Design Exploration Seminar

Future Gadgets as seen through science fiction shows

Human Machine interactions (HMI)

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DECLARATION

I declare that this written submission represents my ideas in my own words and where other's ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/ data/fact/source in my submission.
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APPROVAL SHEET

This Vehicle Design Research Seminar Entitled "**Future Gadgets as seen through science fiction shows -** Human Machine interactions (**HMI**)" by Manish Sharma, 216390010, is approved in the Partial Fulfillment of the Requirements for Master in Design Degree in Mobility and Vehicle Design.

Project Guide:

Date:

Place:

ACKNOWLEDGMENT

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1. INTRODUCTION

Technology and innovation have always been influenced by science fiction. Science fiction shows have frequently presented us with new ideas that have later become realities, from means of communication to modes of transportation. This project aims to explore the various futuristic gadgets and human-machine interfaces (HMIs) that have been portrayed in science fiction shows over the years and examine their potential for real-world applications.

By analyzing the depictions of these devices and interfaces in popular shows like Black Mirror, Westworld, Altered Carbon etc, this project seeks to identify the technologies that are likely to be developed in the near future. It will examine how these gadgets and HMIs can be used to improve our daily lives, enhance our communication capabilities, and provide us with more efficient ways to interact with technology.

Through this project, we hope to document and inspire new ideas for technology development and explore the ways in which science fiction can influence and shape our future.

1.1 ABOUT BLACK MIRROR

Black Mirror is a British science fiction anthology television series created by Charlie Brooker. The show explores the dark and often dystopian implications of advancements in technology and its impact on society. Each episode presents a self-contained story that critiques modern society, touching on topics such as social media, privacy, and artificial intelligence. Black Mirror has become known for its ability to mix humor, horror, and technology in unique and often disturbing ways, making it a must-watch for fans of science fiction and psychological thrillers alike.

This project tries to document the futuristic human machine interface and technologies of the original series which have been showcased as they are a normal part of the lives of the people in the future. The methodology involved was to thoroughly analyze each hour long episode to look for subtle and obvious ways in which how various interfaces are showcased and used.

2. MOTIVATION FOR THE PROJECT

The science fiction television series "Black Mirror" provides a unique glimpse into the potential dangers and consequences of our relationship with technology. The series raises thought-provoking questions about the role of technology in our lives and how it may shape our future. One of the key elements of this series is the Human-Machine Interface (HMI), which serves as a central theme in many of the episodes. The purpose of this project is to document the use of HMI in "Black Mirror" and to analyze its implications for the future of technology. This project aims to shed light on the importance of considering the ethical and social implications of technology as it continues to evolve and play an increasingly prominent role in our lives. By exploring the use of HMI in "Black Mirror," we hope to spark critical thinking and discussion about the direction in which technology is headed and the responsibilities we have as users and designers.

Furthermore, this project aims to raise awareness about the potential risks and unintended consequences of our reliance on technology. Additionally, this project will serve as a valuable resource for anyone interested in exploring the themes of technology and HMI in "Black Mirror." Ultimately, the goal of this project is to foster a more informed and nuanced conversation about the role of technology in our lives.
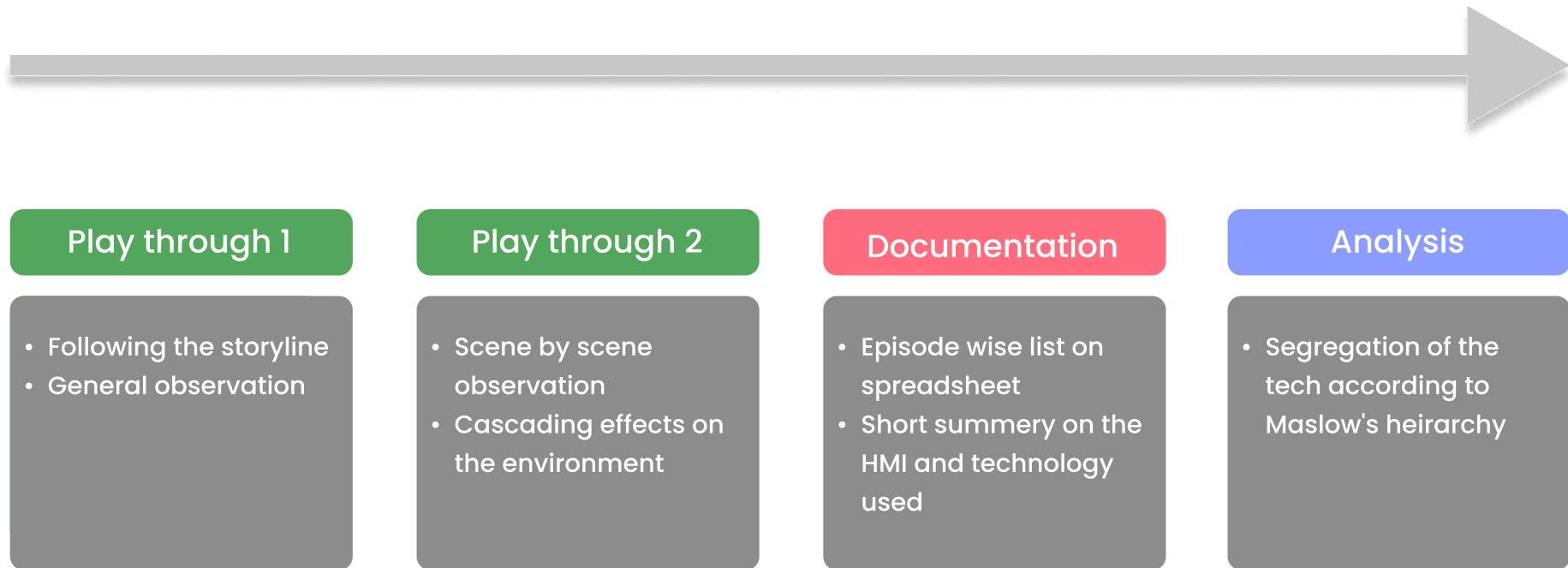
3. METHODOLOGY

Each episode of the series is an hour long feature full of intense character interaction, drama, thriller and interaction with various new technological advanced scenarios and futuristic HMI's. It is almost impossible to go through every little detail of every scene in the first watch itself. Although identifying basic interaction screens is quite easy, it is not true when trying to understand how the technology and human machine interactions has an effect on the environment. This is often overlooked because they almost often occur as a part of engaging plot of the episode and is usually very subtle.

To cover each episode, the first play through was solely focused on following the storyline and noting down obvious technological interfaces used by the characters. In the second play through, each scene was observed for any missed references in the first play through while also noting down the effects of changes from actions that occurred earlier.

The HMI's that was featured in the episodes was systematically documented in a spreadsheet. After the documentation was completed, an analysis was done to map it using Maslow's hierarchy of needs.

3.1 FLOW CHART

Play through 1

- Following the storyline
- General observation

Play through 2

- Scene by scene observation
- Cascading effects on the environment

Documentation

- Episode wise list on spreadsheet
- Short summery on the HMI and technology used

Analysis

- Segregation of the tech according to Maslow's heirarchy

3.1.1 PLAY THROUGH

During the first run of every episode, the focus was to plot down every visible HMI showcased in the show and sometimes also during conversations. However, the main objective of the first play through was to get a grip on the storyline and understand the premise of the particular episode.

There are a few episodes in the entire series in which the use of technology is limited and hence are not included in further analysis. However, in a few others the technology allows teleportation of conscious of a person. These episodes needed to be marked down for further analysis.

During the second run, a lot of events had been occurring in the background of the show, the purpose of the second run was to note down all of these events. In the following pages, some peculiar technologies and HMI's have been portrayed to give an example of the variety of Human machine Interactions that has been showcased in the series.

3.1.2 DOCUMENTATION

For Illustration i have choose the episode 2 of season 1 called **"Fifteen million merits"** takes place in a future where people live in a captive virtual world and are required to perform strenuous physical exercise to generate power for their society

The Human-Machine Interface, allows people to interact with the virtual world and perform various tasks, such as accessing entertainment and communication, earning rewards, and making purchases.

Here, the Main character Bing is showcased to be living is a cell kind of a room where the walls light up as screen with a animated metaverse kind of a world.
Bing can perform simple gestures like shoo away the cock to silence the alarm, look on the screen to see his avatar or pull down a imaginary string to black out the screens like curtains.

Every mirror in the episode acts as an interactive screen, like here Bing is using his bathroom mirror to browse through various morning essential routine.
The merits are shown throughout on different screens, they decrease even when he gets toothpaste as well.

The pop up ads that come on the mirror annoy Bing a lot. These pop-ups come any time and any where, also to skip these u have to pay heavy merit points. Like in the bottom screenshot the pop up appeared when Bing was taking to a girl he liked and it became really embarrassing for him.

In order to earn merits, individuals have to cycle that would generate power. There is a screen also installed in front of every cycle, where they can play games, watch videos etc.

These merits are used to buy various essentials in real as well as virtual world like hairstyle for your avatar. The ultimate aim of earning merits is to get fifteen million so that a ticket to "HOT SHOT" reality show can be bought.

Bing buys a ticket to hotshot for his new friend Abi who is humiliated by the judges.
If we look at the audience in the background we see they are avatars of people sitting in their cell's. Their emotions are expressed through their avatars.

As the story goes ahead we see how Bing's friend Abi is pushed into pornographic advertisements he could not watch her on screen in his cell but if u close your eyes to avoid a pop up add it flashes resume viewing in red.

Bing works hard day and night to earn 15 million merits again to go into hot shot reality show. he shows his raw emotions which is used by the makers of hot shot in promoting the reality show.

The characters are shown wearing augmented reality displays, which they can use to view holographic advertisements, also be used to track the characters' physical activity and performance. The interface appears to be integrated into the bodies of the characters and includes gesture-based controls, holographic displays, and possibly other features. The HMI is a central element of the episode's dystopian setting and serves to further illustrate the characters' lack of agency and control over their lives. Overall, the technology in "Fifteen Million Merits" serves to emphasize the themes of oppression, control, and the consequences of a society that is overly dependent on technology.

Episode	HMI / Technology	Description
1. The Entire History of You	"Grain" (Implant behind the ear)	The HMI technology used in grain tech involves a direct interface between the human brain and the device, allowing for seamless recording and playback of memories. This technology is meant to provide users with the ability to recall past experiences with clarity and detail, but it also raises important questions about privacy and the potential for abuse.
2. Be Right Back	An artificial intelligence (AI) imitation	The HMI device used in the episode is a small earpiece that connects to the user's brain and allows them to communicate with the virtual assistant in a more intuitive and natural way. As Martha interacts with the virtual Ash, the HMI device collects data about her brain waves, allowing the virtual assistant to become more personalized and responsive to her needs. As the episode progresses, Martha becomes more and more dependent on the virtual Ash, using the HMI device to communicate with him on a regular basis. The episode raises questions about the ethics of creating such advanced AI.

Episode	HMI / Technology	Description
3. White Bear	Memory Erasing Device	The HMI technology in this episode takes the form of a device that can erase specific memories from a person's mind. It is used as a form of punishment for criminals, and is considered a more humane alternative to traditional forms of punishment such as incarceration. However, the episode raises important questions about the ethics of using such a technology, and the potential for abuse.
4. The Waldo Moment	Computer-animated bear named Waldo	The episode showcases several key elements. One is the use of motion capture technology to create Waldo's animated movements and expressions. This involves placing sensors on the actor's body and capturing their movements in real-time, which is then translated into the animated character's movements. Another aspect of the technology shown in the episode is the use of advanced algorithms and machine learning to help Waldo interact with people in real-time. Further people are influenced by Waldo's online persona and become emotionally attached to a fictional character.

Episode	HMI / Technology	Description
5. White Christmas	Egg-shaped object— as personal assistants	The HMI device takes the form of a small, circular remote that the user places on a flat surface. Once activated, the device projects a holographic display that can be manipulated using hand gestures and voice commands. The device allows users to control everything from the temperature of their surroundings to the lighting, music, and even the behavior of other people. For example, in the episode, one character uses the HMI to adjust the lighting and music in his room, while another uses it to block out the sound of her partner's snoring.
6. Nosedive	Eye implants and mobile devices	In the episode, the HMI takes the form of a small, transparent device that is implanted in the user's eye. This device allows the user to view other people's profiles and see their social scores, as well as receive real-time feedback on their own social interactions. The HMI in "Nosedive" creates a world where social status is the most important currency, and people's entire lives revolve around maintaining a high social score. However, the HMI also has a dark side, as people become obsessed with maintaining their social score and are willing to sacrifice their personal values and relationships.

| Episode	HMI / Technology	Description
7. Playtest	Experimental game	In the episode, the HMI takes the form of a small device that is implanted in the user's brain. This device allows the user to enter a virtual reality game that is tailored specifically to their fears and anxieties. The user experiences the game through a combination of their own imagination and sensory input from the HMI device. As the game progresses, the HMI begins to blur the lines between reality and the virtual world, causing the user to question what is real and what is not. The HMI uses a variety of sensory inputs to create an immersive experience, such as touch, smell, and sound.
8. San Junipero	Simulated reality	The HMI (Human-Machine Interface) device shown in the episode is a futuristic technology that enables people to upload their consciousness to a virtual reality system called San Junipero. The HMI in "San Junipero" is designed to create a fully immersive and realistic experience, allowing users to feel as if they are living in the real world. The system is also equipped with a variety of customization options, allowing users to change their appearance and environment to suit their preferences.

Episode	HMI / Technology	Description
9. Men Against Fire	MASS, an augmented reality implant	In the episode, the HMI is a small device that is implanted in the soldiers' brains. This device enhances the soldiers' vision, hearing, and other senses, allowing them to detect enemy movements and threats more effectively. It also provides real-time information and analysis about their surroundings, and even includes a targeting system that helps the soldiers aim their weapons more accurately. However, the HMI in "Men Against Fire" has a darker side. It is used to manipulate the soldiers' perception of reality, filtering out certain visual and auditory stimuli to create a sanitized and dehumanized version of the world. This is done to dehumanize the enemy and make it easier for the soldiers to kill them.
10. USS Callister	Multiplayer game Infinity	In the episode, the HMI takes the form of a small device that is attached to the user's temple. This device allows the user to enter a virtual reality game called Infinity, which is a simulation of a spaceship crew that is reminiscent of the classic Star Trek TV show. The HMI in "USS Callister" is designed to be extremely immersive and realistic, providing users with a fully interactive experience that feels almost like real life.

Episode	HMI / Technology	Description
11. Hated in the Nation	Autonomous Drone Bees	The HMI in "Hated in the Nation" is designed to be highly effective and efficient, allowing users to control hundreds of ADIs at once with a simple thought. The device also enables the user to receive sensory information from the bees, such as images and sounds, providing a fully immersive experience. The episode highlights the importance of being aware of the potential risks and taking steps to ensure that technology is used responsibly and ethically.
12. Arkangel	Arkangel - a neural implant system	In the episode, the HMI is a small implant that is inserted into a child's brain, allowing the parent to monitor their child's vital signs, location, and view what their child sees in real-time. The parent can also use a tablet to filter and censor the child's view of the world, blurring out disturbing images or blocking out harmful people. The overbearing control that the mother exerts over her daughter, who is unaware of the monitoring, leads to negative psychological effects, such as an inability to deal with stress and anxiety.

Episode	HMI / Technology	Description
13. Crocodile	"Recaller" to view people's memories	The recaller device in "Crocodile" is a small, handheld device that uses a series of electrodes to tap into a person's neural pathways and retrieve memories. Once the memories are retrieved, the recaller device can play them back as vivid, highly detailed images. The HMI in "Crocodile" raises important ethical questions about the use of advanced technology to access and manipulate a person's memories. It highlights the dangers of using such technology to invade a person's privacy, and the potential consequences of using it for malicious purposes.
14. Hang the DJ	An electronic device – "Coach"	The HMI (Human-Machine Interface) device is a small, circular coach that guides individuals in their search for a romantic partner. The coach in "Hang the DJ" is a small, handheld device that works in conjunction with a matchmaking service. Users are paired with a partner, and the coach device provides guidance on how to interact with them. It monitors their behavior and offers advice and feedback on how to improve their interactions.

Episode	HMI / Technology	Description
15. Metalhead	Robotic guard known as a "dog"	The Human-Machine Interface (HMI) was a handheld device that allowed the operator to control the movements and actions of the robotic dog. The device had a small screen that displayed information about the dog's status, such as its battery level and its current mode of operation. The operator could use the HMI to direct the dog to move in different directions and at varying speeds, and to perform tasks such as jumping, climbing, and attacking.
16. Black Museum	Experimental medical technology	The HMI consisted of a helmet-like device that the user would wear, which was connected to a computer or other device. The device used electrodes to stimulate the user's brain in a way that replicated the experiences of the person being observed or simulated. The HMI was primarily used as a form of entertainment, allowing users to experience extreme sensations without actually putting themselves in danger. However, it was also used as a form of punishment, with prisoners being subjected to intense pain and suffering through the device.

Episode	HMI / Technology	Description
17. Striking Vipers	A fighting game, now experienced in virtual reality	The HMI system in "Striking Vipers" consisted of a pair of small, disc-shaped devices that users attached to their temples. These devices allowed the users to enter a shared virtual reality environment where they could interact with each other as if they were physically present in the same space. Once inside the virtual environment, users could take on the appearance and abilities of different characters or avatars, and engage in various activities such as fighting, exploring, and socializing. However, the HMI also allowed the characters to explore their sexual identities and engage in virtual sexual encounters with each other.
18. Rachel, Jack and Ashley Too	AI toy - Ashley Too Based on pop star "Ashley O"	The HMI in this episode allowed users to access a range of features, including playing music, receiving weather updates, and setting reminders. It also allowed users to engage in conversations with Ashley O's virtual persona, with the AI-powered assistant using natural language processing and machine learning algorithms to generate responses that sounded like they were coming from the real Ashley O.
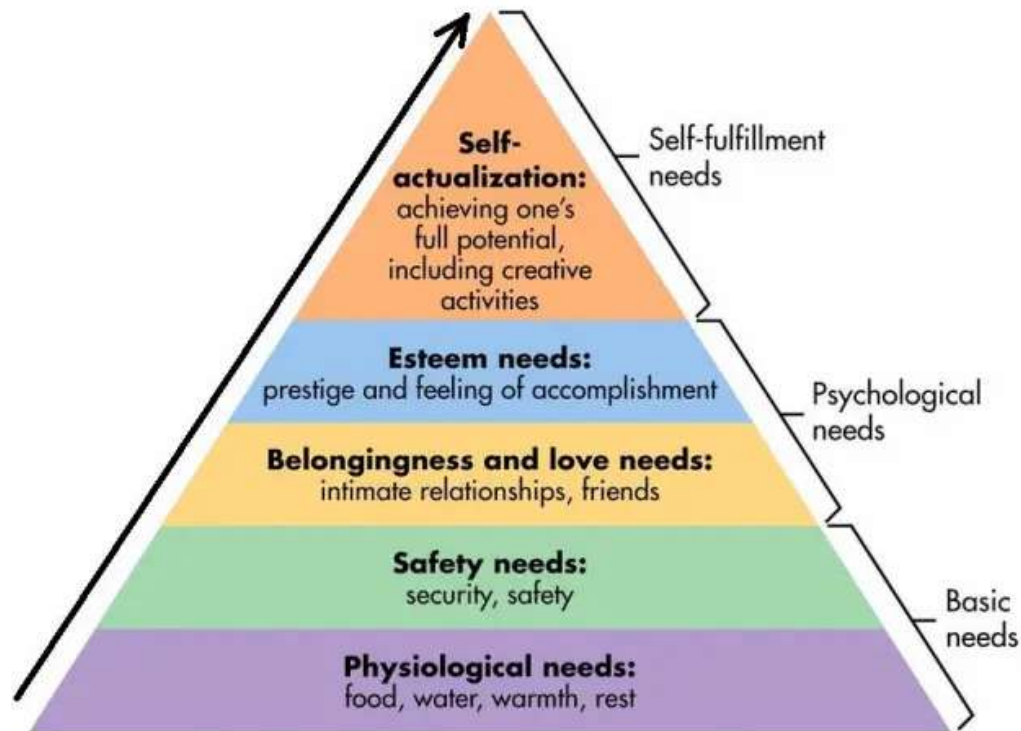
4. ANALYSIS

The HMI's and technology were segregated according to Maslow's hierarchy. Maslow stated that people are motivated to achieve certain needs and that some needs take precedence over others. Our most basic need is for physical survival, and this will be the first thing that motivates our behavior. Once that level is fulfilled the next level up is what motivates us, and so on.

The Human Machine Interfaces were classified on the basis of their function and Maslow's hierarchy.

4.1 CLASSIFICATION

The HMI's are classified further to understand its importance. All the episodes have a separate plot but somewhere are related to a possible future scenario, All the major technologies showcased in different episodes of black mirror have been assigned a certain hierarchy of need to classify them.

Survival

- Holographic user interface
- Stationary bikes to generate electricity
- Autonomous drone bees
- Multiplayer game "Infinity"
- Experimental game (Playtest)

Communication

- "Grain" (Implant behind the ear)
- AI toy - Ashley Too
- An electronic device - "Coach"
- Simulated reality
- Computer-animated bear named Waldo

Safety

- "Recaller" to view people's memories
- Egg-shaped object - as personal assistant
- Arkangel - a neural implant system

Defense

- Experimental medical technology (Black Museum)
- MASS, an augmented reality implant
- Robotic guard "dog"
- Memory Erasing Device

Esteem

- Eye implants and mobile devices
- Striking Vipers (The VR game)
- An artificial intelligence imitation (Be right Back)

However a few HMI's showcased in various episode can be categorized under more than one categories used in classification, listed below with detail.

1 Survival:

- "Fifteen Million Merits" (Season 1, Episode 2) - The characters in this episode use stationary bikes to generate electricity in exchange for merits, which they can use to buy food, water, and other essentials.

- "Hated in the Nation" (Season 3, Episode 6) - Autonomous drone bees are used to pollinate crops due to the decline of real bees, which threatens the world's food supply.

- "Nosedive" (Season 3, Episode 1) - Characters in this episode use technology to access food, transportation, and other essential services, but their access is determined by their social rating on a social media platform.
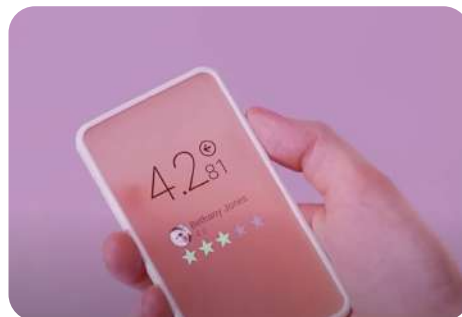
2 Communication:

- "The Entire History of You" (Season 1, Episode 3) - Characters in this episode have an implant called a "grain" that allows them to record and replay all their memories, which affects their relationships and communication with others.

- "San Junipero" (Season 3, Episode 4) - Characters in this episode use advanced technology to upload their consciousness to a virtual world, allowing them to communicate and form relationships beyond physical limitations.

- "Be Right Back" (Season 2, Episode 1) - The main character uses a service that recreates a virtual version of her deceased partner, allowing her to communicate with him through technology.

3 Safety:

- "White Christmas" (Season 2, Episode 4) - Characters in this episode use technology to block people in real life, erasing their existence from their perception of reality, which leads to unintended consequences and raises issues of safety.

- "Crocodile" (Season 4, Episode 3) – A device that can extract memories from people's brains is used to solve crimes, but it raises ethical concerns and threatens people's safety.

- "Arkangel" (Season 4, Episode 2) – A mother uses a tracking device implanted in her daughter's brain to monitor her safety, but it leads to unintended consequences.

4 Defense:

- "Men Against Fire" (Season 3, Episode 5) – Soldiers in this episode are implanted with a chip that alters their perception of reality, making them more effective at killing "roaches," but the technology also hides atrocities committed during war.

- "Black Museum" (Season 4, Episode 6) – The museum showcases several examples of advanced technology used for punishment, including a device that inflicts physical pain on criminals.

- "Metalhead" (Season 4, Episode 5) – Characters in this episode are pursued by a robotic dog that is programmed to kill them, highlighting the potential danger of advanced robotics.

5 Esteem:

- "USS Callister" (Season 4, Episode 1) - The main character creates a simulated universe based on his favorite TV show where he is in control, which satisfies his need for esteem and power.

- "Nosedive" (Season 3, Episode 1) - Characters in this episode use technology to boost their social status and gain approval from others, satisfying their need for esteem and recognition.

- "Striking Vipers" (Season 5, Episode 1) - Characters in this episode use virtual reality technology to explore their desires and fulfill their fantasies, satisfying their need for esteem and self-expression.

5. CONCLUTION

In conclusion, the analysis of HMI (human-machine interface) showcased in various episodes of the Black Mirror web series provides valuable insights into how technology can impact human behavior and well-being. Through examining the episodes "Be Right Back," "White Christmas," and "San Junipero," we can see how HMI can both satisfy our need for social connection and personal growth, while also threatening our autonomy, authenticity, and sense of purpose. As we continue to develop and integrate HMI into our daily lives, it is crucial that we consider these ethical and psychological implications to ensure that technology serves us, rather than the other way around.

The analysis of HMI in the series highlights the complex relationship between human needs and technology, and emphasizes the need for a human-centered approach to design. By incorporating insights from Maslow's hierarchy of needs, we can create technology that supports our fundamental human needs and aspirations, while also promoting our autonomy, self-actualization, and well-being. As we move forward in our rapidly changing technological landscape, it is vital that we remain mindful of the potential consequences of our innovation and work towards designing technology that enriches, rather than detracts from, our human experience.

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