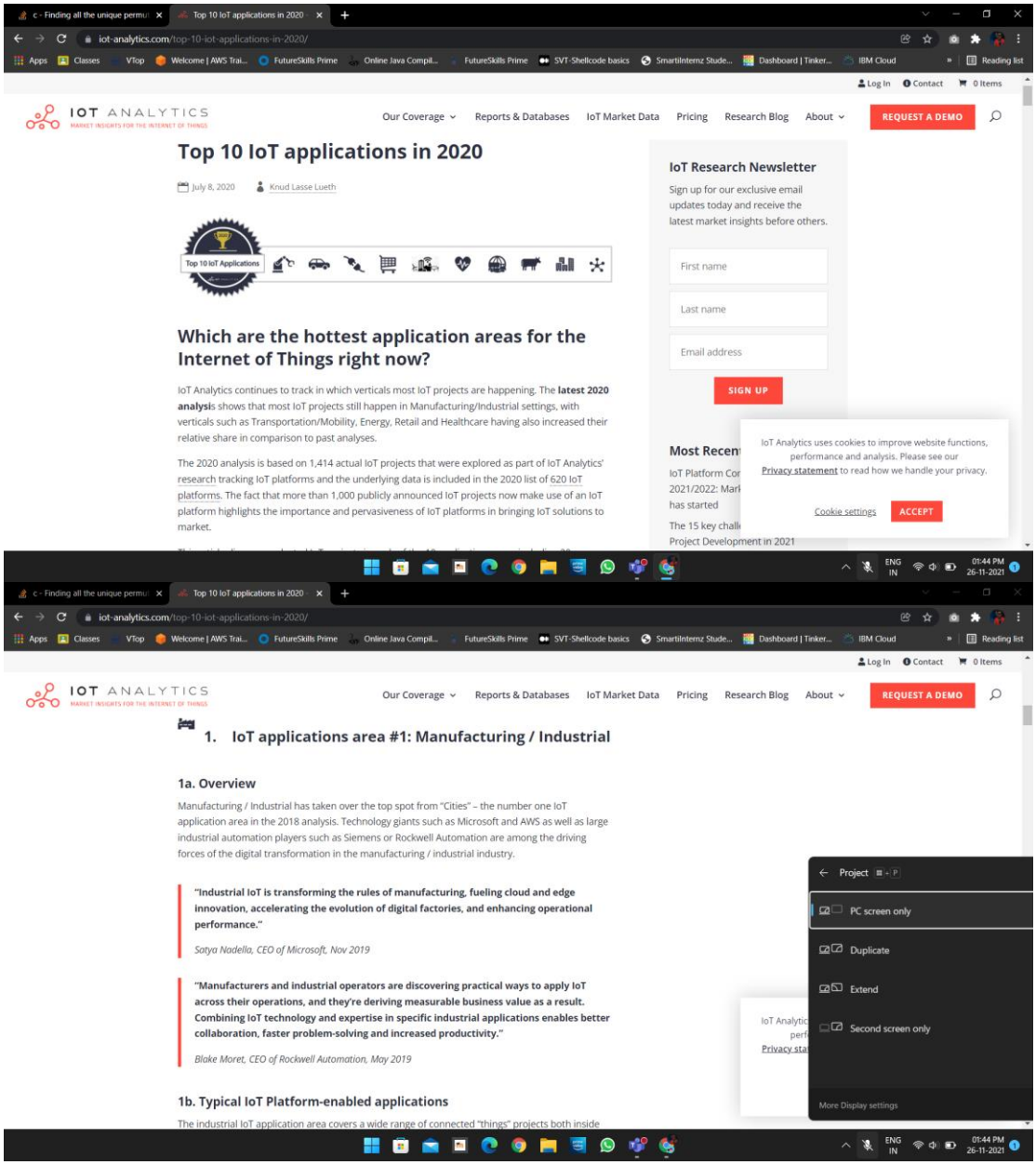
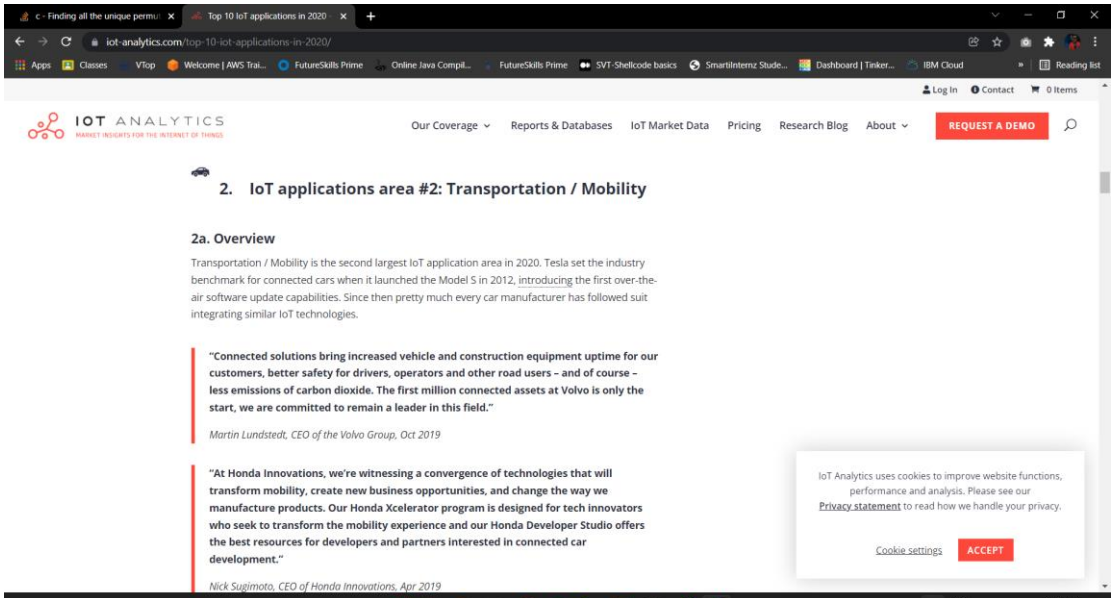
IoT Introduction and Its Applications

Rishabh Maheshwari
19BCY10145

Project Output

1. Industrial IoT Applications

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2. IoT applications area #2: Transportation / Mobility
2a. Overview
Transportation / Mobility is the second largest IoT application area in 2020. Tesla set the industry benchmark for connected cars when it launched the Model S in 2012, introducing the first over-the-air software update capabilities. Since then pretty much every car manufacturer has followed suit integrating similar IoT technologies.
"Connected solutions bring increased vehicle and construction equipment uptime for our customers, better safety for drivers, operators and other road users – and of course – less emissions of carbon dioxide. The first million connected assets at Volvo is only the start, we are committed to remain a leader in this field."
Martin Lundstedt, CEO of the Volvo Group, Oct 2019
"At Honda Innovations, we're witnessing a convergence of technologies that will transform mobility, create new business opportunities, and change the way we manufacture products. Our Honda Xcelerator program is designed for tech innovators who seek to transform the mobility experience and our Honda Developer Studio offers the best resources for developers and partners interested in connected car development."
Nick Sugimoto, CEO of Honda Innovations, Apr 2019
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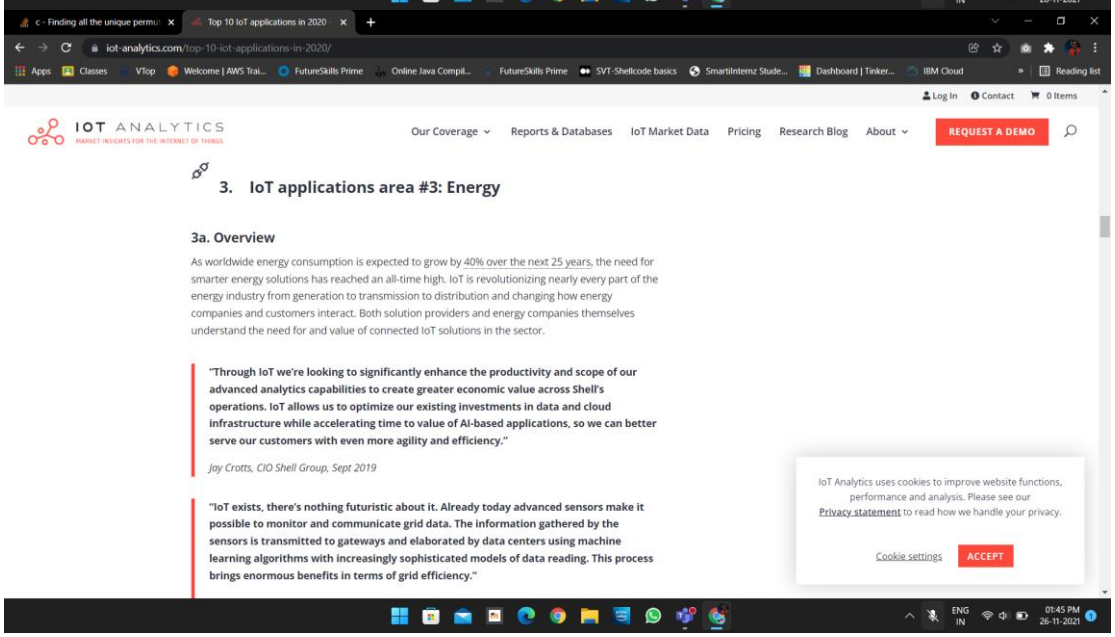
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3. IoT applications area #3: Energy
3a. Overview
As worldwide energy consumption is expected to grow by 40% over the next 25 years, the need for smarter energy solutions has reached an all-time high. IoT is revolutionizing nearly every part of the energy industry from generation to transmission to distribution and changing how energy companies and customers interact. Both solution providers and energy companies themselves understand the need for and value of connected IoT solutions in the sector.
"Through IoT we're looking to significantly enhance the productivity and scope of our advanced analytics capabilities to create greater economic value across Shell's operations. IoT allows us to optimize our existing investments in data and cloud infrastructure while accelerating time to value of AI-based applications, so we can better serve our customers with even more agility and efficiency."
Jay Crotts, CIO Shell Group, Sept 2019
"IoT exists, there's nothing futuristic about it. Already today advanced sensors make it possible to monitor and communicate grid data. The information gathered by the sensors is transmitted to gateways and elaborated by data centers using machine learning algorithms with increasingly sophisticated models of data reading. This process brings enormous benefits in terms of grid efficiency."
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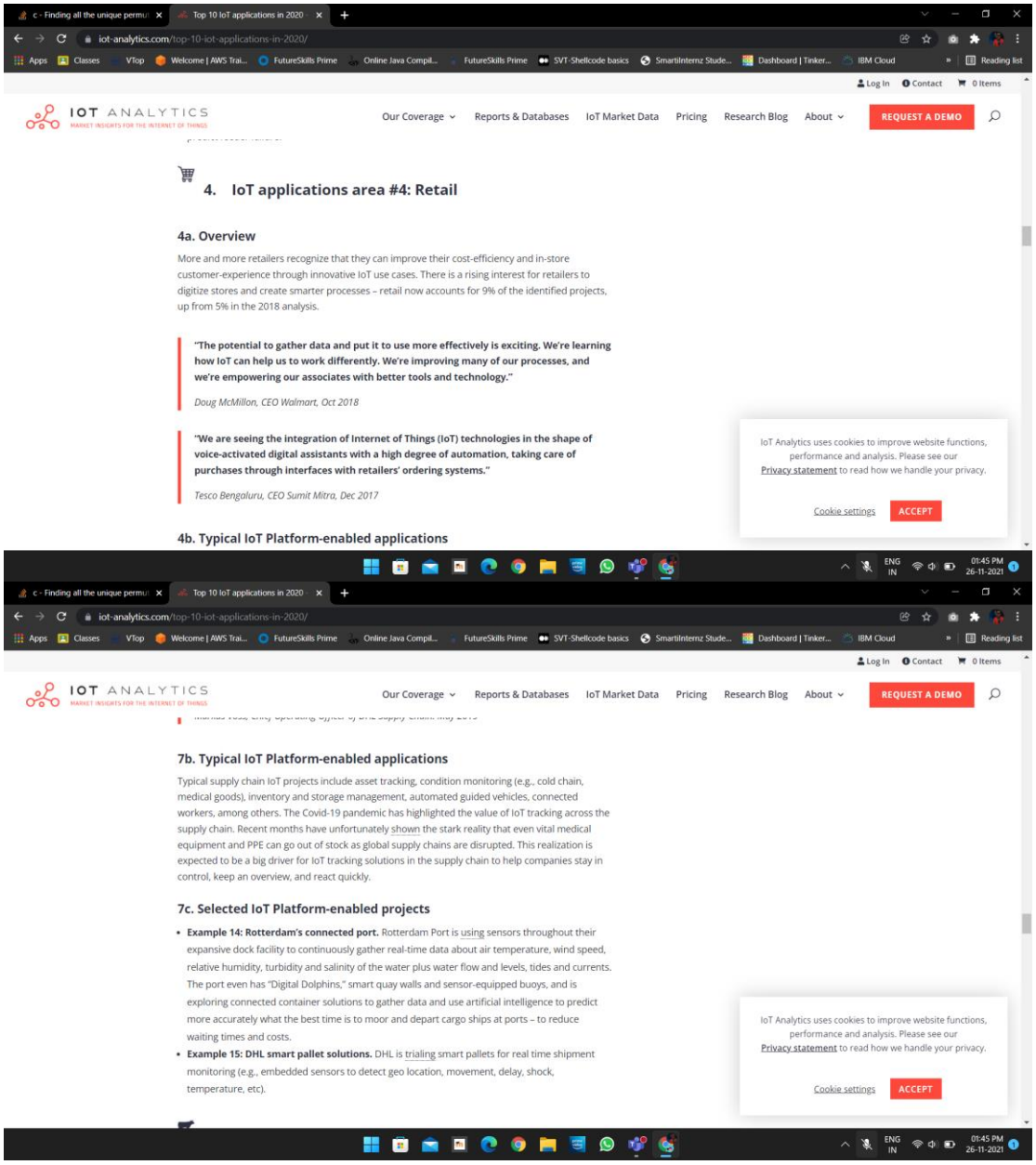
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4. IoT applications area #4: Retail
4a. Overview
More and more retailers recognize that they can improve their cost-efficiency and in-store customer-experience through innovative IoT use cases. There is a rising interest for retailers to digitize stores and create smarter processes – retail now accounts for 9% of the identified projects, up from 5% in the 2018 analysis.
"The potential to gather data and put it to use more effectively is exciting. We're learning how IoT can help us to work differently. We're improving many of our processes, and we're empowering our associates with better tools and technology."
Doug McMillon, CEO Walmart, Oct 2018
"We are seeing the integration of Internet of Things (IoT) technologies in the shape of voice-activated digital assistants with a high degree of automation, taking care of purchases through interfaces with retailers' ordering systems."
Tesco Bengaluru, CEO Sumit Mitra, Dec 2017
4b. Typical IoT Platform-enabled applications
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7b. Typical IoT Platform-enabled applications
Typical supply chain IoT projects include asset tracking, condition monitoring (e.g., cold chain, medical goods), inventory and storage management, automated guided vehicles, connected workers, among others. The Covid-19 pandemic has highlighted the value of IoT tracking across the supply chain. Recent months have unfortunately shown the stark reality that even vital medical equipment and PPE can go out of stock as global supply chains are disrupted. This realization is expected to be a big driver for IoT tracking solutions in the supply chain to help companies stay in control, keep an overview, and react quickly.
7c. Selected IoT Platform-enabled projects
Example 14: Rotterdam's connected port. Rotterdam Port is using sensors throughout their expansive dock facility to continuously gather real-time data about air temperature, wind speed, relative humidity, turbidity and salinity of the water plus water flow and levels, tides and currents. The port even has "Digital Dolphins," smart quay walls and sensor-equipped buoys, and is exploring connected container solutions to gather data and use artificial intelligence to predict more accurately what the best time is to moor and depart cargo ships at ports – to reduce waiting times and costs.
Example 15: DHL smart pallet solutions. DHL is trialing smart pallets for real time shipment monitoring (e.g., embedded sensors to detect geo location, movement, delay, shock, temperature, etc).
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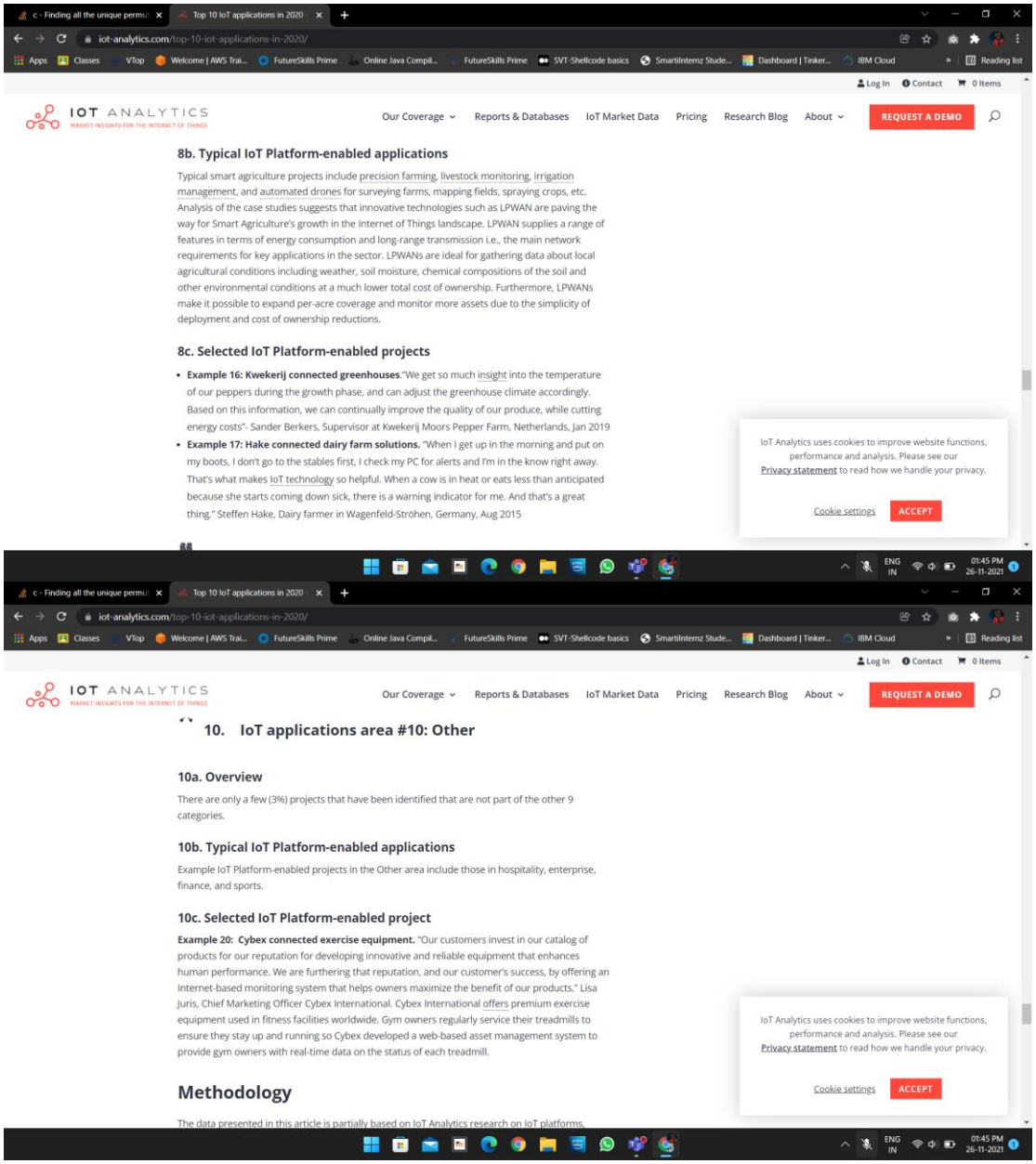
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8b. Typical IoT Platform-enabled applications
Typical smart agriculture projects include precision farming, livestock monitoring, irrigation management, and automated drones for surveying farms, mapping fields, spraying crops, etc. Analysis of the case studies suggests that innovative technologies such as LPWAN are paving the way for Smart Agriculture's growth in the Internet of Things landscape. LPWAN supplies a range of features in terms of energy consumption and long-range transmission i.e., the main network requirements for key applications in the sector. LPWANs are ideal for gathering data about local agricultural conditions including weather, soil moisture, chemical compositions of the soil and other environmental conditions at a much lower total cost of ownership. Furthermore, LPWANs make it possible to expand per-acre coverage and monitor more assets due to the simplicity of deployment and cost of ownership reductions.
8c. Selected IoT Platform-enabled projects
Example 16: Kwekerij connected greenhouses."We get so much insight into the temperature of our peppers during the growth phase, and can adjust the greenhouse climate accordingly. Based on this information, we can continually improve the quality of our produce, while cutting energy costs"- Sander Berkers, Supervisor at Kwekerij Moors Pepper Farm, Netherlands, Jan 2019
Example 17: Hake connected dairy farm solutions. "When I get up in the morning and put on my boots, I don't go to the stables first, I check my PC for alerts and I'm in the know right away. That's what makes IoT technology so helpful. When a cow is in heat or eats less than anticipated because she starts coming down sick, there is a warning indicator for me. And that's a great thing." Steffen Hake, Dairy farmer in Wagenfeld-Ströhen, Germany, Aug 2015
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10. IoT applications area #10: Other
10a. Overview
There are only a few (3%) projects that have been identified that are not part of the other 9 categories.
10b. Typical IoT Platform-enabled applications
Example IoT Platform-enabled projects in the Other area include those in hospitality, enterprise, finance, and sports.
10c. Selected IoT Platform-enabled project
Example 20: Cybex connected exercise equipment. "Our customers invest in our catalog of products for our reputation for developing innovative and reliable equipment that enhances human performance. We are furthering that reputation, and our customer's success, by offering an Internet-based monitoring system that helps owners maximize the benefit of our products." Lisa Juris, Chief Marketing Officer Cybex International. Cybex International offers premium exercise equipment used in fitness facilities worldwide. Gym owners regularly service their treadmills to ensure they stay up and running so Cybex developed a web-based asset management system to provide gym owners with real-time data on the status of each treadmill.
Methodology
The data presented in this article is partially based on IoT Analytics research on IoT platforms.
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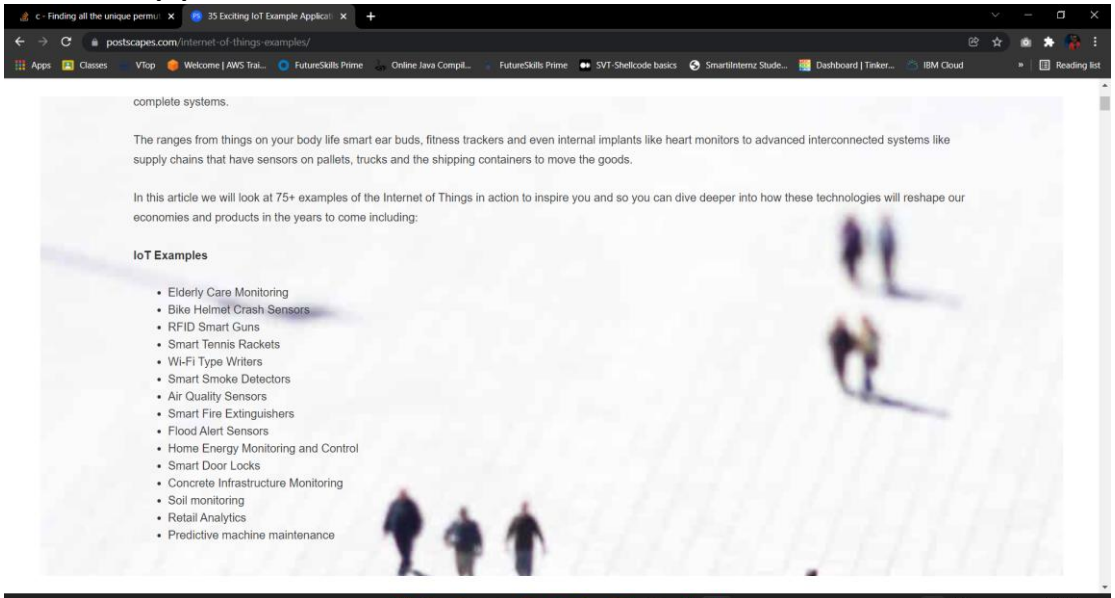
2. IoT Applications



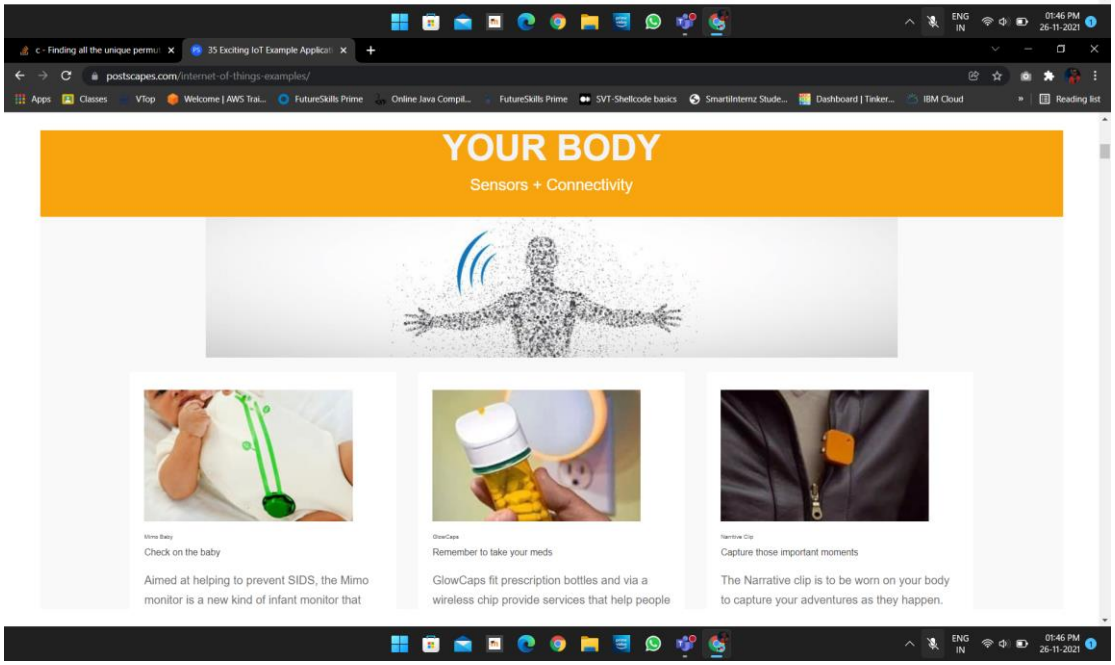
complete systems.

The ranges from things on your body life smart ear buds, fitness trackers and even internal implants like heart monitors to advanced interconnected systems like supply chains that have sensors on pallets, trucks and the shipping containers to move the goods.

In this article we will look at 75+ examples of the Internet of Things in action to inspire you and so you can dive deeper into how these technologies will reshape our economies and products in the years to come including:

IoT Examples

- Elderly Care Monitoring
- Bike Helmet Crash Sensors
- RFID Smart Guns
- Smart Tennis Rackets
- Wi-Fi Type Writers
- Smart Smoke Detectors
- Air Quality Sensors
- Smart Fire Extinguishers
- Flood Alert Sensors
- Home Energy Monitoring and Control
- Smart Door Locks
- Concrete Infrastructure Monitoring
- Soil monitoring
- Retail Analytics
- Predictive machine maintenance



YOUR BODY

Sensors + Connectivity

Check on the baby

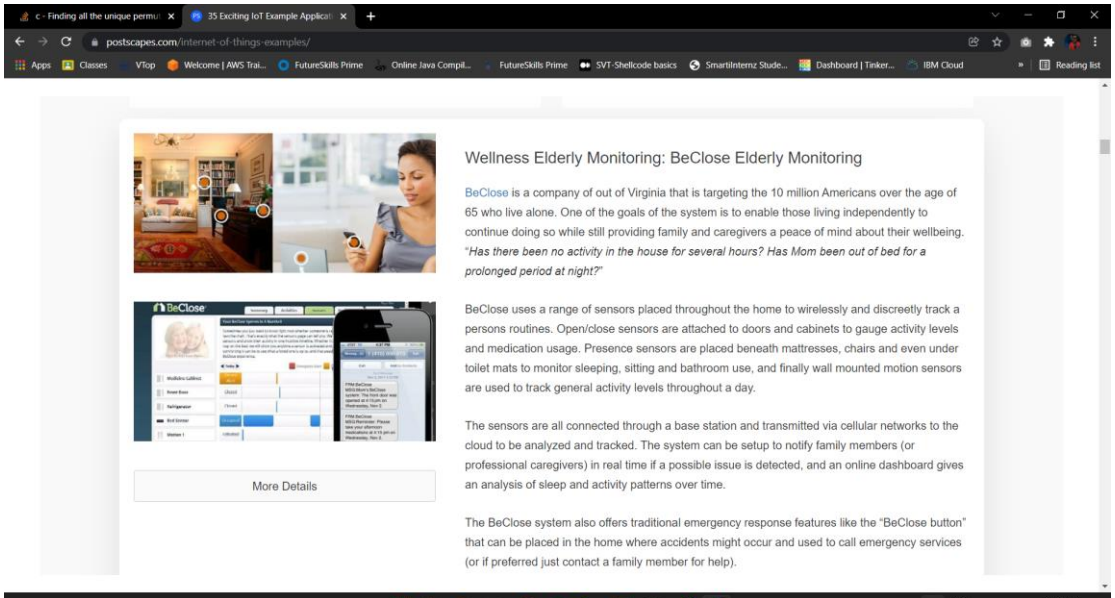
Aimed at helping to prevent SIDS, the Mimo monitor is a new kind of infant monitor that

Remember to take your meds

GlowCaps fit prescription bottles and via a wireless chip provide services that help people

Capture those important moments

The Narrative clip is to be worn on your body to capture your adventures as they happen.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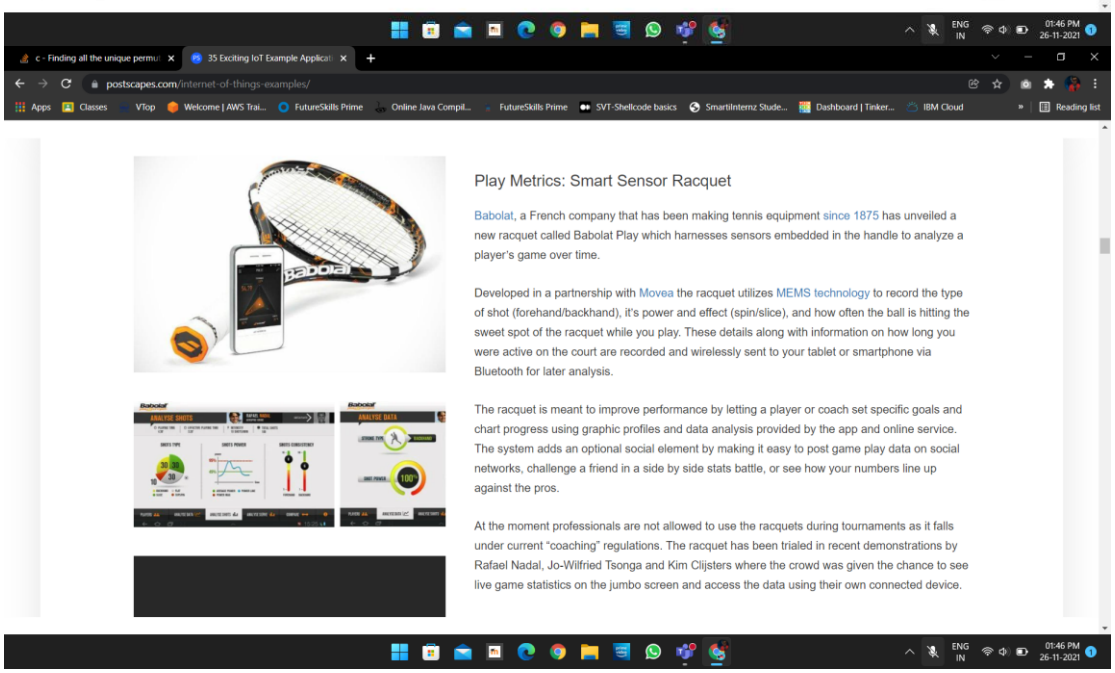
BeClose
More Details
Wellness Elderly Monitoring: BeClose Elderly Monitoring
BeClose is a company of out of Virginia that is targeting the 10 million Americans over the age of 65 who live alone. One of the goals of the system is to enable those living independently to continue doing so while still providing family and caregivers a peace of mind about their wellbeing. "Has there been no activity in the house for several hours? Has Mom been out of bed for a prolonged period at night?"
BeClose uses a range of sensors placed throughout the home to wirelessly and discreetly track a persons routines. Open/close sensors are attached to doors and cabinets to gauge activity levels and medication usage. Presence sensors are placed beneath mattresses, chairs and even under toilet mats to monitor sleeping, sitting and bathroom use, and finally wall mounted motion sensors are used to track general activity levels throughout a day.
The sensors are all connected through a base station and transmitted via cellular networks to the cloud to be analyzed and tracked. The system can be setup to notify family members (or professional caregivers) in real time if a possible issue is detected, and an online dashboard gives an analysis of sleep and activity patterns over time.
The BeClose system also offers traditional emergency response features like the "BeClose button" that can be placed in the home where accidents might occur and used to call emergency services (or if preferred just contact a family member for help).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Babolat
ANALYSE SHOTS
ANALYSE DATA
Play Metrics: Smart Sensor Racquet
Babolat, a French company that has been making tennis equipment since 1875 has unveiled a new racquet called Babolat Play which harnesses sensors embedded in the handle to analyze a player's game over time.
Developed in a partnership with Movea the racquet utilizes MEMS technology to record the type of shot (forehand/backhand), it's power and effect (spin/slice), and how often the ball is hitting the sweet spot of the racquet while you play. These details along with information on how long you were active on the court are recorded and wirelessly sent to your tablet or smartphone via Bluetooth for later analysis.
The racquet is meant to improve performance by letting a player or coach set specific goals and chart progress using graphic profiles and data analysis provided by the app and online service. The system adds an optional social element by making it easy to post game play data on social networks, challenge a friend in a side by side stats battle, or see how your numbers line up against the pros.
At the moment professionals are not allowed to use the racquets during tournaments as it falls under current "coaching" regulations. The racquet has been trialed in recent demonstrations by Rafael Nadal, Jo-Wilfried Tsonga and Kim Clijsters where the crowd was given the chance to see live game statistics on the jumbo screen and access the data using their own connected device.
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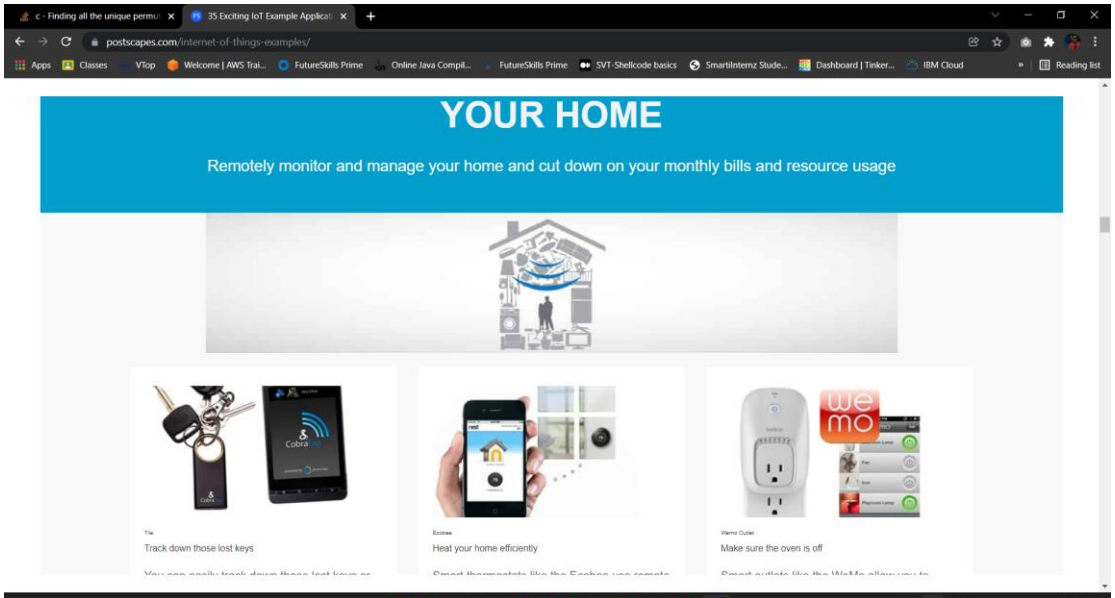
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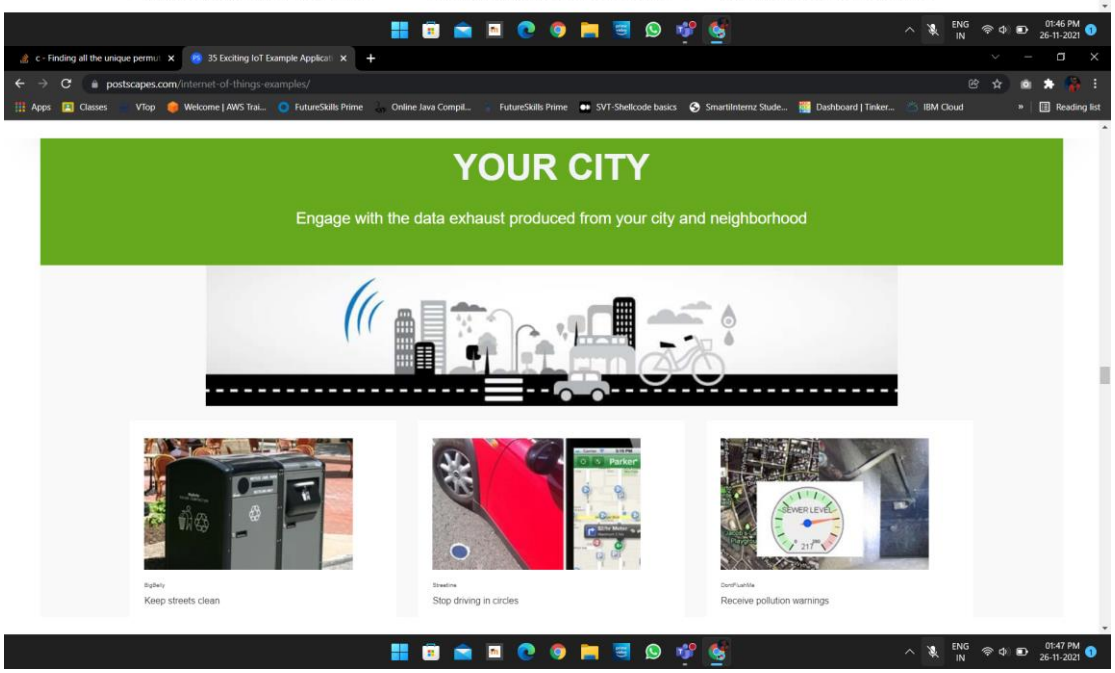
YOUR HOME
Remotely monitor and manage your home and cut down on your monthly bills and resource usage
Track down those lost keys
Heat your home efficiently
Make sure the oven is off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Keep streets clean
Stop driving in circles
Receive pollution warnings
SEWER LEVEL
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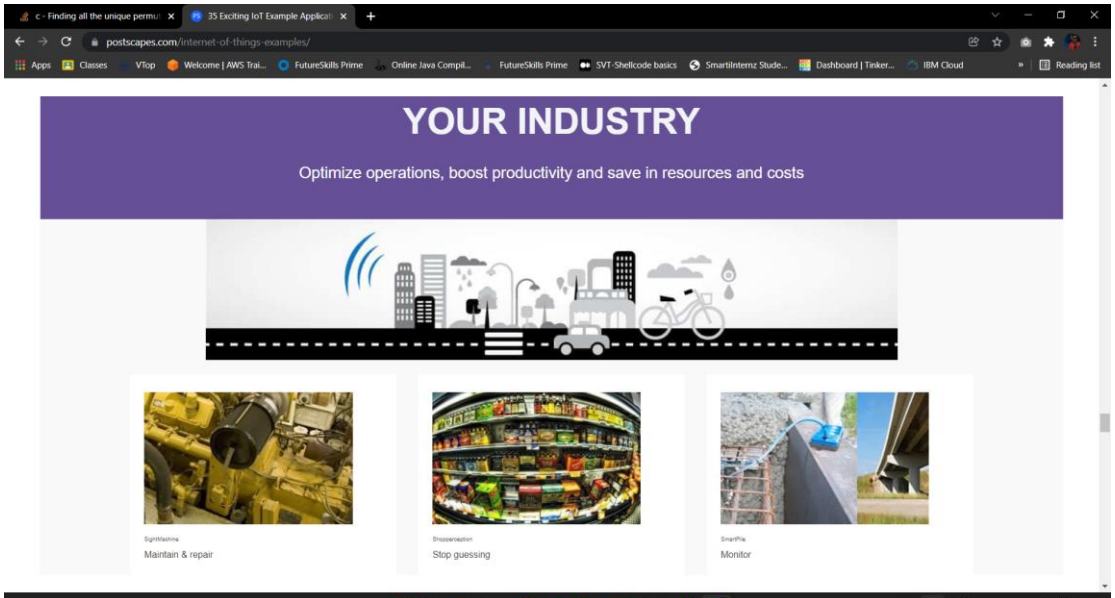
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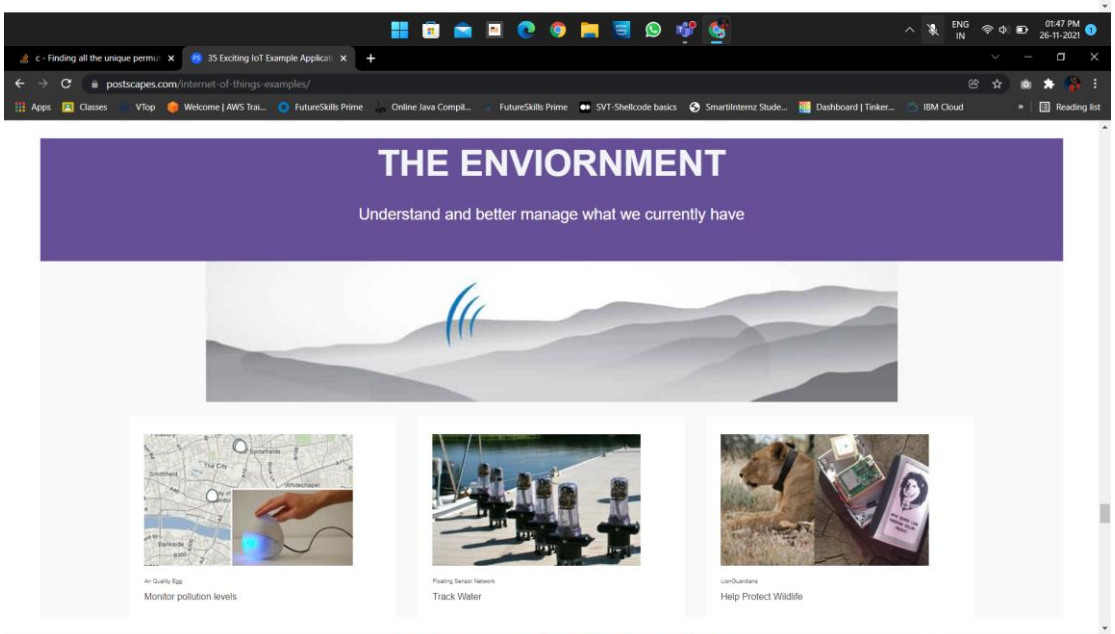
SightMachine
Maintain & repair
Shoppersvision
Stop guessing
SmartPole
Monitor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Understand and better manage what we currently have
Air Quality Egg
Monitor pollution levels
Floating Sensor Network
Track Water
LionGuardians
Help Protect Wildlife
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