more vulnerable to cyber attacks. A successful attack on a smart grid AI system could potentially cause widespread power outages across a city or region. The more intelligent and connected our energy systems become, the more important cybersecurity becomes — and this is an underappreciated challenge in the energy industry.

### 7.5 Customer Trust in Telecom

Telecom companies collect more personal data about their customers than almost any other industry — they know where you go, who you call, what apps you use, and when you sleep. Using this data to train AI models is technically very powerful, but it requires a level of customer trust that is not always present. A single privacy scandal (like an operator selling location data without consent) can destroy years of trust-building.



## 8. Conclusion and Personal Reflections

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Completing Part 02 of this GenAI research has significantly deepened my understanding of how broadly generative AI is being applied across very different types of industries. Going from Healthcare and Banking in Part 01 to Telecom, Edtech, Media, Automotive, and Energy in Part 02 has shown me that there is really no major industry that GenAI is not touching.

If I had to pick the single most important insight from Part 02, it would be this: GenAI is most valuable when the problem involves enormous amounts of data, real-time decision-making, and a need for personalisation — because those are the three things that humans are genuinely bad at doing at scale, and that AI is genuinely good at.

### 8.1 My Top Learnings from Part 02

1. The DeepMind energy story is the most impactful case study I found — a 40% reduction in cooling energy for data centres is not just a business win, it is a real contribution to reducing carbon emissions. It made me realise that AI and sustainability can work together.
2. The Edtech section changed how I think about education. Before this research, I saw AI tutors as a gimmick. After reading about Khanmigo, I now see them as a genuine opportunity to give quality education to students who currently do not have access to it.
3. The Media & Entertainment ethics debate is genuinely unresolved, and I think it is the most important ethical question in AI right now. When AI can create art, music, and writing, we need to seriously ask what we value about human creativity and how we protect it.
4. Autonomous vehicles taught me what 'high-stakes AI' really means. In most industries, if AI makes a mistake, the consequences are financial or inconvenient. In self-driving cars, a mistake can kill someone. This completely changes the standards that AI needs to meet.
5. Looking across all 10 industries (Parts 01 and 02 combined), I see a consistent pattern: the industries adopting AI fastest are the ones with the largest data volumes, the most repetitive cognitive tasks, and the most competitive pressure. That logic will continue to drive AI adoption.

### 8.2 What I Want to Explore Next

- How AI models are actually evaluated and tested for quality before they are deployed in high-stakes settings
- The technical architecture of recommendation systems — I want to understand how Netflix's AI actually works at a code level
- RAG (Retrieval-Augmented Generation) and how it solves the hallucination problem — this seems very relevant to education and healthcare AI
- How companies are building responsible AI governance frameworks — especially for regulated industries like automotive and energy

#### Final Summary — Part 02 at a Glance

- 5 industries covered: Telecom, Edtech, Media & Entertainment, Automotive & Mobility, Energy & Utilities
- 40+ use cases documented across all five sectors
- 5 detailed case studies: Vodafone TOBi, Khan Academy Khanmigo, Netflix Recommendations, Waymo Synthetic Data, DeepMind Energy AI

- Common patterns identified: Data Mountain Problem, Personalisation, Prediction Before Action, AI as Safety Tool
  - Unique challenges identified per industry — not just general AI challenges but sector-specific ones
  - Best case study: DeepMind's 40% energy reduction — GenAI solving a real climate problem
  - Most interesting new concept: Synthetic data generation — AI creating training data for other AI
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## Appendix A: New Terms I Learned in Part 02

Here are the important technical terms and concepts I came across in Part 02 that I had not covered in Part 01:

Term	Simple Definition
Synthetic Data	Artificially generated data that mimics real data. Used to train AI when real data is scarce, expensive, or dangerous to collect (e.g., crash scenarios for self-driving cars).
Reinforcement Learning	A type of AI training where the model learns by trial and error, receiving rewards for correct actions and penalties for wrong ones. Used in DeepMind's energy management AI.
LiDAR	Light Detection and Ranging — a sensor technology used in self-driving cars that uses laser pulses to create 3D maps of the surroundings.
Churn	In business, churn refers to customers leaving a service. A major concern for telecom and streaming companies; AI is used to predict and prevent it.
Deepfake	AI-generated synthetic media (video, audio, or images) of real people saying or doing things they never actually did.
Adaptive Learning	An educational approach where the difficulty and style of content automatically adjusts based on how a student is performing in real time.
Smart Grid	An electricity distribution network upgraded with digital communication and AI capabilities to better manage supply and demand.
Edge AI	AI processing that happens on the device itself (like inside a car) rather than sending data to a cloud server. Critical for real-time autonomous driving decisions.
Sentiment Analysis	AI that reads text or audio and determines whether the emotion or opinion expressed is positive, negative, or neutral. Used in telecom customer service.
V2X (Vehicle-to-Everything)	Communication technology that allows vehicles to communicate with other vehicles, traffic lights, and road infrastructure — enabling safer autonomous driving.

Term	Simple Definition
Load Balancing (Energy)	The process of distributing electricity demand across a grid to prevent overloads. AI automates this in real time across smart grids.
Digital Pedagogy	The practice of applying technology thoughtfully to improve education — not just using tech for its own sake, but using it to genuinely improve how students learn.

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