# Proposal for New Wearable IoT Product

Created by Jacob Virgilio

12/13/2024

## Big Data Tools

Discuss why big data-specific tools are necessary for big data analytics.

* Give examples of 2–3 tools that might be used in analyzing big data and why they are necessary.

| Tool | Strengths | Weaknesses | Best Used |
| --- | --- | --- | --- |
| Hive | * Scalability * Cost-efficient * Flexible integration | * High Latency * Software learning curve * Large data usage | * Software is best used in institutions that do not need instant feedback: data warehousing, some financial services. |
| Spark | * Developer friendly * Low latency * Active community | * Resource Intensive * Some Compatibility issues * Scalability | * Best used in services that have access to better systems: Telecom, some retail, streaming. |
| Flink | * Stream and batch processing * Real time data processing * Easy integration | * Limited storage * Less streaming services supported * Requires significant configuration | * Best used in services regarding application development: aircraft, game development. |
| Pentaho | * Usability * Reporting tools * Scalability | * Limited data extraction * Poor performance * Less community support. | * Best used in business intelligence related institutions. |

* Explain how big data tools work together with common data handling tools.

Big data tools work in conjunction with other types of data handling tools. These programs, such as Hive, Spark, Flink, and Pentaho, intake large amounts of data from multiple different complex datasets. These then clean and transform the data into more specialised formats, and present them as readable graphs and conclusions similar to smaller, more usable data. The two types of data handling tools work together to create data that is much more usable.

## Relational vs. Non-relational Databases

* Explain how the diversity of IoT data can influence your choices for tools.

IoT data can stem from and generate a large amount of data types including but not limited to: sensor readings, text, geolocation data, video and audio. These data sets can consist of both structured and unstructured data, which requires the capability to process and read both of these types of data. The overall volume of data can also affect the choices of tools, since some tool sets are better suited for larger or smaller amounts of data. When working with data sets, finding a good balance between structured and unstructured, and larger and smaller sets depends on the best tool for the job.

## Effects of IoT

* Describe a scenario in which IoT improves the consumer’s experience.

There are many different examples of IoT improving a customer experience. An example of this is a grocery algorithm predicting and preparing a list for a consumer based on their previous purchases. This potentially saves the consumer time, and helps improve the overall efficiency of their day. Another example of this is a home thermostat automatically adjusting the temperature in the house based on the user’s schedule.

* Describe a scenario in which IoT can improve an organization's ability to use information to benefit their customers.

A scenario where IoT can improve an organization's ability to use information can include foot traffic sensors in retail stores, telling the organization what products a customer is more likely to look at or purchase based on the time of day, month, or weather. These data metrics can help the company better organise and predict the needs of the customer in real time.

## Machine Learning and AI

* Explain how machine learning will improve the utility of the consumer devices.

Machine learning and AI will help improve consumer devices by providing them with a level of personalization and optimization not possible without some form of automated pattern recognition. AI and machine learning will be able to predict a user’s needs based on their previous usage, and address potential issues based on the users previous experiences. An AI algorithm will also be able to use predictive recommendation based on the individual user.

* Explain how AI expands the capabilities of the consumer devices.

AI expands the capabilities of consumer devices by providing an extra layer of personalization and automation. In the example of a grocery list, an AI will be able to predict what an individual needs for a certain week or provide other recommendations similar to what the user prefers. This improves the effectiveness and overall usage of the consumer device.

## Impacts of AI

* Discuss the security considerations of collecting data for use with AI.

Security needs to be paramount in any industry that uses AI. With the addition of AI, other security risks can also be introduced. If an AI is collecting too much data, it puts that data at risk of breaches. An AI should be limited on how much data it can collect overall, while only collecting needed data for its application. This limits the scale of the breaches if they were to happen. Additionally, protections must be put in place for servers and data centers holding secure data.

* Discuss anonymization of data and how and when it might be appropriate.

Data anonymization is the act of removing or reducing identifying information on an individual or group. The overall idea of this strategy is making it as hard as possible for someone to trace a certain string of data back to anyone specific. This is appropriate or effective when publishing public studies or if the data is shown to anyone other than a trusted source. Depending on the specific information, the data anonymization needs to be stronger. An example of this is confidential information, which is from the healthcare industry, that needs to be completely anonymous.

## AI and Business Strategies

* Explain how AI could be used to facilitate interaction with your consumers.

In its most widely used form, AI can be used to facilitate a primary form of technical help or customer assistance. If an extremely common problem exists in an industry, AI can be used to communicate that problem to the consumer. This helps reduce the overall workload of assistance workers, and helps reduce overall wait times for the customer. In a completely different vein, AI can also communicate with the customer by providing recommendations or similar products to things they have already purchased. This helps the customer potentially try new things, and helps the organization sell a wider range of product.

## References

“What Is AI Data Security? Examples & Best Practices.” SentinelOne, 16 Oct. 2024, [www.sentinelone.com/cybersecurity-101/data-and-ai/ai-data-security/](http://www.sentinelone.com/cybersecurity-101/data-and-ai/ai-data-security/).

Takyar, Akash. “AI in Consumer Electronics: Use Cases, Technologies, Benefits and Implementation.” *LeewayHertz - AI Development Company*, 7 May 2024, www.leewayhertz.com/ai-in-consumer-electronics/.

Siegel, Eric. “How Machine Learning Can Improve the Customer Experience.” *Harvard Business Review*, 24 Mar. 2023, hbr.org/2023/03/how-machine-learning-can-improve-the-customer-experience.

Clothier, Martin. “Using IoT in Retail to Improve Customer Experience.” *Www.columbusglobal.com*, 20 Dec. 2022, www.columbusglobal.com/en-gb/blog/using-iot-in-retail-to-improve-customer-experience.

Anand, Ashesh. “How Can You Improve Customer’s Experience Using IoT? | Analytics Steps.” *Www.analyticssteps.com*, www.analyticssteps.com/blogs/how-can-you-improve-customers-experience-using-iot.

Jaby. “10 Excellent Ways AI Is Enhancing Customer Experience.” *SurveySparrow*, 31 July 2023, surveysparrow.com/blog/ai-customer-experience/.