INDUSTRIAL DESIGN PROJECT III

SMART GLOVE FOR CONTROL AND INTERACTION OF ELECTRIC SUPER BIKE.

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INTRODUCTION

WHO IS THE USER?

Generation Z / Alpha
Age: 20-45 years in 2035
Rides bike for pleasure

Characteristics:
1. Tech savvy
2. Conscious consumerism
3. Digital access - Information at finger tips

Behavioral consideration:
1. Impatient and Independent
2. More goal oriented
3. More self sufficient

Generation Z and Alpha, aged 20-45 years in 2035, exhibit traits of impatience and independence. Growing up in a digital era, they are accustomed to instant gratification and have developed a strong desire for efficiency. Their goal-oriented nature drives them to set ambitious targets and strive for success. Additionally, this generation values self-sufficiency, seeking to rely on their own skills and resources to accomplish tasks. Embracing a healthier and environmentally conscious lifestyle, they enjoy riding bikes for pleasure, combining exercise and leisure. Their inclination towards sustainable practices and personal fulfillment shapes their approach to work and life as they navigate the world with determination and self-reliance.

WHO IS THE USER?

Generation Z / Alpha

Habits:
1. Primarily shop online
2. Conscious consumerism
3. Communication at the speed
4. Lack concentration

Focus:
1. Entrepreneurial generation
2. Community building
3. Diversity
4. Mental healthcare
5. Significant Online presence

Generation Z and Alpha, aged 20-45 years in 2035, are known as an entrepreneurial generation. They possess a strong desire for autonomy and have a natural inclination towards starting their own businesses. They excel at community building, leveraging their significant online presence to connect with like-minded individuals and collaborate on projects. They prioritize mental healthcare, recognizing the importance of emotional well-being and advocating for destigmatizing mental health issues. With a significant online presence, they primarily shop online, practicing conscious consumerism and supporting brands that align with their values. However, their communication style, often at the speed of instant messaging, may lead to a lack of concentration and reduced attention spans.

ULTRAVIOLETTE

Ultraviolette Automotive Pvt. Ltd., is an innovator in sustainable mobility and energy infrastructure. Established in 2016, Ultraviolette Automotive was founded by Narayan Subramaniam and Niraj Rajmohan. The company was born out of the unique vision of creating top-of-the line mobility solutions, that's driven by progressive design and energy efficient technology. Ultraviolette Automotive is developing India's first ecosystem of high-performance electric vehicles and future-ready energy infrastructure.

OBJECTIVE

“ REDEFINING EXPERIENCES IN THE MOBILITY SECTOR YEAR 2030”

IDEATIONS

1) Design of experience center for Individual who want to experience the thrill of riding an electric superbike.

Keywords: Future Mobility , User experience ,
Spaces and Interaction

2) To redefine charging experience eliminating manual plugging in of the charger and providing autonomy to charging process.

Keywords: Future Mobility , Enhanced experience , Autonomous

3) To enhance experience of powering up appliances with portable battery tech. Redesigning the battery pack to be used in different applications/ plug and play scenario

Keywords: Utility , Future Energy

4)Jarvis for bikers /Autonomous robot assistant.
Could be drone/table top device/ watch etc
The device is a riders assistant - Would help in navigation, Information finding, monitoring functions etc.,

Keywords: Smart companion , Enhanced experience ,
Information relay

5) Smart accessories for piloting the vehicle.
Accessories for control and Interaction with bike

Keywords: Smart wearable , User experience ,
Control and Interaction

6) Helmet for racing, equipped with Head mounted Display and lets the driver see all the necessary information in the field of view.

Keywords: Future Mobility , User experience , Display in FOV

7) Pod for space travel that enables people to travel to the edge of the world and back.

Keywords: Future Mobility, space , User experience

8) Mobility gear for rooftop/last mile mobility
Could be a glider/ exo suit / shoes etc.,

Keywords: Future Mobility , User experience , Smart wearable

CITIES OF FUTURE

Smart city systems are set to revolutionize the way we live in futuristic cities. By leveraging technologies like IoT, AI, and data analytics, these systems will optimize various aspects of urban life. Intelligent transportation systems will enable efficient traffic management, seamless connectivity, and improved public transportation. Energy management systems will maximize energy efficiency, incorporate renewable sources, and reduce carbon footprint. Smart grids will monitor and control electricity distribution, promoting sustainable energy usage. Additionally, advanced surveillance, emergency response systems, and predictive analytics will enhance safety and security in these cities. Overall, smart city systems will create more sustainable, connected, and livable urban environments for the residents of the future.

Akon City is a visionary project led by artist and philanthropist Akon. Located in Senegal, it aims to be a futuristic smart city with sustainable infrastructure and advanced technology. Powered by Akon's initiative, Akon Lighting Africa, the city will prioritize renewable energy and provide a high quality of life. With its innovative approach and commitment to social impact, Akon City is poised to become a beacon of hope and a hub for innovation in Africa.

CITIES OF FUTURE

Smart infrastructure will play a pivotal role in shaping the cities of the future. It will encompass advanced technologies and connectivity to enhance efficiency, sustainability, and quality of life. Intelligent building systems will incorporate automated energy management, efficient resource usage, and personalized comfort controls. Integrated smart grids will enable optimized energy distribution and consumption. Furthermore, smart infrastructure will include intelligent water management systems to monitor and conserve water resources effectively. Together, these advancements in smart infrastructure will pave the way for more sustainable, resilient, and technologically advanced cities.

BiodiverCity Penang in Malaysia is an innovative and ambitious project focused on integrating biodiversity conservation and urban development. It aims to create a sustainable and resilient city that promotes harmony between humans and nature. The project includes the restoration and conservation of natural habitats, the implementation of green infrastructure, and the incorporation of eco-friendly practices in urban planning. BiodiverCity Penang aims to serve as a model for sustainable development, showcasing the importance of preserving biodiversity while creating vibrant and livable urban spaces.

CITIES OF FUTURE

AI and automation will play a transformative role in shaping the cities of the future. These technologies will be utilized to enhance efficiency, improve services, and streamline urban operations. AI-powered systems will optimize traffic management, reducing congestion and enhancing transportation networks. Automation will revolutionize various sectors, from manufacturing to waste management, increasing productivity and reducing human error. Additionally, AI-enabled platforms will enhance public safety, emergency response, and resource allocation, making futuristic cities safer and more responsive to the needs of their residents.

Innisfil, a town in Canada, is pioneering a groundbreaking project called The Orbit. It is an innovative approach to public transportation that leverages technology and ridesharing services to connect residents efficiently. Through a partnership with a ride-sharing company, The Orbit provides on-demand transit options, enabling residents to travel seamlessly within the town and to nearby urban centers. The service is cost-effective and flexible, allowing residents to book rides through a mobile app and access transportation services that are tailored to their needs. The Orbit represents a forward-thinking model for suburban transportation, embracing the benefits of technology and ridesharing to enhance mobility and connectivity in Innisfil.

CITIES OF FUTURE

Autonomous vehicles are poised to revolutionize transportation in futuristic cities. These self-driving vehicles will utilize advanced sensors, AI, and connectivity to navigate roads and transport passengers with minimal human intervention. With their ability to communicate with each other and infrastructure, they will optimize traffic flow and reduce congestion. Autonomous vehicles will provide a safer and more efficient transportation experience, minimizing accidents and improving energy efficiency. Moreover, they will offer enhanced accessibility and convenience, transforming the way people commute and travel within cities.

Net City in China is an ambitious project aimed at creating a technologically advanced and interconnected urban environment. It leverages cutting-edge technologies such as 5G, artificial intelligence, and IoT to create a seamlessly connected city. Net City integrates smart infrastructure, intelligent transportation systems, and advanced data analytics to enhance efficiency and improve quality of life for its residents. The project envisions a city where technology is integrated into every aspect, from energy management to healthcare, fostering innovation and sustainable development.

CITIES OF FUTURE

Virtual and augmented reality (VR/AR) technologies are set to transform the experience of futuristic cities. VR will offer immersive virtual environments, enabling residents to explore and interact with digital representations of their urban surroundings. AR will overlay digital information onto the real world, enhancing navigation, communication, and access to services in real-time. These technologies will revolutionize urban planning by allowing stakeholders to visualize and simulate proposed changes to the cityscape. Furthermore, VR/AR will enhance entertainment, education, and cultural experiences, creating new opportunities for engagement and connection in the cities of the future.

Telosa, a visionary project in the United States, aims to create a sustainable and equitable city of the future. Founded by a prominent entrepreneur, it envisions a fully sustainable city that prioritizes environmental conservation and social equity. Telosa aims to incorporate advanced technology, renewable energy, and smart infrastructure to ensure efficient resource usage and reduce its ecological footprint. The project seeks to address urban challenges by providing affordable housing, ample green spaces, and robust public transportation, fostering a high quality of life for its residents while promoting sustainability.

FUTURE SYSTEMS (FORECASTING)

1. Sensor technology to understand the bike parameters
   Heads up display/ electronic screen for information visualization

   In the future, sensor technology will enable bikes to gather and analyze data on parameters like speed, acceleration, and tire pressure. Heads-up displays or electronic screens will provide riders with real-time information on speed, distance, navigation, and even potential hazards, enhancing safety and optimizing the riding experience.

2. All information infrastructure of the city available to the user.

   In the future, users will have access to the entire information infrastructure of cities. Through interconnected systems, individuals will be able to access real-time data on transportation, energy usage, public services, and more. This will enable better decision-making, resource optimization, and improved quality of life for urban dwellers.

3. Energy/ battery technology significantly improved - battery anxiety reduced.

   In the future, significant advancements in energy and battery technology will alleviate battery anxiety. Improved battery capacities, faster charging, and longer lifespans will be the norm. With enhanced energy storage solutions, devices and vehicles will have longer endurance, reducing concerns about running out of power and allowing for more seamless and convenient experiences.

4. Information available at the fingertips , all information database can be accessed

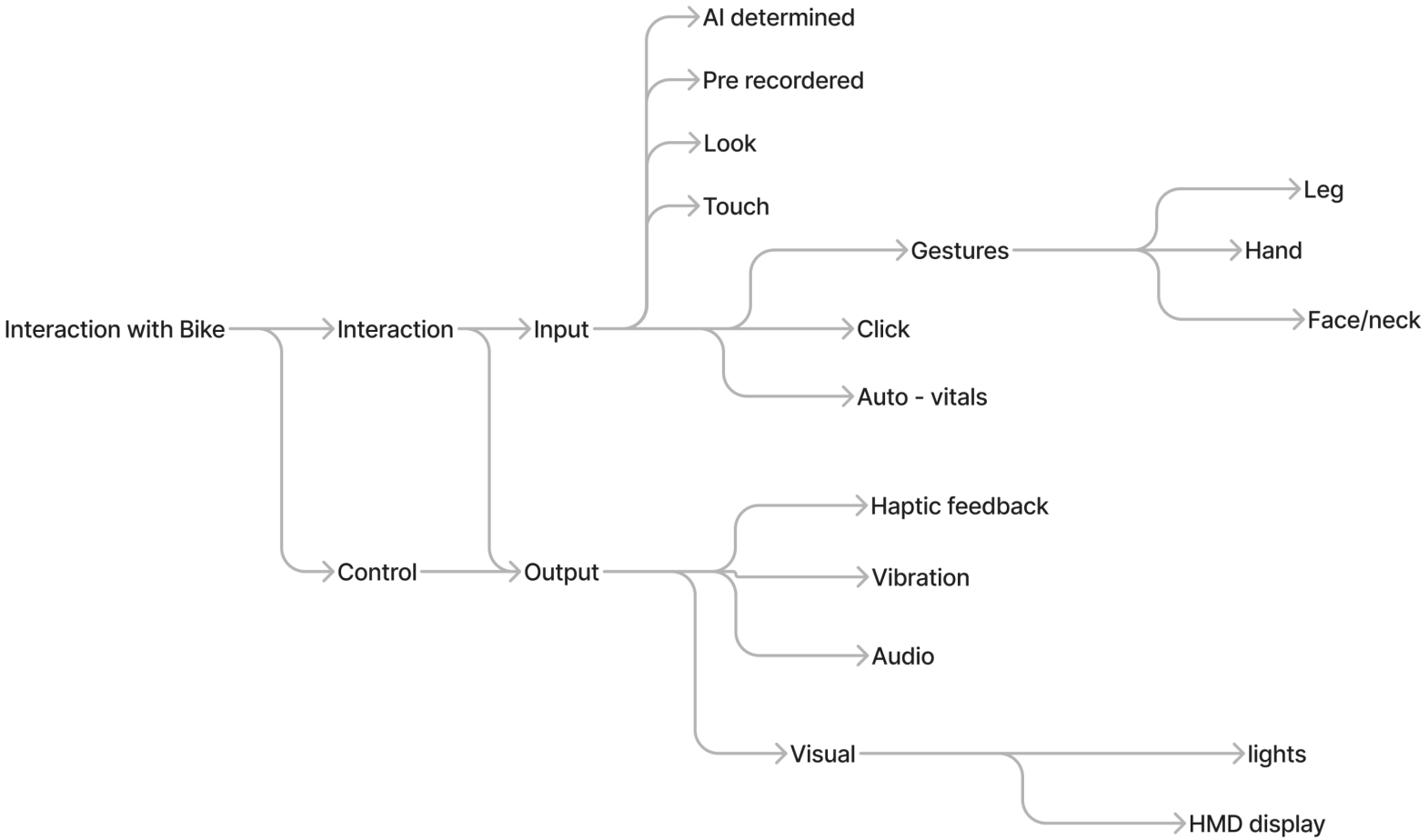
   In the future, information will be readily available at our fingertips. Through advanced technologies like augmented reality glasses or wearable devices, users will have instant access to vast databases of knowledge. From historical facts to real-time data, this seamless access to information will empower individuals with instant and comprehensive knowledge, revolutionizing the way we learn, work, and make decisions.

INITIAL DESIGN BRIEF

Design smart wearable accessories for control and interaction of electric super bike for year 2035. The device should enhance the motorcycle riding experience.


HELMET
BRACELET
RING
GLOVES
SHOES
STRAPPED
BACKPACKS
CLOTHING
ULTRAVIOLETTE

SMART WEARABLE INTERACTIONS



The possible areas of intervention are Helmet, bracelet or ring, gloves, shoes or clothing.

These are the first impressions on the possible interactions that an electric bike can have.

INTERACTIONS

Speed limits

Traffic alert

Navigation

Lock/Unlock

Fine control of the bike

Performance modes

Time

Call/message

Notification

Request medical assisstance

Request technical assisstance

Signal fellow rider

Access companion

Information about the place

Reviews and rating about places

The first impressions of the information that can be interacted with by the rider

INTERACTIONS

Performance adjustment with posture

Folding and unfolding mirror interaction

Adjustable riding triangle

Winglet adjustable/ dynamic winglets

Visor changing mode with simple interaction

Windshield up and down/ head lights up and down

The first impressions of the information that can be interacted with by the rider

TECHNOLOGY REFERENCES

BOSCH

BMA456 TARGET APPLICATIONS

- Step counting in wearable devices
- Wake up display on wrist tilt
- Low power user interaction by tab/double tab
- Advanced gesture recognition
- Activity recognition/tracking
- Advanced power management for mobile devices
- Tilt compensation for electronic compass
- Spirit leveling / Virtual horizon

Bosch is an industry leader in developing innovative solutions for a wide range of industries, making it an ideal choice for product development. With its extensive expertise in areas like automotive technology, industrial automation, and consumer goods, Bosch offers unparalleled knowledge and cutting-edge technology. Their commitment to quality, reliability, and sustainability ensures that products developed with Bosch will meet the highest standards. Choosing Bosch for product development guarantees access to state-of-the-art solutions and a trusted partner dedicated to driving success.

life.augmented

COMPLETE SOLUTION

- Large sensor portfolio
- Integrated hardware and software solutions
- 100% security of supply
- Scalability of solutions
- Quality is a must for ST
- ST is MEMS market leader

STMicroelectronics (ST) is a leading semiconductor company that offers compelling reasons for using their products in product development. With a diverse portfolio of advanced technologies, ST empowers innovation in areas such as automotive, industrial automation, IoT, and consumer electronics. Their comprehensive range of sensors, microcontrollers, and power management solutions enables developers to create cutting-edge products with enhanced functionality and efficiency. ST's commitment to quality, reliability, and sustainability ensures that products developed using their components meet the highest industry standards. Choosing ST brings access to advanced semiconductor solutions and expertise that fuel technological advancements.

TECHNOLOGY REFERENCES

In the realm of technology reference, several remarkable products have gained significant attention. Bose headphones set a high standard for immersive audio experiences, with noise-canceling capabilities and exceptional sound quality. Ray-Ban smart glasses seamlessly blend style with innovative features like built-in cameras and audio connectivity, redefining the concept of wearable eyewear. Smart bike helmets with integrated sensors and LED lights prioritize safety, enabling real-time data tracking and improved visibility for cyclists. Smart rings offer convenient access to notifications, fitness tracking, and contactless payments, enhancing connectivity in a compact form factor. Lastly, smart clothing integrates sensors and connectivity to monitor biometrics, track activity, and provide personalized experiences, revolutionizing the intersection of fashion and technology. These products exemplify the endless possibilities technology brings to everyday life, enriching our experiences and pushing the boundaries of innovation.

BIKE ACCESSORY REFERENCE - SENA

SENA, an acronym for "Smart Ergonomic Navigation Assistant," is a cutting-edge navigation device designed with a focus on usability, aesthetics, and user experience. Several design considerations have gone into creating SENA to ensure it meets the needs and expectations of its users. Let's explore some of these considerations:

User-Centered Design: The design process for SENA begins with a thorough understanding of the target users and their requirements. Extensive user research and feedback have been incorporated to ensure the device addresses real user needs. User personas, scenarios, and usability tests are conducted to refine the design and enhance user satisfaction.

Ergonomics: SENA is designed to provide a comfortable and effortless navigation experience. The device's shape, weight, and dimensions are carefully considered to fit well in the user's hand. The placement of buttons and controls is intuitive and easily accessible, allowing users to navigate through the device's features without strain or discomfort.

Intuitive Interface: The user interface of SENA is designed to be intuitive and user-friendly. The device features a high-resolution touchscreen display that presents information in a clear and organized manner. The interface follows established design principles, such as consistency, hierarchy, and visual cues, to enable users to interact with the device effortlessly and understand its functionality at a glance.

Source: https://www.sena.com/

Aesthetics: SENA boasts an appealing and modern design aesthetic. The device incorporates clean lines, sleek curves, and premium materials, giving it a visually pleasing appearance. The design language is carefully chosen to evoke a sense of sophistication and technological advancement, aligning with the device's positioning as a high-end navigation assistant.

Robust Build Quality: SENA is built to withstand the rigors of everyday use. Durable materials are chosen to ensure the device can endure accidental drops, impacts, and environmental factors. The construction is sturdy, providing a sense of reliability and longevity to the users. Customization Options: Recognizing the diverse preferences of users, SENA offers customization options. Users can personalize the device's interface, such as choosing from various color themes, font sizes, and icon styles. This flexibility allows individuals to tailor their SENA experience according to their preferences and enhances user engagement.

Accessibility: Accessibility features are an essential part of SENA's design. The device includes options for adjustable font sizes, voice-guided navigation, and tactile feedback, catering to users with visual or hearing impairments. The goal is to make SENA inclusive and accessible to a wide range of users, ensuring everyone can benefit from its navigation capabilities.

PRIMARY RESEARCH

RESEARCH METHODOLOGY

In order to gather insights into the habits, personality traits, challenges, and overall impact of motorbike riding among individuals in Mumbai, a research study was conducted. The study involved interviews with 12 bikers who were selected to represent diverse age groups, genders, and experience levels. The objective was to obtain a comprehensive understanding of the subject matter by including a diverse range of perspectives.

The research design employed a purposive sampling technique, which involved selecting participants based on specific criteria relevant to the research objectives. The age groups chosen included individuals in their 20s, 30s, and 40s to capture a broad demographic range. Both male and female bikers were included to account for potential gender differences in riding experiences. Furthermore, participants with varying experience levels, such as beginners, intermediate riders, and seasoned professionals, were selected to explore the impact of experience on riding habits and challenges faced.

Semi-structured interviews were conducted to gather qualitative data from the participants. The interview protocol was developed in a way that addressed the key areas of interest, namely habits, personality traits, challenges, and the impact of motorbike riding. The interviews were conducted in person at mutually convenient locations to ensure a comfortable environment for the participants, promoting open and honest responses.

The collected data was then subjected to thematic analysis to identify recurring patterns, key themes, and noteworthy insights. This qualitative analysis technique facilitated the identification of commonalities and differences in the participants' responses, enabling a comprehensive exploration of the research questions.

Overall, the research methodology employed a purposive sampling technique and qualitative interviews to capture the diverse experiences and perspectives of 12 bikers in Mumbai. This approach allowed for an in-depth understanding of their habits, personality traits, challenges faced, and the impact of motorbike riding on their overall experience. The findings from this study can provide valuable insights for policymakers, bike manufacturers, and riding enthusiasts, contributing to the development of safer and more enjoyable riding experiences in the future.


OFF ROADER


ADVENTURE


SPORTS


COMMUTER

EXPERIENCES

Freedom - nothing between you and outside

Almost meditation

Connecting with machine

Pushing Limits

CHALLENGES

Security of the bike

Navigation

Visibility

Road safety

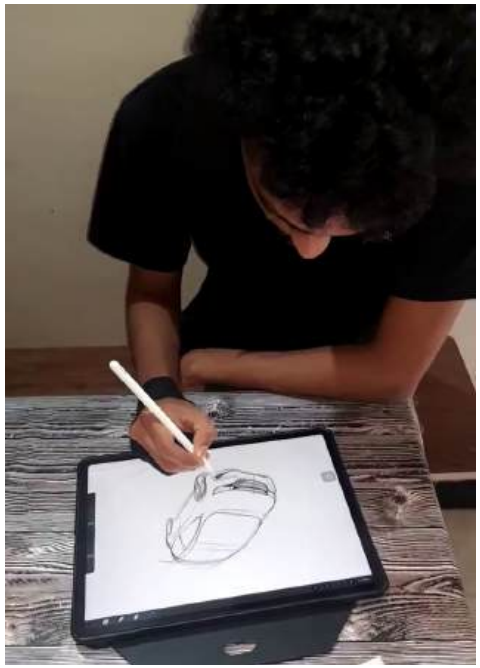
USER PERSONA

Meet Jaseel, a 25-year-old biker who has been riding for over 8 years.

He's passionate about all things biking and loves to geek out on the latest gear, routes, and technology. John spends his weekends exploring new trails and roads, and his evenings researching and reading about biking online.

"I live for the thrill of the open road. Nothing beats the feeling of the wind in my face and the freedom to explore new destinations on my bike."






USER PERSONA

ENDURANCE

TECHNICAL

GEEK

ADRENALINE

TENTATIVE DESIGN BRIEF

Design smart wearable accessories for control and interaction of electric super bike.
The device should check and provide feedback to the biker to reduce physical fatigue.
The device should provide feedback to the biker to keep him alert while riding.
The device should work effectively in all weather conditions.
The device should not distract the rider at any point during the ride.
The device provides feedback about the bike parameters intuitively.

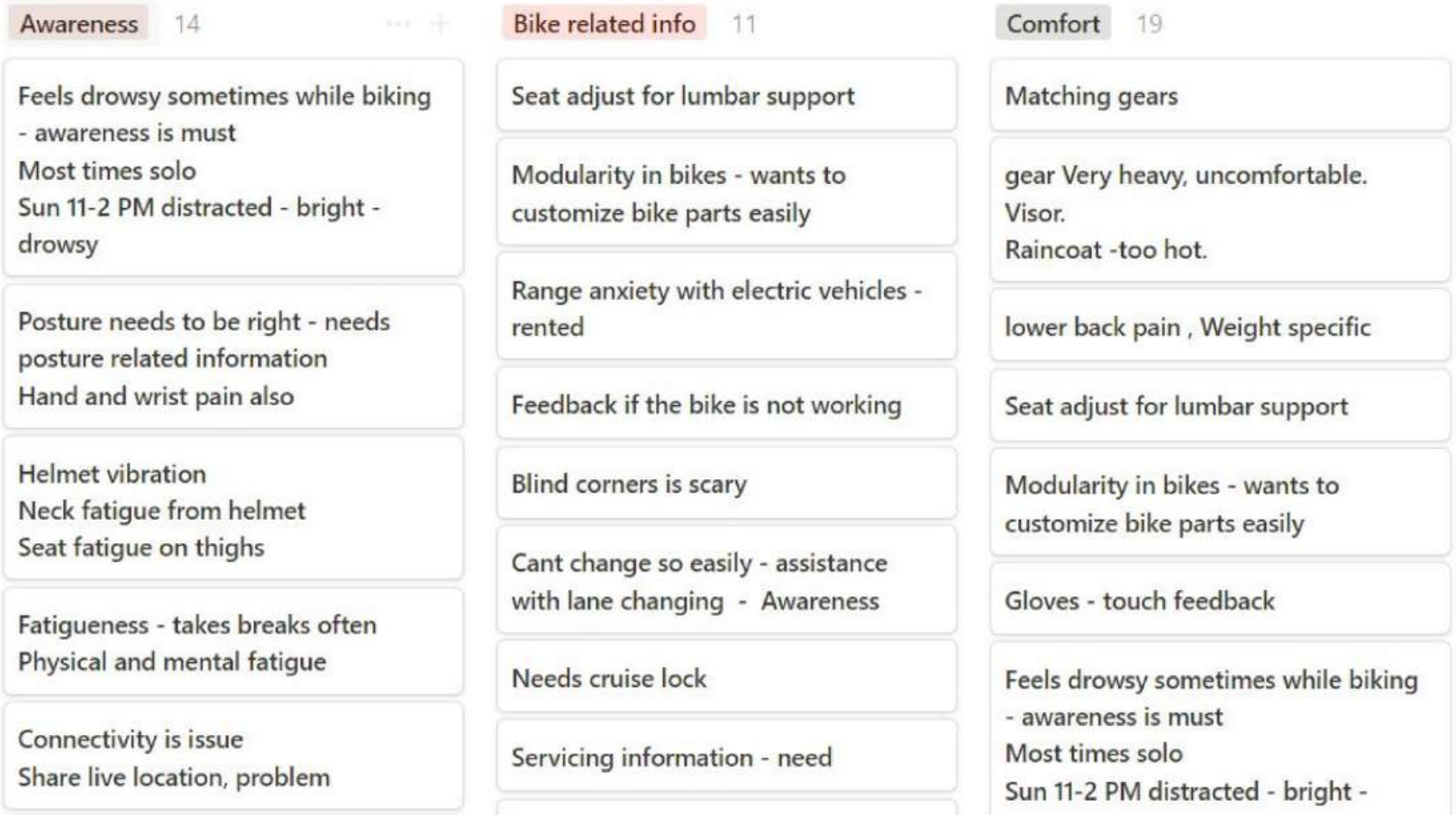
THEMATIC ANALYSIS

Aa Interview snippet	Tags	# Shared score
Navigation Need a way to effectively navigate on the road danger taking eyes off road Phone problem	External factor dependent, Bad Experience, Critical, High priority	7
Storage/ luggage Need sufficient storage capacity on you while biking	low priority	2
Physical access Need a non obstructive way of accessing phone and essentials during the bike ride	Bad Experience, low priority	3
Physical fatigue Need a way to recharge while riding the bike for long hours Need a way to have healthy posture while bike rides	Bad Experience, Critical, High priority	3
Mental fatigue Need a way to manage stress while riding	Bad Experience, Critical, High priority	3
Security of the bike	External factor dependent, Critical, High priority	4

The study involved in-depth interviews with bikers, focusing on their navigation challenges, experiences, and expectations. The gathered data will undergo thematic analysis, which involves categorizing and identifying recurring themes and patterns. This analysis will provide valuable insights that will guide the design process of a navigation solution tailored specifically for bikers.

The primary objective was to delve into their experiences and gain a comprehensive understanding of their needs and preferences related to navigation. Through a shared scoring system, I assessed the impact of the identified problem statement. This method allowed for the identification of common pain points and desired solutions.

THEMATIC ANALYSIS



Through the thematic analysis of the affinity study conducted with bikers, several common themes and sub-themes emerged. These included issues related to awareness about surroundings, comfort navigation, visibility in varying weather conditions, and the need for a user-friendly interface.

These themes will serve as key focal points for the design of an effective and user-centric navigation solution for bikers.

THEMATIC ANALYSIS

Aa Title	Column 9	Column 1	Column 2	Column 3	Column 4
Keywords	Awareness	Bike related Info	Comfort	Content creation	Control and access
Repetiton score	14	11	19	5	33
Sub theme description	The biker wants to be aware about what is happening with his bike and the parameters of the bike and what happens around the bike	Understanding the bike parameters helps the rider have a better experience	Riders prioritize comfort	Riders want to capture images/videos etc when on their ride	The rider wants to access certain information on the go

After synthesizing the sub-themes from the affinity study with bikers, the final overarching themes that emerged were:

1. Awareness about the surroundings
2. Safety
3. Comfort
4. Navigation on the go
5. Control and access of the bike

These themes will serve as guiding principles to design a comprehensive and user-centric navigation solution tailored specifically for bikers.

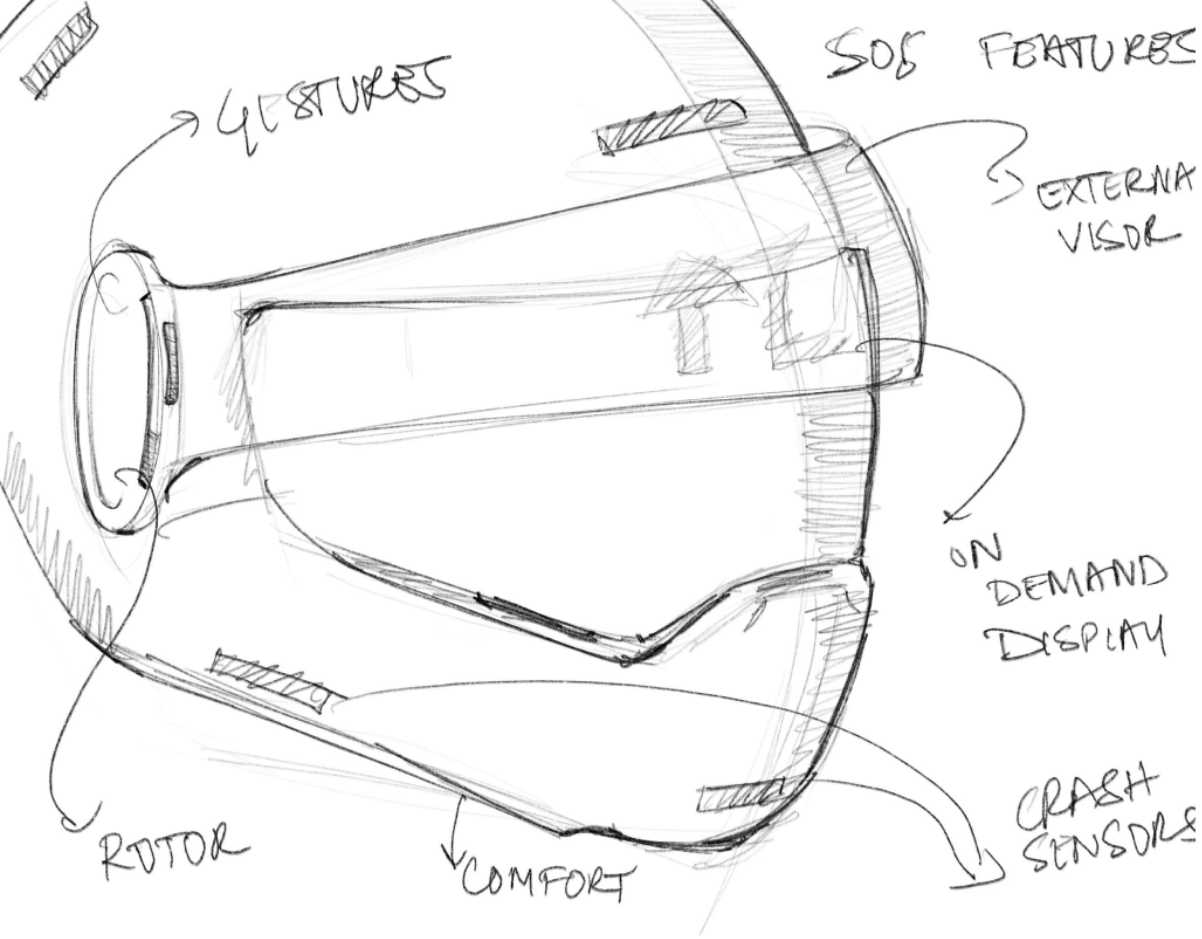
DESIGN BRIEF

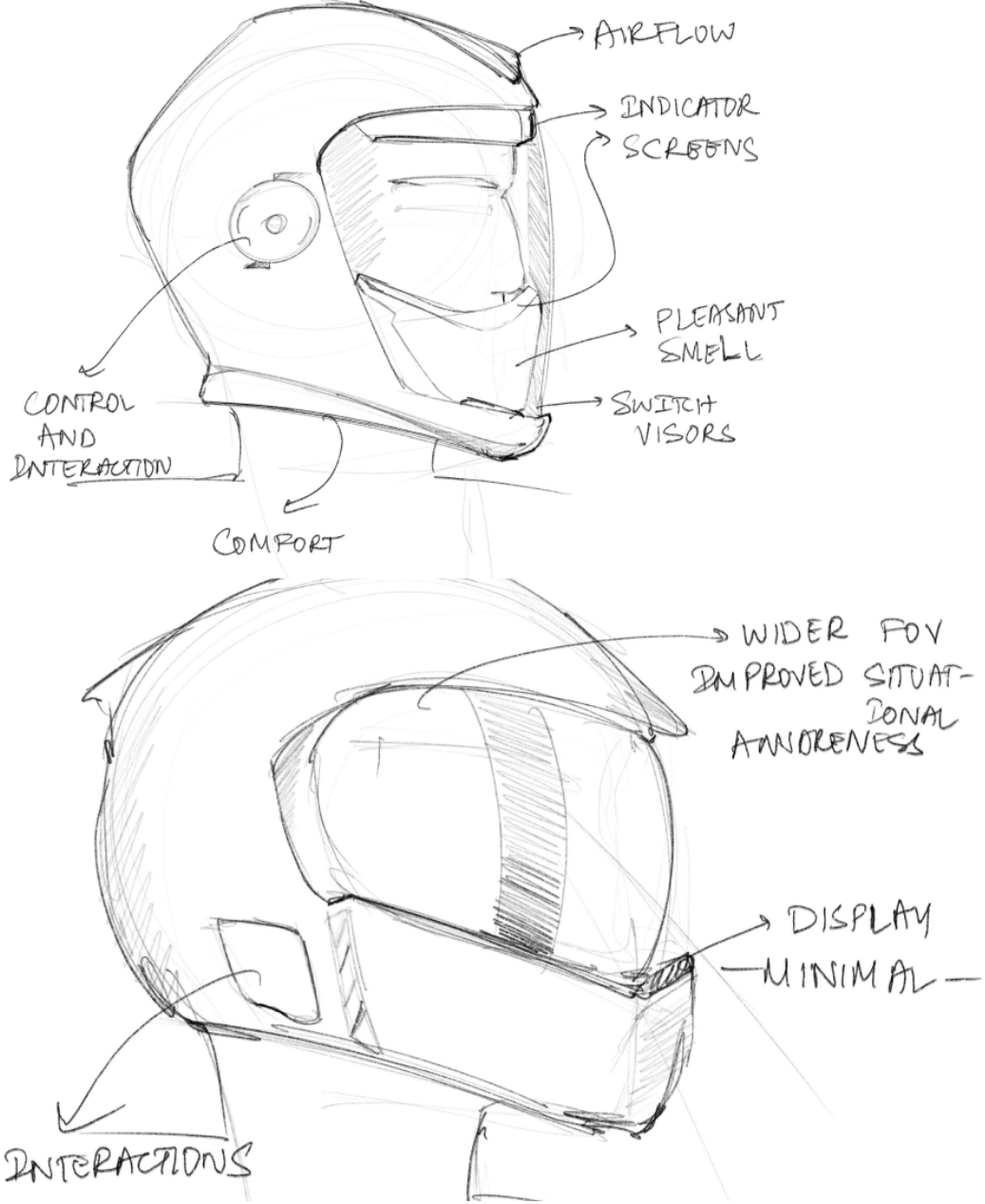
Design a smart wearable for electric motorbike riders to enhance the control and interaction with the bike.

The product should improve situational awareness of the user about his surrounding and provide related information.
The product should also provide necessary information about the bike parameters, navigation and alerts.
The product should provide control over their bike with features that enable the rider to change modes, headlights, etc.,

The product should enhance riders safety by providing SOS/ necessary communication features.
The equipment should be comfortable and ergonomic, reducing rider fatigue and making long rides more enjoyable.
The final product should be ready for mass production.
The design should be user-friendly, with a focus on enhancing the rider’s experience.

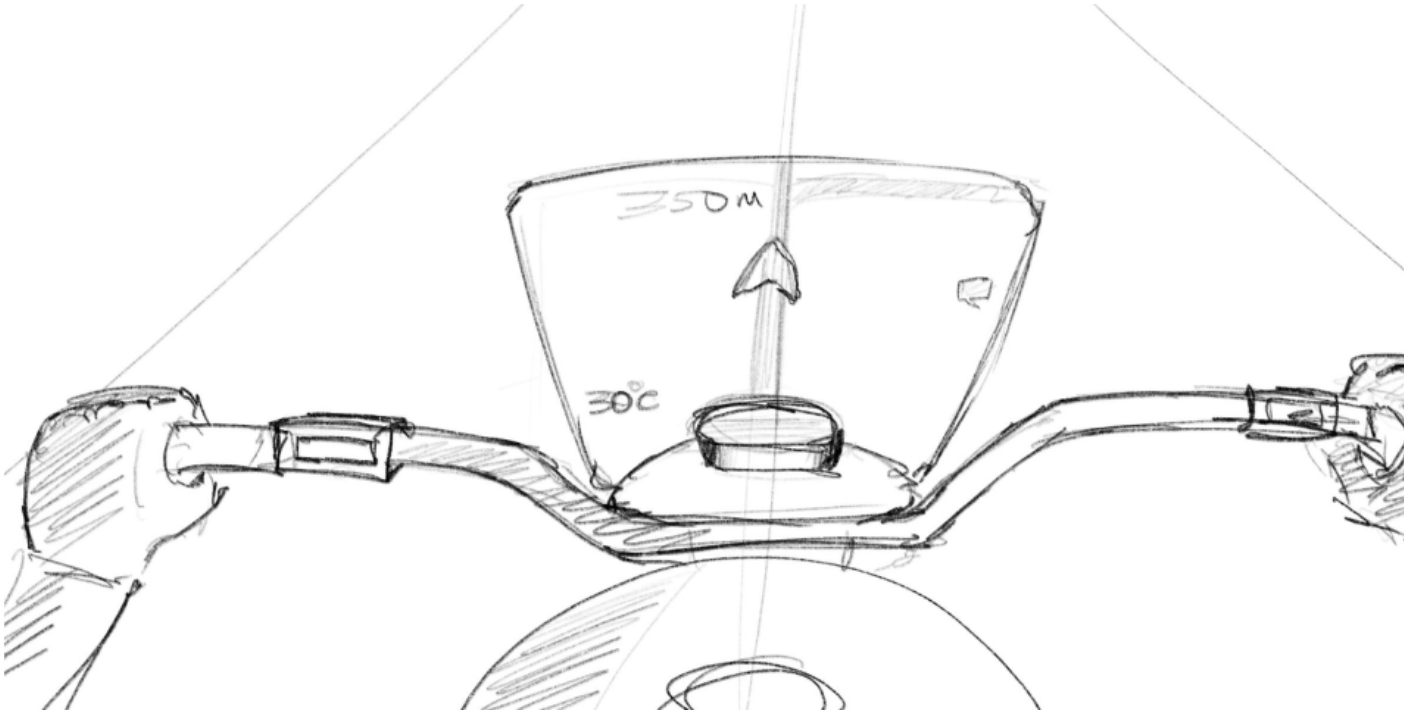
DESIGN DIRECTIONS



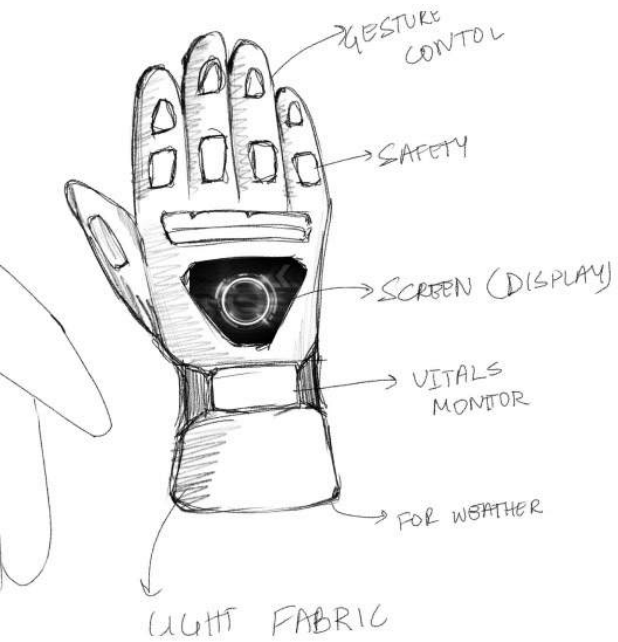


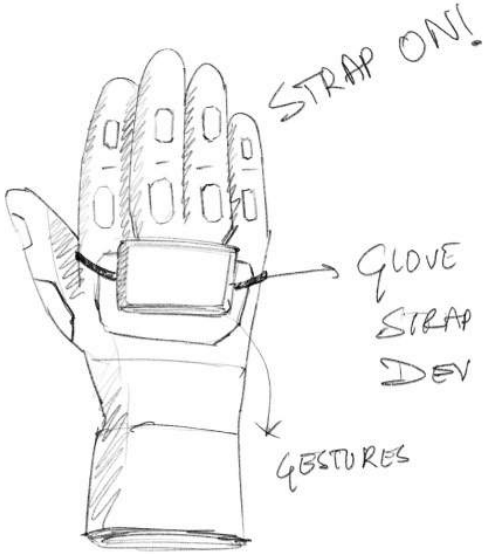
01. INTEGRATED HUD

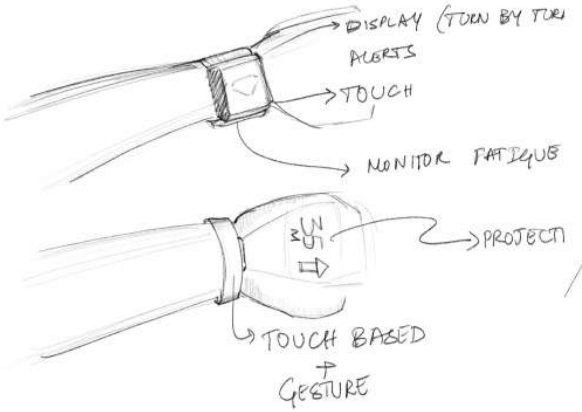
02. INDEPENDANT HUD

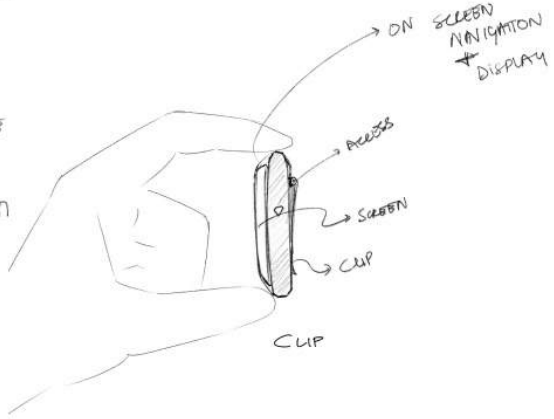


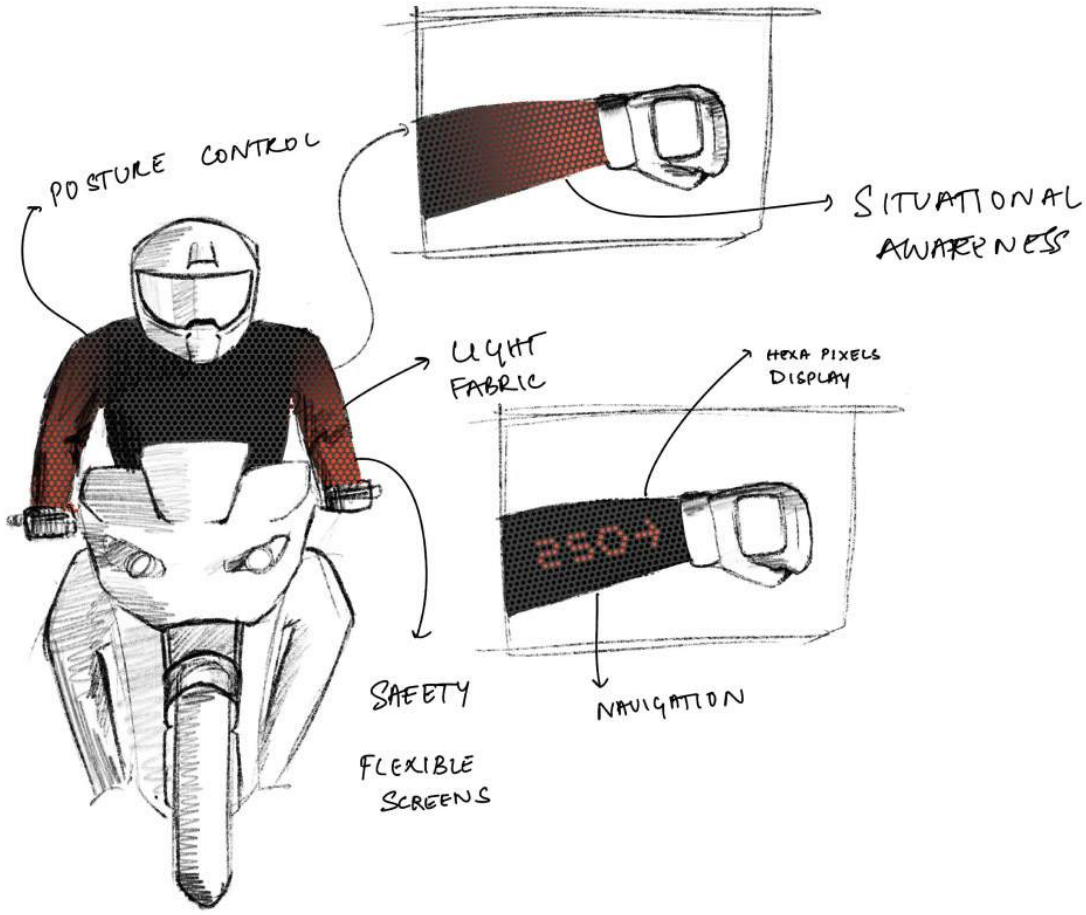
03. HAND/BODY WORN





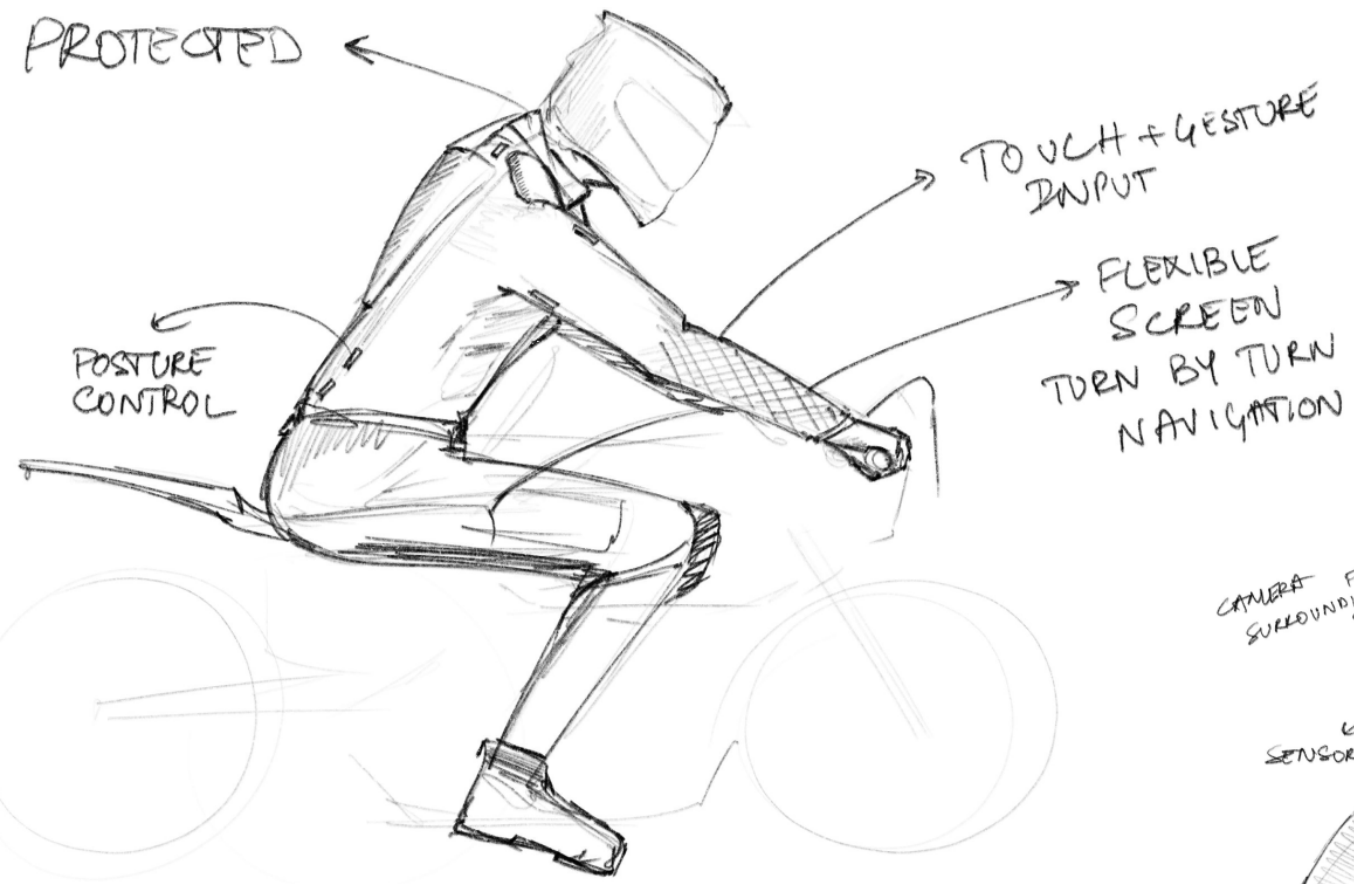


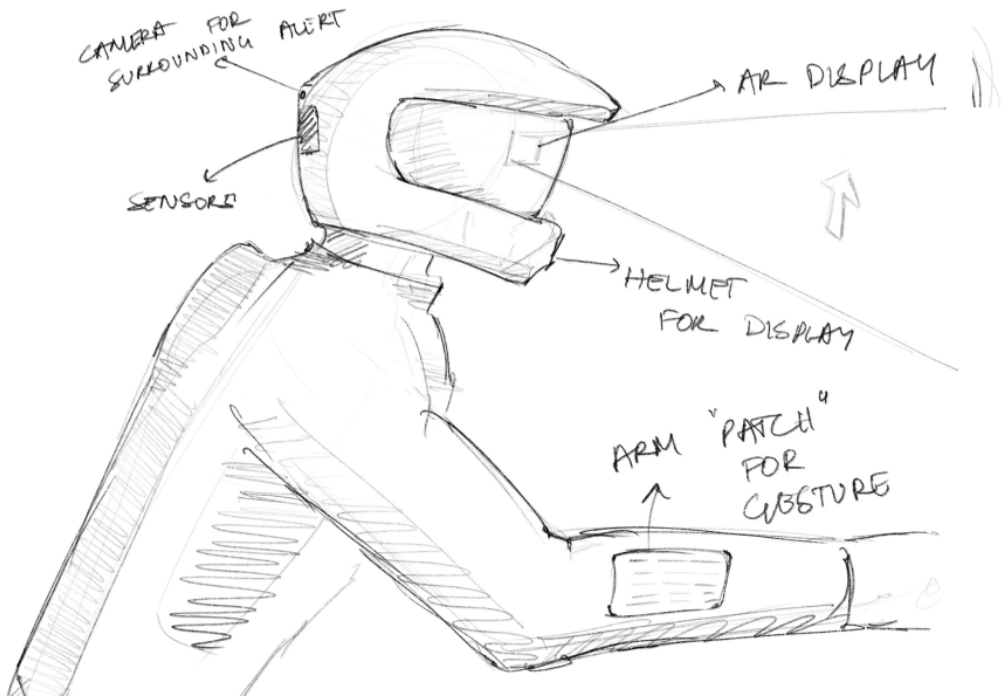




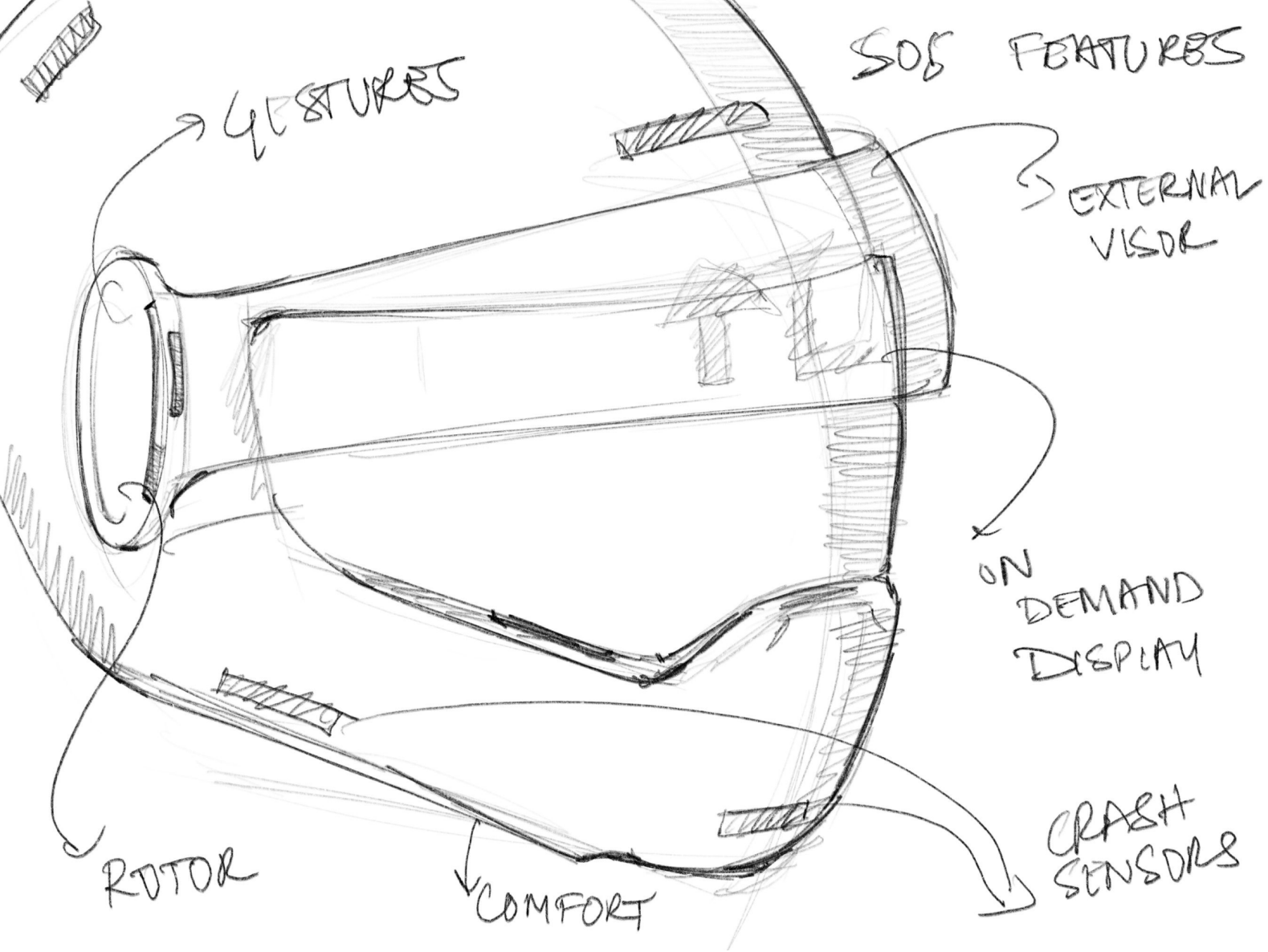
04. COMPANION TECH

05. COMBINATION



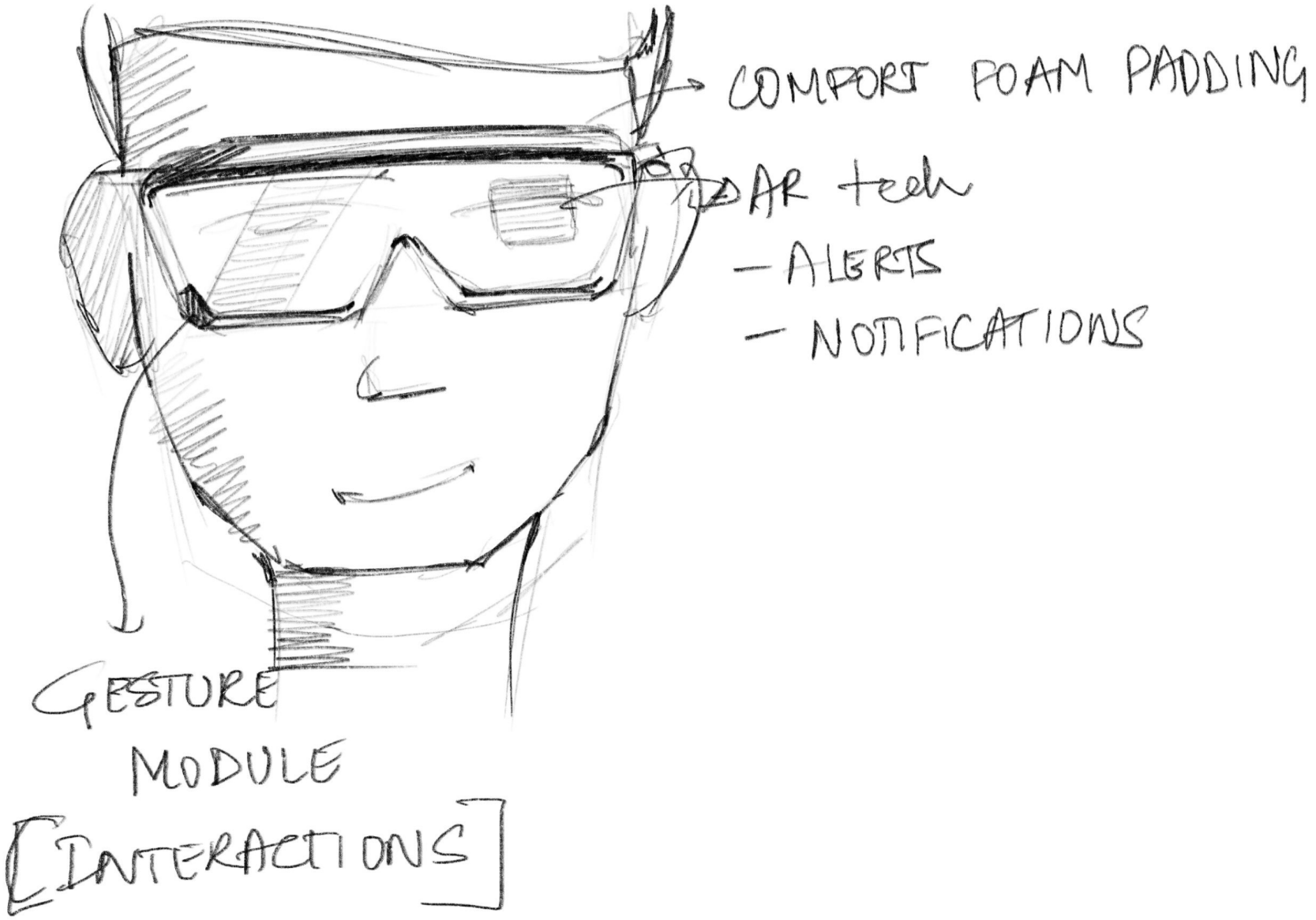


EVALUATIONS



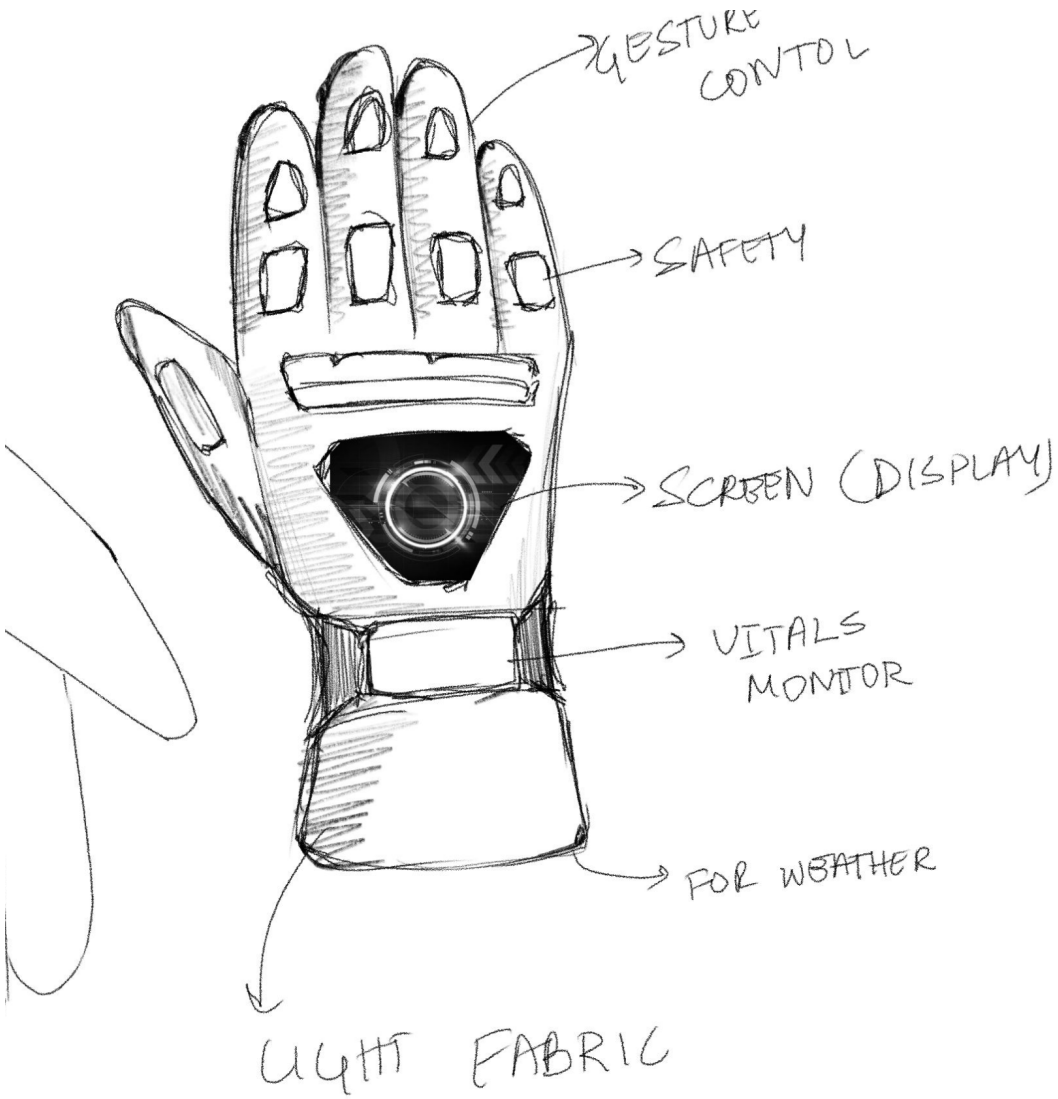
Pros:
Display of information is the best
Can access map based navigation
Can reduce gear fatigue
Situational awareness best

Cons
Limited interactions with the bike
Gesture control hands off the handle
Button based limited



Pros:
Can use it with any bike/ personal device.
Low Fatigue, excellent situational awareness.

Cons:
Can affect the safety and security
Additional riding gear for control.
Needs to be a family of devices to interact with

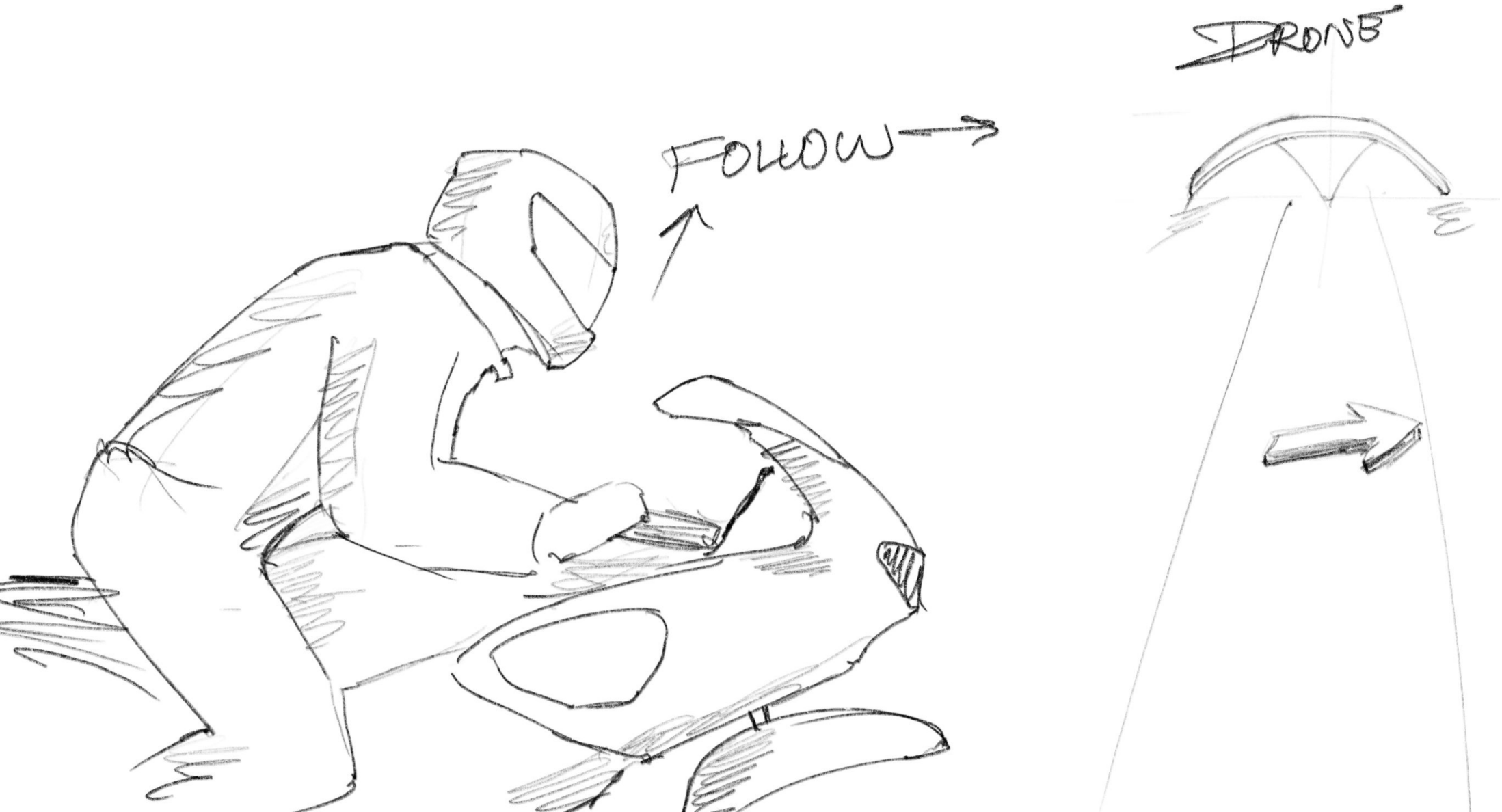


Pros:
Provides best control and interaction features.
Can be intuitive.

Cons:
The display tech is obsolete - Can only hint towards information.
Overall situational awareness poor.
Can only access turn by turn navigation.

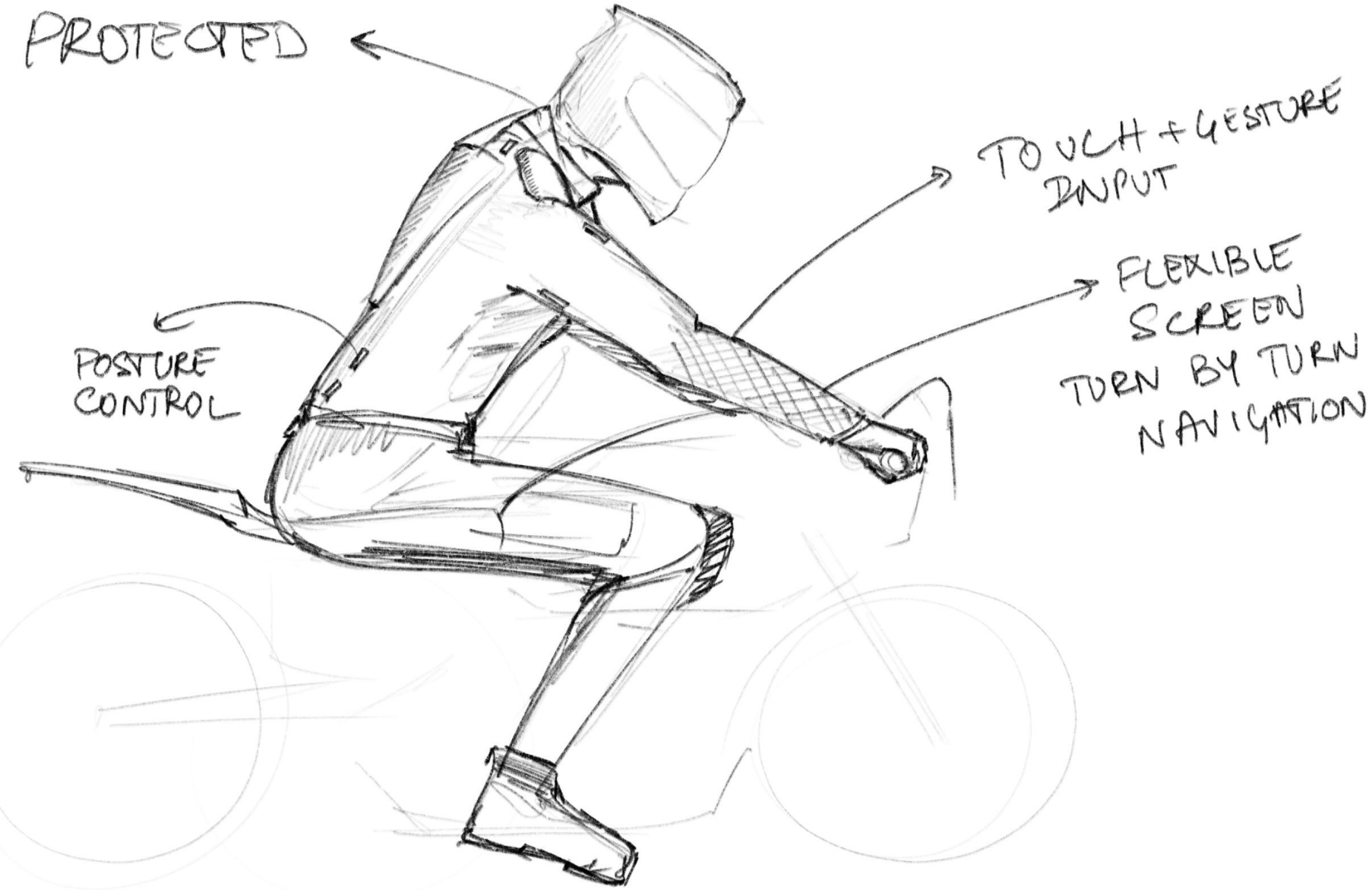
Pros:
Provides personal experiences.

Cons:
Difficult to control when riding - standalone



Can provide intuitive controls
Display full information
Excellent situational awareness. Maps can be accessed.

This design direction was considered the best to move forward with evaluationg it against the design brief.



THE WHAT WHY HOW STUDY?

COMPETITIVE ANALYSIS

The aim of the study was to find answers to the following questions

What are the concept designs from the worlds best companies in this sector?

Why are the concepts relevant and why are there certain design decisions taken

How is their approach of solving the what and the why of their problem statement?

Several companies are actively working on future technologies in the motorbike segment, aiming to redefine the riding experience and advance the industry. Here are some notable examples:

BMW Motorrad: BMW Motorrad, a division of the BMW Group, is dedicated to creating innovative and sustainable mobility solutions. They envision a future with electric motorcycles and have developed the BMW Motorrad Vision DC Roadster, an electric concept motorcycle that showcases their commitment to electrification.

Cross Helmet: Cross Helmet is a technology company focused on enhancing rider safety and connectivity. Their flagship product, the CrossHelmet X1, is a smart motorcycle helmet equipped with a heads-up display (HUD), rearview camera, and advanced noise cancellation technology, offering riders improved situational awareness and communication capabilities.

Kawasaki: Kawasaki, a renowned motorcycle manufacturer, is actively involved in future technology development. They have been exploring electric motorcycle concepts and have showcased prototypes like the Kawasaki EV Endeavor. Kawasaki aims to combine performance, innovation, and sustainability in their upcoming electric models.

Jarvis: Jarvis, a startup based in Sweden, is working on autonomous technology for motorcycles. Their philosophy revolves around improving safety and convenience by integrating artificial intelligence and sensor systems into motorcycles, enabling them to navigate autonomously in traffic and adapt to various road conditions.

These companies share a common goal of pushing the boundaries of motorbike technology, whether through electric mobility, connectivity, autonomy, or enhanced safety features, ultimately redefining the future of motorcycle riding.

BMW MOTORRAD NEXT VISION 100

The BMW Motorrad NEXT VISION 100 introduces an innovative concept for a cruising vehicle that revolutionizes the riding experience. This futuristic marvel seamlessly integrates a Heads-Up Display (HUD) into the vehicle, allowing riders to interact with vital information and control various aspects of the bike effortlessly. Utilizing intuitive gesture-based controls, riders can effortlessly switch between different modes, such as sport, touring, or eco, enhancing the versatility and adaptability of the vehicle. Furthermore, the incorporation of gesture-based indicators adds a touch of convenience and safety, making it easier for riders to communicate their intentions to other road users.

Source: https://www.youtube.com/watch?v=Jix_p2BgByU

BMW MOTORRAD NEXT VISION 100

Insights:

1. Gestures for opening the storage on a jacket
2. Companion type tech
3. Cruising type vehicle, HUD interacting with the vehicle,
4. Gestures mostly for controlling mode of the vehicle, indicators.

Source: https://www.youtube.com/watch?v=Jix_p2BgByU

KAWASAKI J CONCEPT

The Kawasaki Concept J is an exciting glimpse into the future of motorcycles. This visionary concept combines advanced technology with a sleek design, showcasing Kawasaki's commitment to innovation. The Concept J features a cutting-edge Heads-Up Display (HUD) that seamlessly integrates with the motorcycle, providing riders with essential information at a glance. Gestures play a key role in controlling the various modes and functions of the bike, allowing for a seamless and intuitive riding experience. Additionally, the concept incorporates futuristic indicators that enhance visibility and communication on the road. With the Kawasaki Concept J, the boundaries of motorcycle design and technology are pushed, promising an exhilarating and connected riding future.

Insights:

1. Focus on giving futuristic feeling - cyborg type
2. Distracting, engaging, complete control feeling
3. All Information on the display
4. Mostly voice control Feedback related to voice/mode etc displayed

Source: https://www.youtube.com/watch?v=a_hOpP8rPYI

CROSS HELMET

The Cross Helmet is an extraordinary innovation in motorcycle headgear that blends advanced technology with enhanced safety features. This futuristic helmet boasts a sleek and aerodynamic design, coupled with a built-in Heads-Up Display (HUD) that provides riders with a wealth of information right in their line of sight. From navigation directions to weather updates, the HUD ensures that riders stay connected and informed without distractions. The Cross Helmet also integrates a rearview camera, eliminating blind spots and enhancing situational awareness. With its cutting-edge features and emphasis on safety, the Cross Helmet represents a remarkable leap forward in motorcycle helmet technology, promising a thrilling yet secure riding experience.

Insights:

1. Focus on giving futuristic feeling
2. Complete control feeling
3. Voice control/ Touch sensors All display concepts top.
4. All information non interactable.

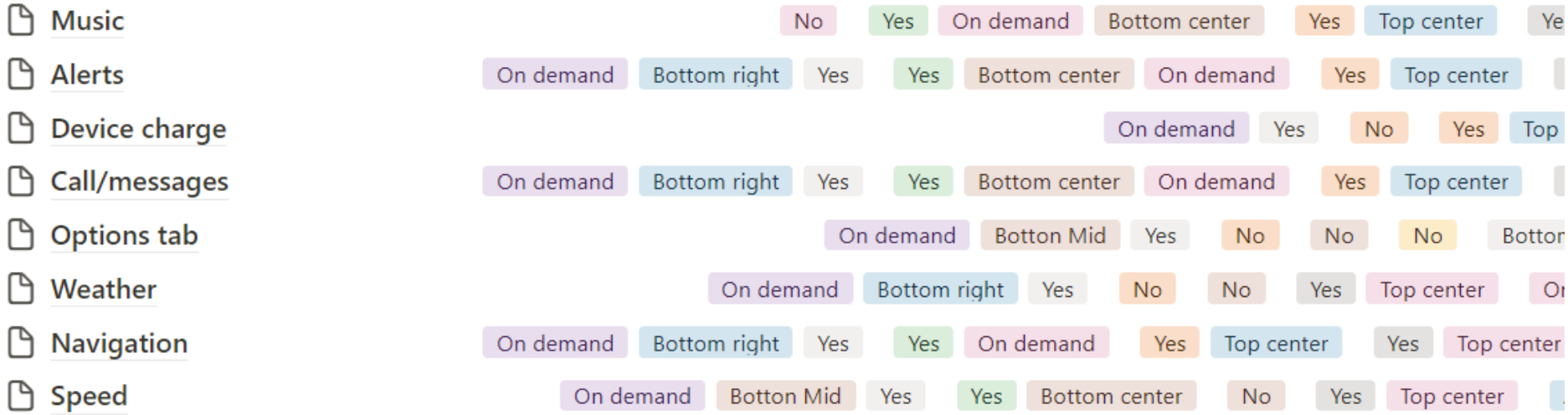
Source: https://www.crosshelmet.com/

COMPETITIVE ANALYSIS

Parameter	BMW HUD	BMW Motorrad	Cross helmet	Jarvis X
Music	Yes, On demand, Bottom c	No	Yes, Top center	Yes, Top center
Alerts	Yes, Bottom center, On der	On demand, Bottom right	Yes, Top center	Yes, Top center
Gear OPEN	Yes, Bottom center	No	No	No
Content creation tool	Yes, On startup	No	Yes, Top center	No
Engine oil/ tire pressure	Yes, On startup	No	No	No
Health stats	No	No	No	No
Current location	No	No	No	No
Device charge	No	On demand, Yes	Yes, Top center	No
Charge status bike	No	No	No	No
Call/messages	Yes, Bottom center, On der	On demand, Bottom right	Yes, Top center	Yes, Top center
Bike Mode	No	No	No	No
Options tab	No	On demand, Botton Mid, Y	No	No
Weather	No	On demand, Bottom right	No	Yes, Top center
Time	No	No	Yes, Top center	Yes, Top center
Navigation	Yes, On demand	On demand, Bottom right	Yes, Top center	Yes, Top center
Speed	Yes, Bottom center	On demand, Botton Mid, Y	No	Yes, Top center

To understand and derive insights clustering of the information was done based on the features

COMPETITIVE ANALYSIS



Insights:
These are the list of parameters that are displayed in the field of view of the user.
They are " On demand" features, the user has to do some action/ gesture/ voice to activate the feature.

COMPETITIVE ANALYSIS

Aa Parameter	BMW Motorrad	Kawasaki Concept J	Cross helmet
Navigation	On demand Bottom right Yes	On demand Center Yes	Yes Top center
Call/messages	On demand Bottom right Yes	On demand Top right Yes	Yes Top center
Alerts	On demand Bottom right Yes	On demand Center Yes	Yes Top center

Insights:
These are the list of parameters that are displayed in the field of view of the user.
They are " Non reactive" features, the user does not to any action/ gesture/ voice to use the feature.

Aa Parameter	BMW Motorrad	Kawasaki Concept J	Cross helmet
Charge status bike	No	No	No
Current location	No	No	No
Health stats	No	No	No

Insights:
These are the list of parameters that are "not displayed" in the field of view of the user.

TECHNOLOGY REFERENCES FOR INTERACTION

When it comes to technology reference, several standout products have left their mark. Leap Motion, a hand-tracking device, revolutionized interaction with computers by allowing users to control digital content with gestures and movements. The Apple Watch, a pioneer in wearable technology, seamlessly combines style and functionality, enabling users to stay connected, monitor health metrics, and access various apps on their wrists. Flex Gloves, equipped with sensors, offer a unique way to interact with virtual reality (VR) environments, allowing users to manipulate and feel objects in VR spaces. These products exemplify the transformative power of technology, pushing the boundaries of what's possible and inspiring further innovation in their respective fields.

Source: https://mimugloves.com/gloves/
https://www.ultraleap.com/product/leap-motion-controller/
https://www.pcmag.com/how-to/control-apple-watch-with-hand-gestures

QUALITATIVE STUDY

ADVENTURE

GAUNTLET

RACE

OFF-ROAD

Construction: Participants emphasized the importance of durable materials like leather or synthetic fabrics, highlighting the need for abrasion resistance and long-lasting performance.

Impact Protection: Riders expressed a preference for gloves with reinforced knuckle guards, palm sliders, and strategic padding to minimize the risk of injuries during accidents or falls.

Ventilation: Participants highlighted the significance of gloves with perforated panels or mesh inserts, enabling proper airflow to keep their hands cool and comfortable during long rides.

Closure Systems: Riders favored gloves with secure closure systems such as adjustable straps or Velcro, ensuring a snug fit and preventing slippage during rides.

Touchscreen Compatibility: Participants highlighted the convenience of gloves with touchscreen compatibility on the fingertips, allowing them to use navigation systems or smartphones without removing their gloves.

Visibility: Riders emphasized the importance of reflective elements or high-visibility accents on gloves to enhance visibility during night rides, promoting safety on the road.

Source: https://www.webbikeworld.com/motorcycle-riding-gear/

SAFETY STANDARDS

EU CE CERTIFICATION

The CE certification, which stands for "Conformité Européene" (European Conformity), is a mandatory conformity marking for certain products sold within the European Economic Area (EEA). It indicates that a product complies with the relevant European Union (EU) directives and meets the essential requirements for safety, health, and environmental protection.

The CE certification is required for a wide range of products, including machinery, electrical and electronic equipment, medical devices, toys, personal protective equipment, construction products, and more. It is not a quality mark but rather a declaration by the manufacturer that the product meets the applicable EU requirements.

Topics to consider:

1. Ergonomics
2. Optimum level of protection
3. Suitable constituent materials
4. Comfort and effectiveness
5. Manufacturer's instructions and information

When it comes to motorcycle riding gloves, safety certification plays a crucial role in ensuring the rider's protection on the road. These certifications guarantee that the gloves meet specific standards and requirements for optimal safety. Several factors are considered in the certification process, focusing on areas of protection, ergonomics, constituent materials, comfort, effectiveness, and manufacturer's instructions.

Firstly, ergonomics are vital in motorcycle gloves. They should fit well, allowing for proper hand movement and grip on the controls. Certification ensures that the gloves are designed with the rider's comfort and dexterity in mind, enabling them to maneuver their bike easily.

The optimum level of protection is another key aspect. CE certification ensures that motorcycle gloves provide adequate protection in critical areas. These include the knuckles, fingers, palms, and wrists. Certification ensures that the gloves are constructed with appropriate impact-absorbing materials and reinforced protection to minimize the risk of injury in the event of a crash or fall.

Suitable constituent materials are also assessed during the certification process. The gloves should be made from high-quality materials that offer durability, abrasion resistance, and protection against the elements. Certification verifies that the gloves meet the required standards for materials used, ensuring their reliability and effectiveness in various weather conditions.

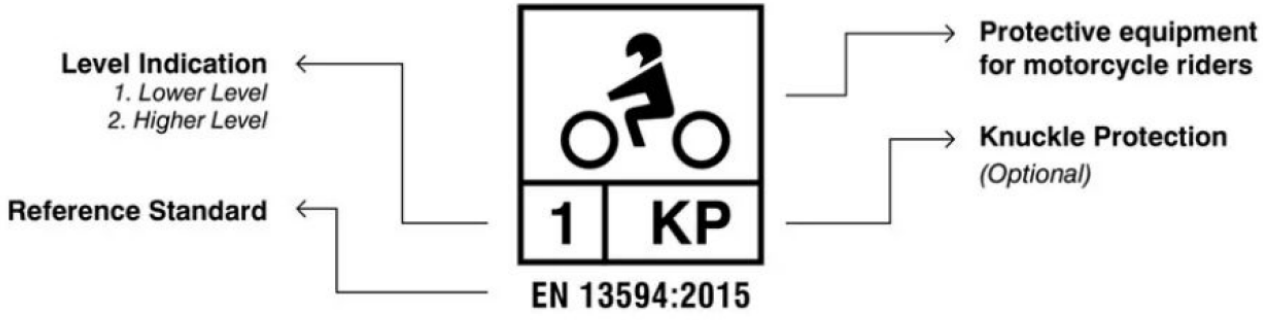
Comfort and effectiveness go hand in hand. Certified gloves are designed to provide both comfort and functionality. They should offer proper ventilation to prevent excessive sweating and maintain a comfortable temperature. The gloves should also have

effective grip features to enhance control of the motorcycle, even in wet conditions.

Lastly, manufacturer's instructions and information play a vital role in safety certification. Certified gloves come with clear instructions on usage, maintenance, and care. They provide essential information on the limitations, lifespan, and recommended replacement intervals. This ensures that riders have the necessary guidance to use the gloves correctly and maximize their protective benefits.

Overall, obtaining safety certification for motorcycle riding gloves ensures that they meet stringent standards for ergonomics, protection, materials, comfort, and usability. This certification provides riders with the assurance that their gloves are designed and tested to offer the highest level of safety during their rides.

▸	**Each product shall be permanently marked with at least the following information:**
01	Name or trademark of the manufacturer
02	Designation of the product
03	Number and year of the European Standard (EN 13594:2015)
04	Pictogram as shown below containing the relevant information
05	CE marking & I-booklet pictogram
06	Size designation



CE MARKING

Source: https://www.revitsport.com/en/revit-ce-certification

INTERACTION FEATURES

FEATURES IDEATION

BikeHUD like features?
Fighter jet like features?
Race car F1 like features?
Gaming like features?

Gestures - electronic interaction

Hololens
Quest
HTC vive

Gestures - Physical

Bikers hand signs

F1 - to change the screen modes

F2 - select an option on screen

F3 - Audio+Music controls

F4 - Call+notification control

F5 - Voice activation

F6 - Display ON/OFF

F7 - Navigation - Quit + Recentre

F8 - Switch Modes of the bike - Performance

F9 - Trip Controls (Start / stop)

F10 - Content creation - Take photo/ record video

F11 - SOS/ call for help

Future interactions:

Gaze assisted
Point at object interaction
Focus type interaction
Eye/face tracking interaction
Automated AI assisted

INTERACTION OF A GESTURE

Performing a gesture is divided into four steps:

Lets taking switching bike mode as example

1. Intent: The biker thinks of changong the bike mode when hes comfortable. the thought counts as the intent.

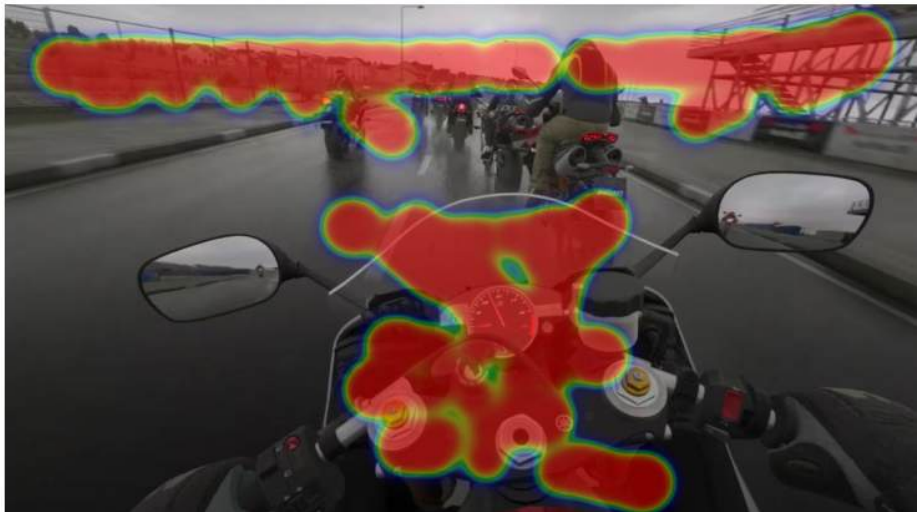
2. Gesture: The biker performs the necessary gesture to change the bike mode.

3. Confirm: The biker should recieve some sort of confirmation that the gesture is accepted by the system.

4. Feedback: The biker feels the change in performace of the bike and recieves the feedback that the gesture is accepted appropriately.

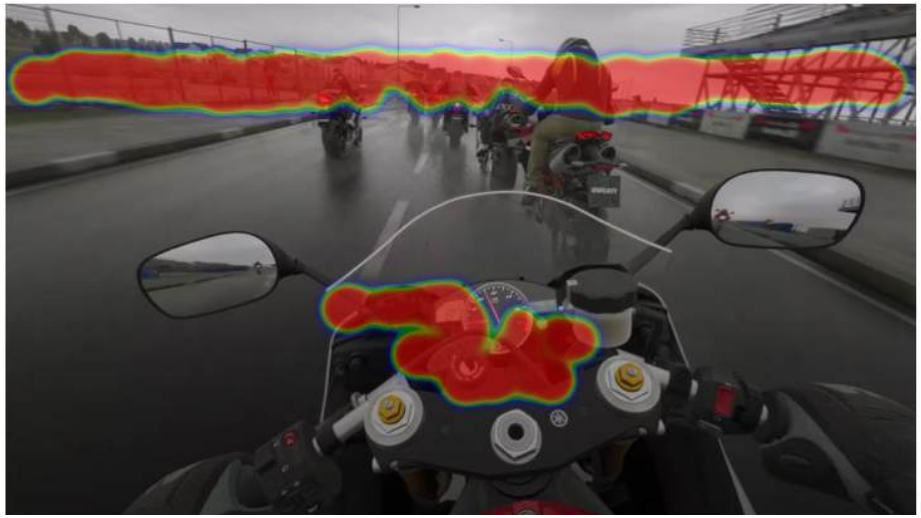
RANGE OF A GESTURE

INTERACTION OF A GESTURE

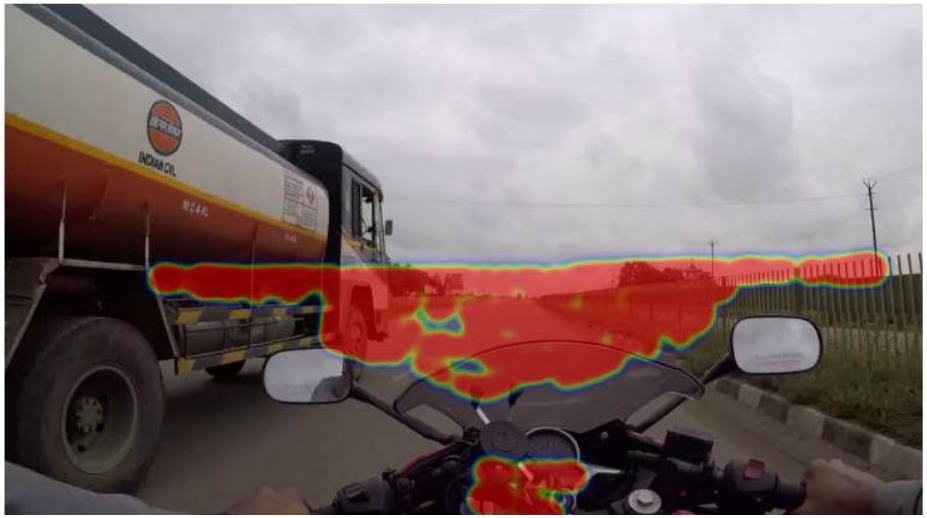


Rider with less experience on race track

Rider while riding in the city



Rider with high experience on race track



Rider while cruising on highways/ entering cities

Sources: https://www.youtube.com/watch?v=f1kddCTu86M

GAMIFICATION

Game screens

Understanding Gamification aspect:
Insights: Non blockish information - the information presented are only the ones that user takes decisions on.
Navigation - highlighted bottom left
Time duration top right Speed via dial
Small numeric display , gear number

Sources: https://www.youtube.com/watch?v=Jlj41Yv47TE

AR SCREEN DETAILS


NON CRITICAL INFO / SLOW CHANGING
PERIPHERAL VISION
HORIZON
NO INFORMATION
HORIZON
PERIPHERAL VISION
FOCUS
FUNCTIONAL
PARAMETERS
INTUITIVE DIRECTIONAL
PERFORMANCE
PARAMETERS
VISUAL INDICATORS
VISUAL INDICATORS

FEATURE LIST

Aa Features list	Frequency	Dependencies on Tech	Classification category
E1- Regen control	Most used	HUD Gesture Bike	Performance
G11 - SOS/ call for help	Emergency	SOS Gesture	Function Critical
G10 - Content creation - Take photo/ reco	Most used	Camera HUD Gesture	Function Non-critical
G9 - Trip Controls (Start / stop) / Options	Rarely used	Bike HUD Gesture	Function Non-critical
G8 - Switch Modes of the bike - Performar	Most used	Bike HUD Gesture	Performance
G7 - Navigation - Quit + Recentre	Moderately used	Phone Bike HUD Gestu	Function Critical
G6 - Display ON/OFF	Moderately used	HUD Gesture	Function Critical
G5 - Voice assist activation	Rarely used	Phone Audio HUD	Function Non-critical
G4 - Call+notification control	Moderately used	Phone Audio HUD Gest	Function Non-critical
G2 - select an option on screen / Confirm	Most used	HUD Gesture	Function Critical
G1 - to change the screen modes	Moderately used	HUD Gesture	Function Non-critical
G3 - Audio+Music controls	Moderately used	HUD Gesture	Function

FINAL FEATURE LIST

Aa Features list	Classification category	Frequency
E1- Regen control	Performance	Most used
G9 - Trip Controls (Start / stop) / Options	Function Non-critical	Rarely used
G8 - Switch Modes of the bike - Performan	Performance	Most used
G6 - Display ON/OFF	Function Critical	Moderately used
G2 - select an option on screen / Confirm ç	Function Critical	Most used
G1 - to change the screen modes	Function Non-critical	Moderately used
G3 - Audio+Music controls	Function	Moderately used

Dependencies based on Bike , Heads up Display and the gesture control device was finalised

FINAL INTERACTIONS

LEFT

Frequency

RIGHT

select an option on screen
/ Confirm gesture

Switch Modes of the bike

Regen control

Options

change the screen modes

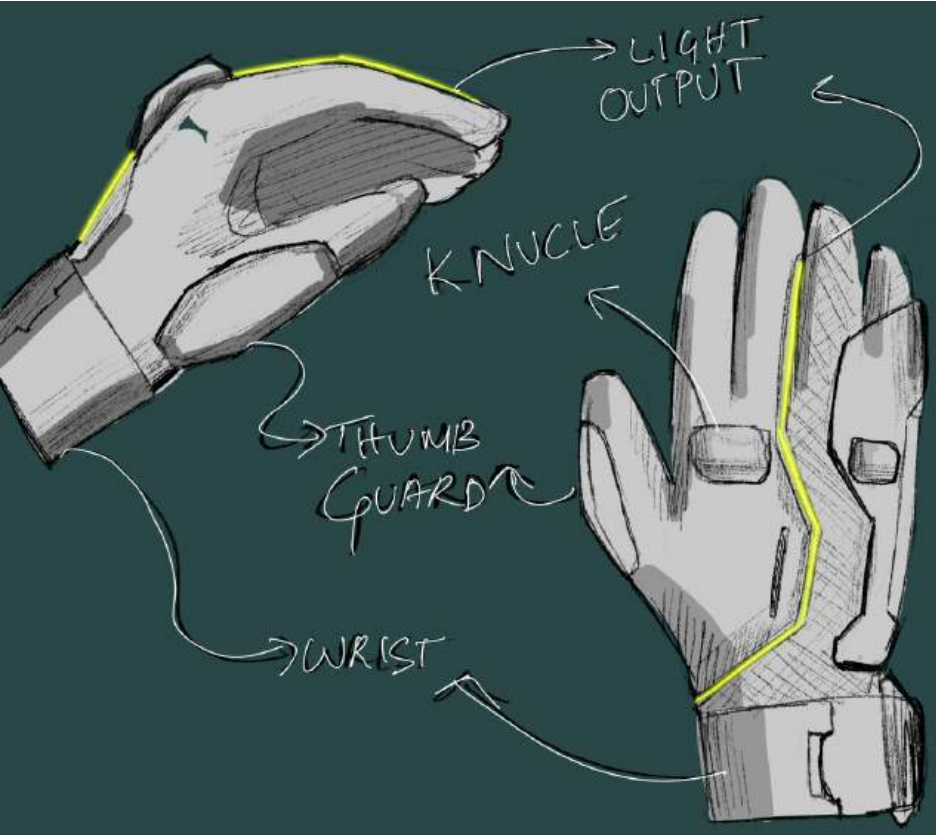
Display ON/OFF

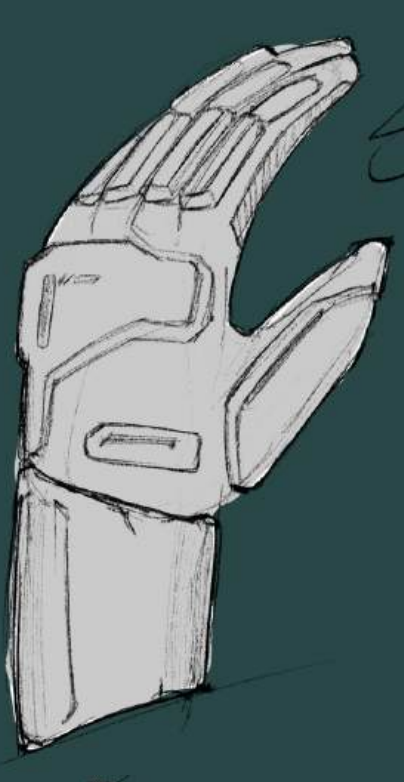
Audio+Music controls

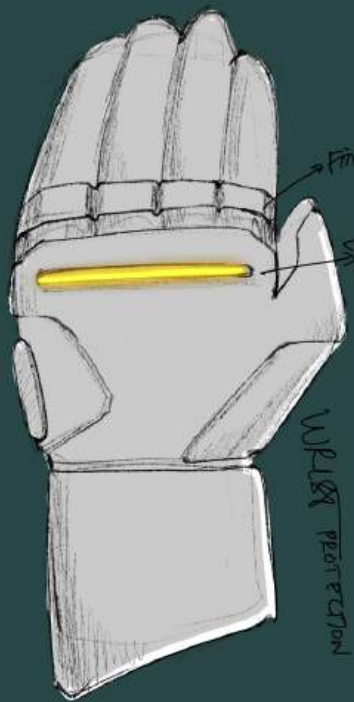
Features list

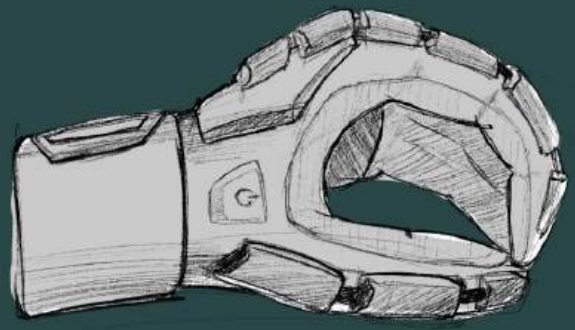
Aa Features list	Final gesture	Classification category	Frequency
E1- Regen control	R - Middle finger double tap	Performance	Most used
G8 - Switch Modes of the bike - Performance	R - Index finger double tap	Performance	Most used
G9 - Trip Controls (Start / stop) / Options	L - Long press Index finger (Options)	Function Non-critical	Rarely used
G6 - Display ON/OFF	L - Swipe up/down	Function Critical	Moderately used
G2 - select an option on screen / Confirm gesture	L - Index finger double tap	Function Critical	Most used
G1 - to change the screen modes	L - Two finger air swipe	Function Non-critical	Moderately used
G3 - Audio+Music controls	L - Clockwise/anticlockwise/ Index finger Double click	Function	Moderately used

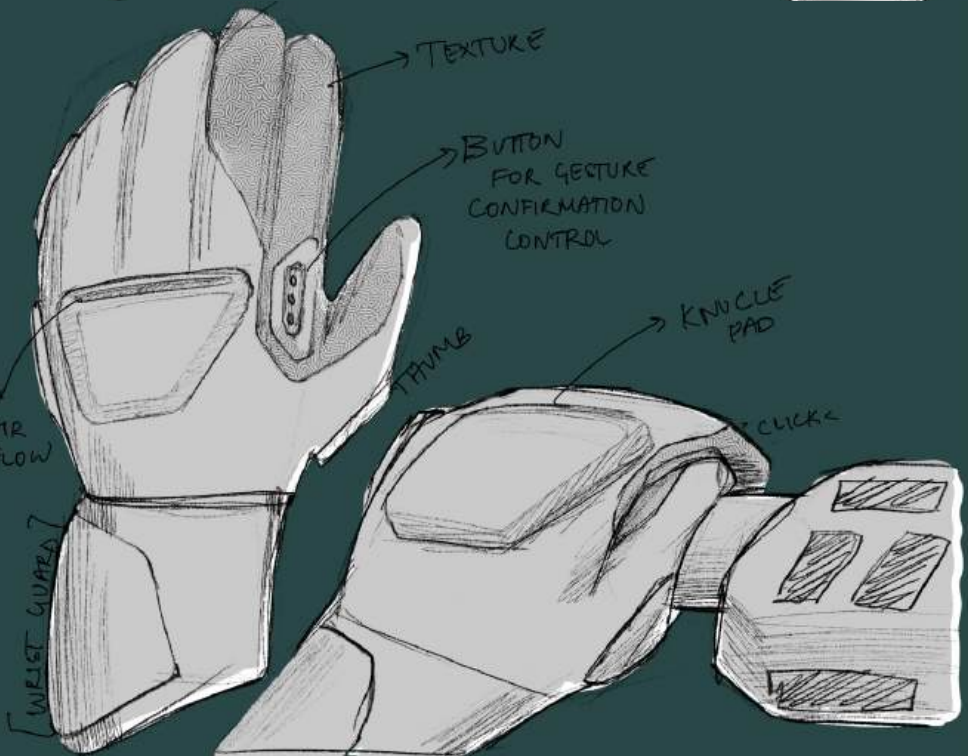
IDEATIONS


LIGHT OUTPUT
KNUCLE
THUMB GUARD
WRIST


SPACE TECH?
BLOCKISH


FINGER PROTECTION
INDICATOR LIGHTS
WRIST PROTECTION



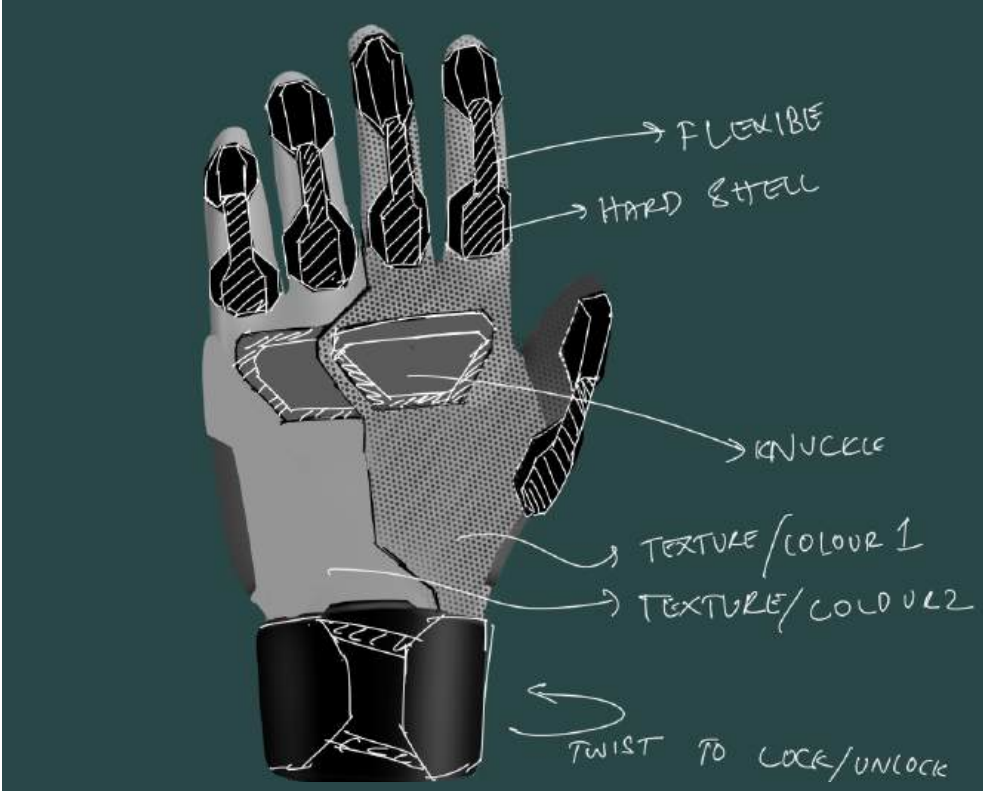

TEXTURE
BUTTON FOR GESTURE CONFIRMATION CONTROL
AIR FLOW
WRIST GUARD?
THUMB
KNUCLE PAD
CLICK

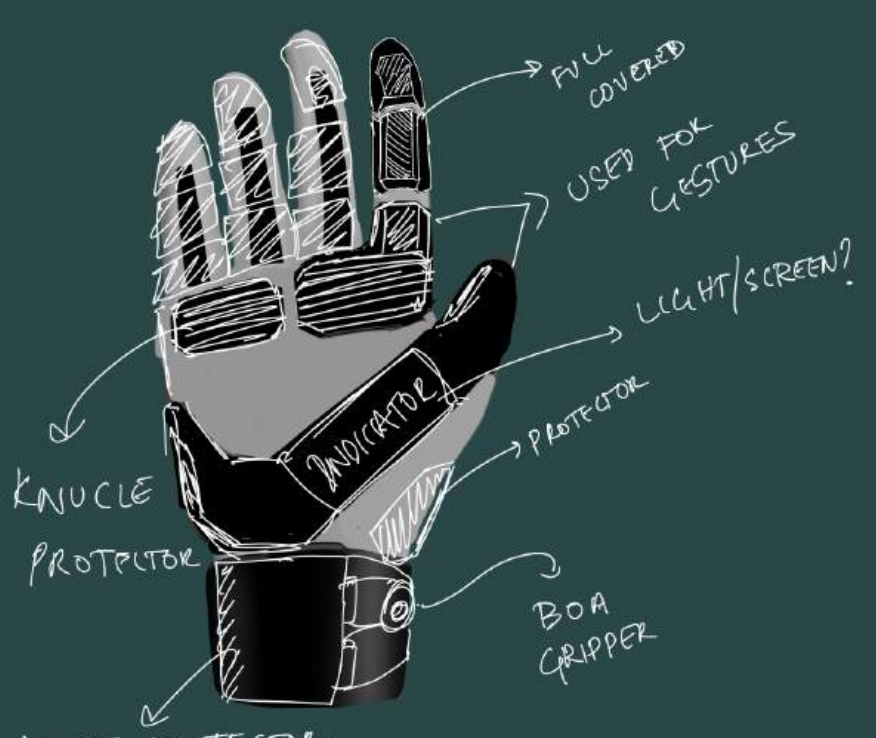

INDICATOR LIGHTS
PULL TO TIGHTEN


TEXT
GRIP
TOUCH
SLIDER

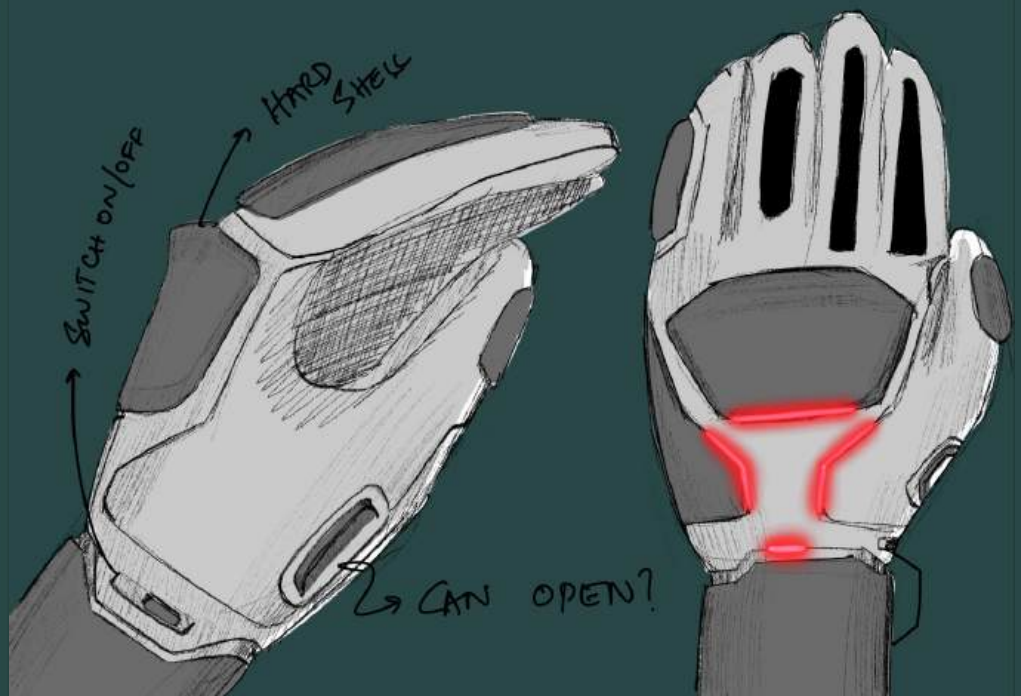

LITTLE FINGER PROTECTION
TOUCH SENSITIVE
GRIP
INDICATOR LIGHTS
CLIP
PULL TO TIGHTEN
CLICK TO RELEASE


SLIDER
CLICK TO RELEASE

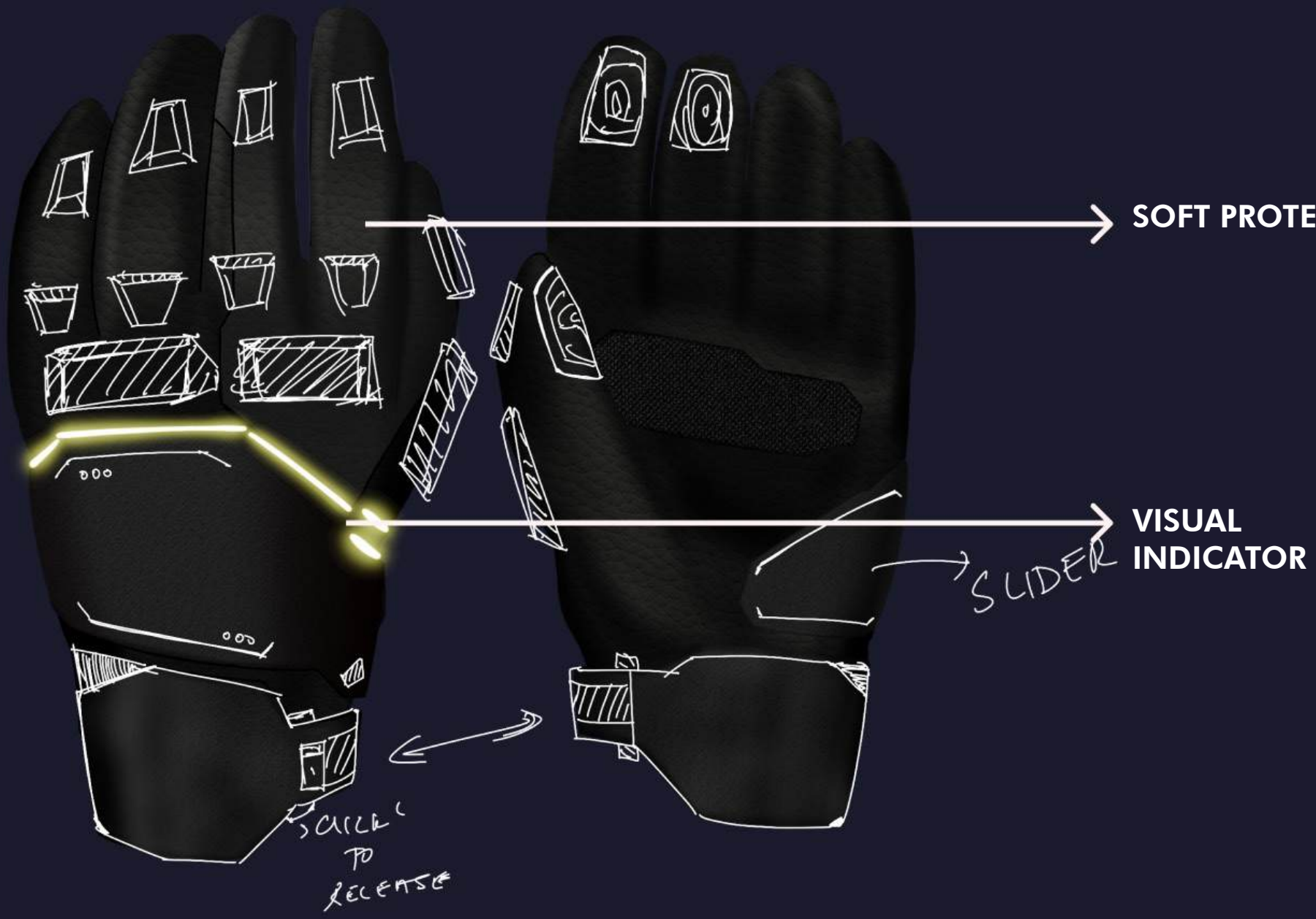

FLEXIBLE
HARD SHELL
KNUCKLE
TEXTURE/COLOUR 1
TEXTURE/COLOUR 2
TWIST TO LOCK/UNLOCK


FULL COVERED
USED FOR GESTURES
LIGHT/SCREEN?
INDICATOR
PROTECTOR
KNUCLE PROTECTOR
BOA GRIPPER
WRIST PROTECTOR

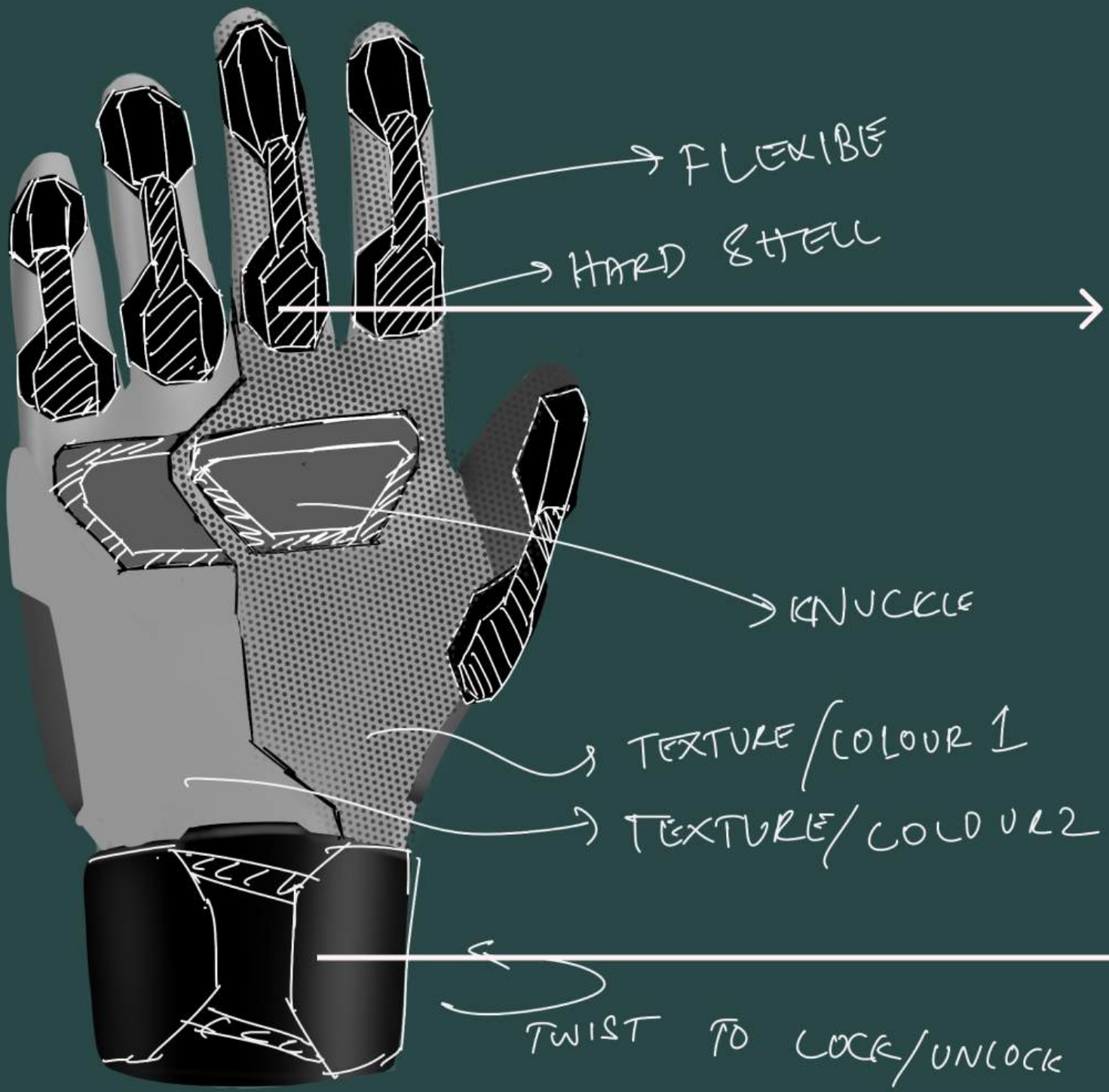

FINGER GUARDS
[FLEXIBLE]
KNUCKLE PROTECT
HARD
THUMB PROTECTOR
LIGHT INDICATOR ON/OFF
CLICK TO RELEASE


SWITCH ON/OFF
HARD SHELL
CAN OPEN?

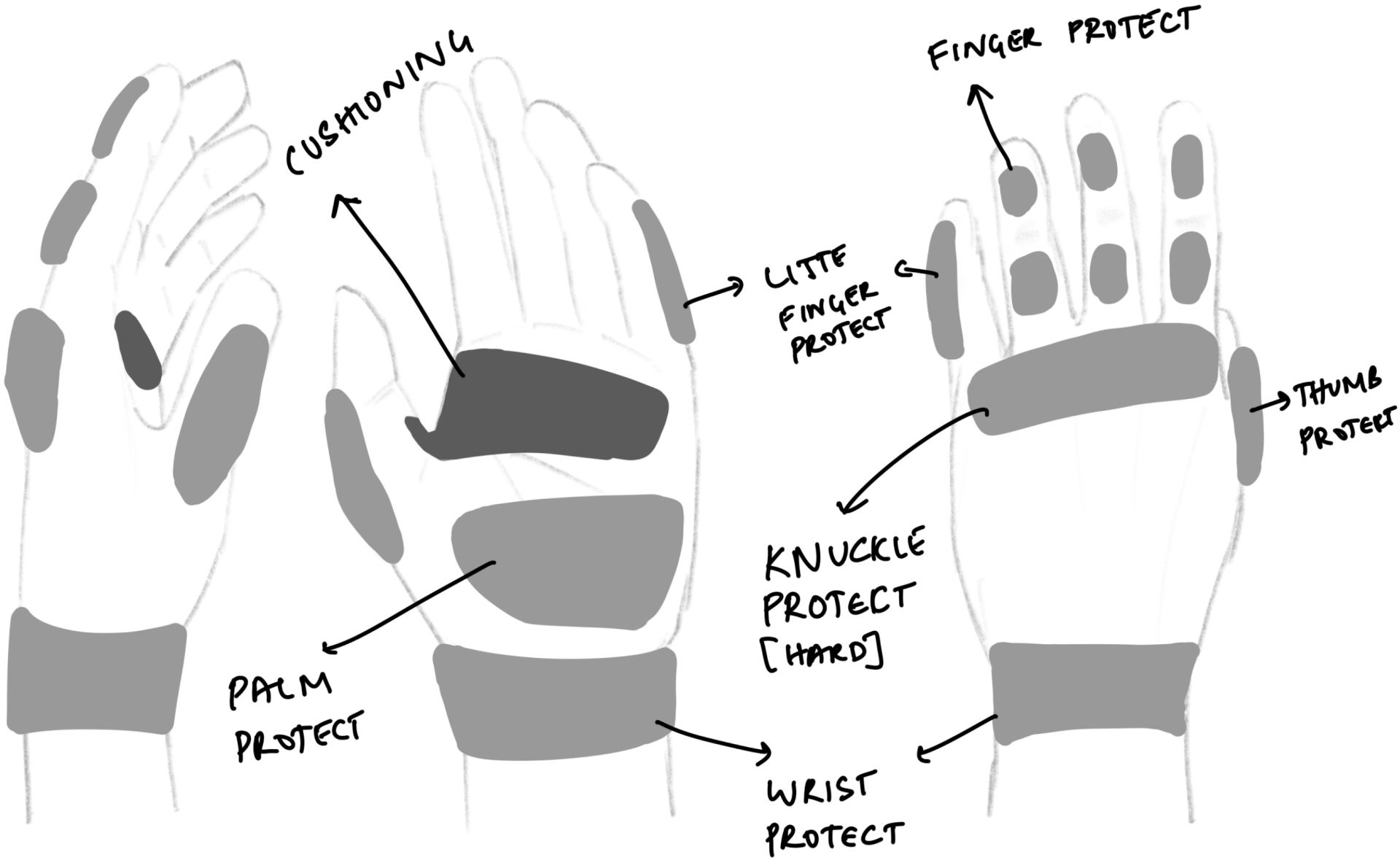
SELECTED IDEAS



SELECTEED IDEAS



PROTECTION DETAILS



FORM EXPLORATIONS


SPEED


SPACE


TACTICAL

SPEED

SPACE

TACTICAL

SPEED+ - SELECTED FORM

RIDERS GLOVE BENCHMARKING

VIATERRA HOLESHOT – SHORT MOTORCYCLE RIDING GLOVES

Durable Material:

The HOLESHOT uses goat skin leather that is durable, light and naturally water resistant. The thickness of the leather is kept high for enhanced abrasion resistance.

CE Level 1 Protection:

We chose the low profile KNOX SPS 303 to provide protection without interference during everyday use. For the right fit and better coverage, the knuckle protectors are configured in 2 sizes to work well for small & large hands. The fingers on the gloves have memory foam padding along with PVC protectors for impact protection.

Holeshot surpasses Level 2 standards for the knuckle, palm and wrist to ensure maximum safety on your daily commutes!

Palm Abrasion Protection as measured by mean abrasion time on palm area - 3.5X Level 2 standard
Knuckle Impact Protection as measured by mean transmitted peak force on the knuckles - 3X Level 2 standard
Wrist Closure Resistance measured as force held for 30 seconds - Meets Level 2 standard

Excellent Ventilation & Breathability:

Heavy duty 3D air mesh and perforated leather used throughout to allow maximum air flow - perfect for hot, humid Indian weather!

Enhanced Comfort:

We have also included accordion on the fingers for additional stretch & comfort when operating the clutch and brake. An additional memory foam layer is placed under the knuckle protector with enhanced coverage for added comfort.

RIDERS GLOVE BENCHMARKING

VIATERRA HOLESHOT – SHORT MOTORCYCLE RIDING GLOVES

Product features:

Meets CE Level 1 & exceeds Level 2 for key metrics
Palm Abrasion Protection as measured by mean abrasion time on palm area - 3.5X Level 2 standard

Knuckle Impact Protection as measured by mean transmitted peak force on the knuckles - 3X Level 2 standard

Wrist Closure Resistance measured as force held for 30 seconds - Meets Level 2 standard

Impact Protection that is comfortable
Dual Density hard TPU protectors are provided to absorb impact on knuckles.

An additional memory foam layer is placed under the knuckle protector with enhanced coverage for added comfort.

Patented KNOX SPS 303 for scaphoid protection
Knox Scaphoid Protection System (SPS) on the palm to eliminate the grab effect that occurs when the palm contacts the road.

Holeshot uses the KNOX SPS 303, made from a layer of Knox's latest abrasion-resistant LDPE material.

Goatskin Leather for enhanced abrasion protection
The Holeshot uses goatskin leather that is durable, light and naturally water-resistant.

Finger impact protection + accordion for comfort
The fingers on the gloves have PVC protectors and memory foam padding for impact protection.

Excellent Ventilation & Breathability
Heavy duty 3D air mesh and perforated leather used throughout to allow maximum air flow - perfect for hot, humid Indian weather

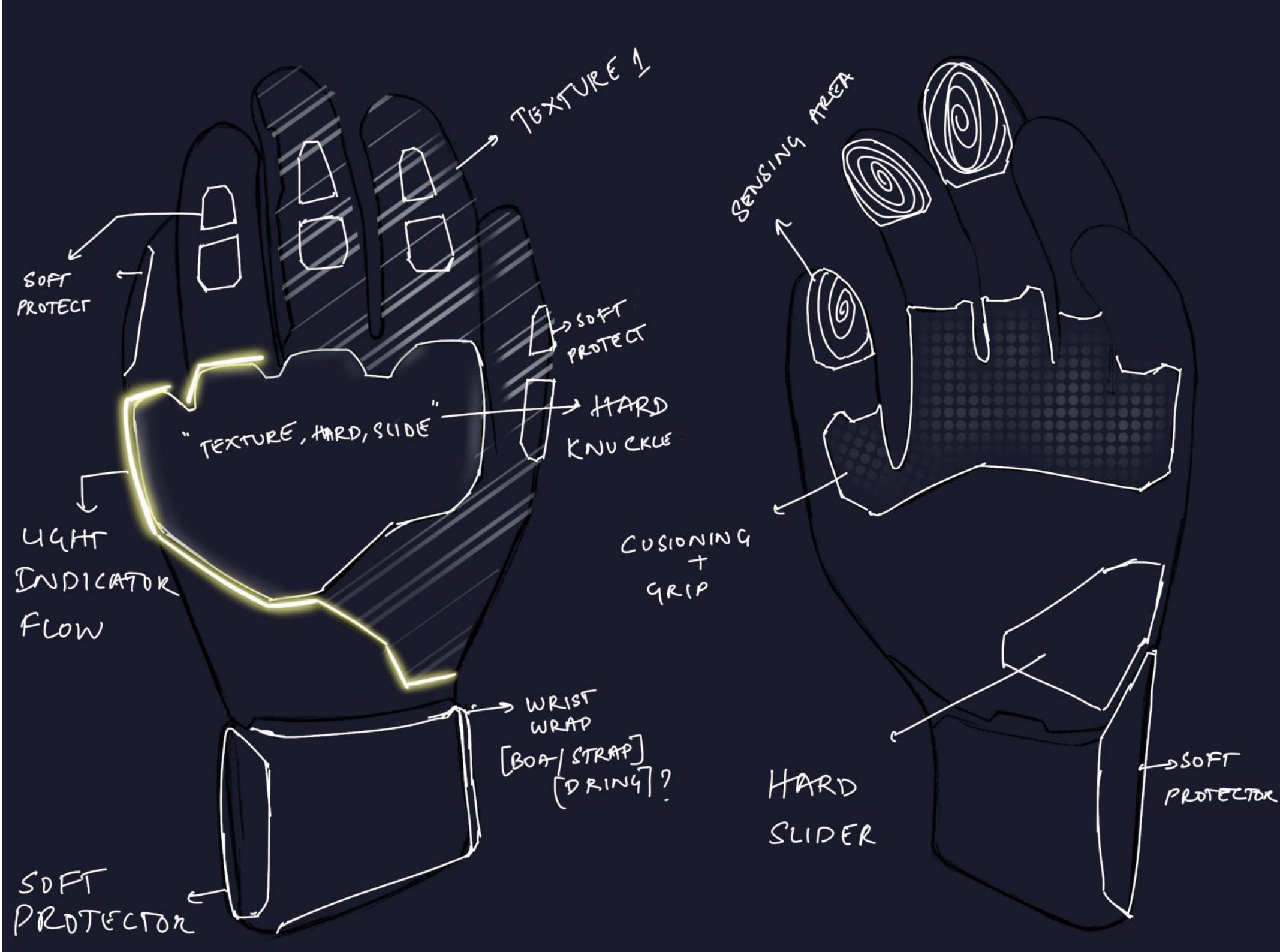
Silicone SuperGrip for smooth throttle operation
Grippier palms to hold bars lightly while operating throttle smoothly and without stress

Phone Friendly for both hands
The Holeshot has special conductive leather panels strategically placed on the index finger and thumb tips of both hands - so you can operate your smartphone during quick breaks/ stops without removing the gloves!

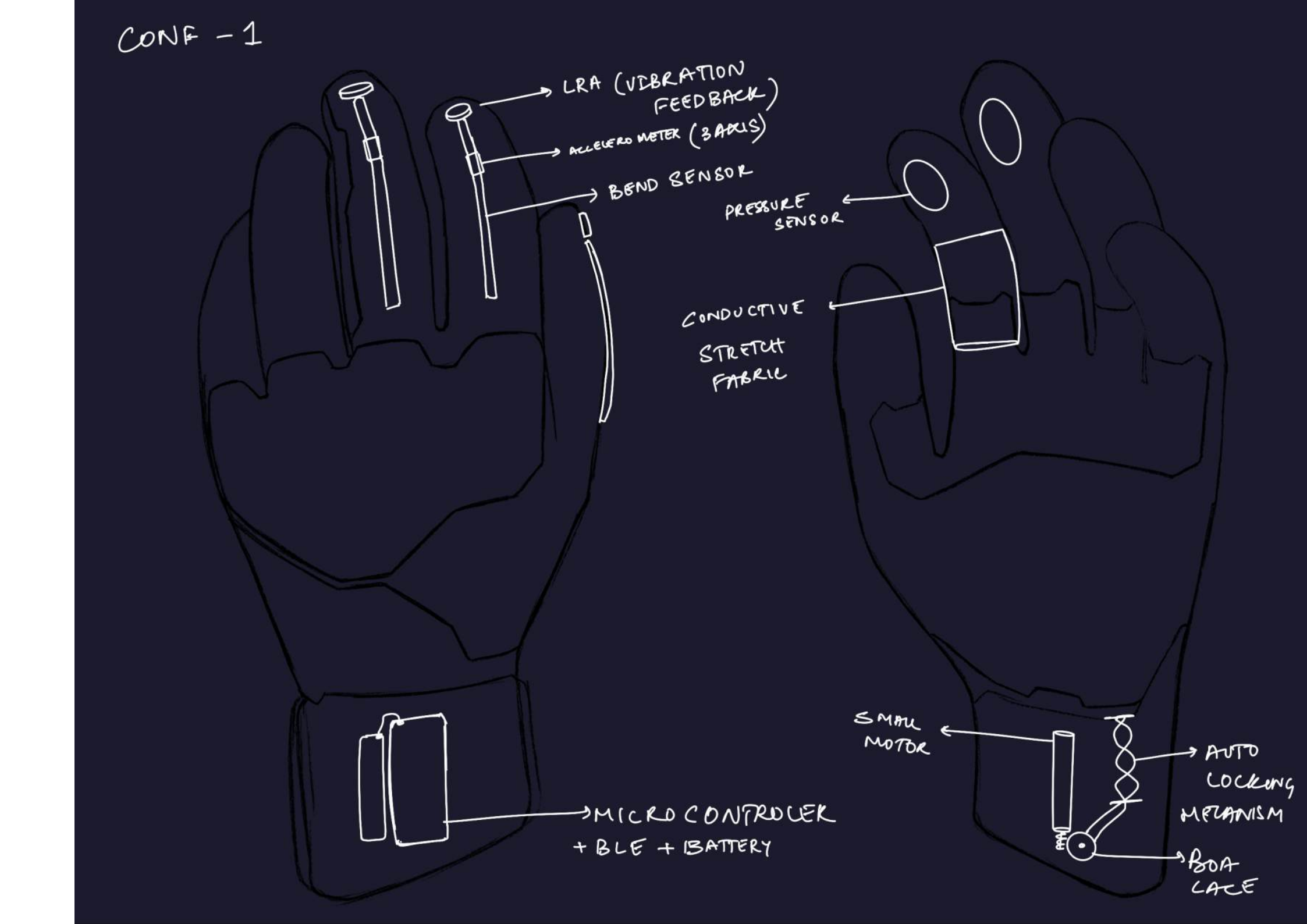
This leather has properties that mimic a conductive path and enable easy operation of touch-sensitive electronic devices.

https://viaterragear.com/

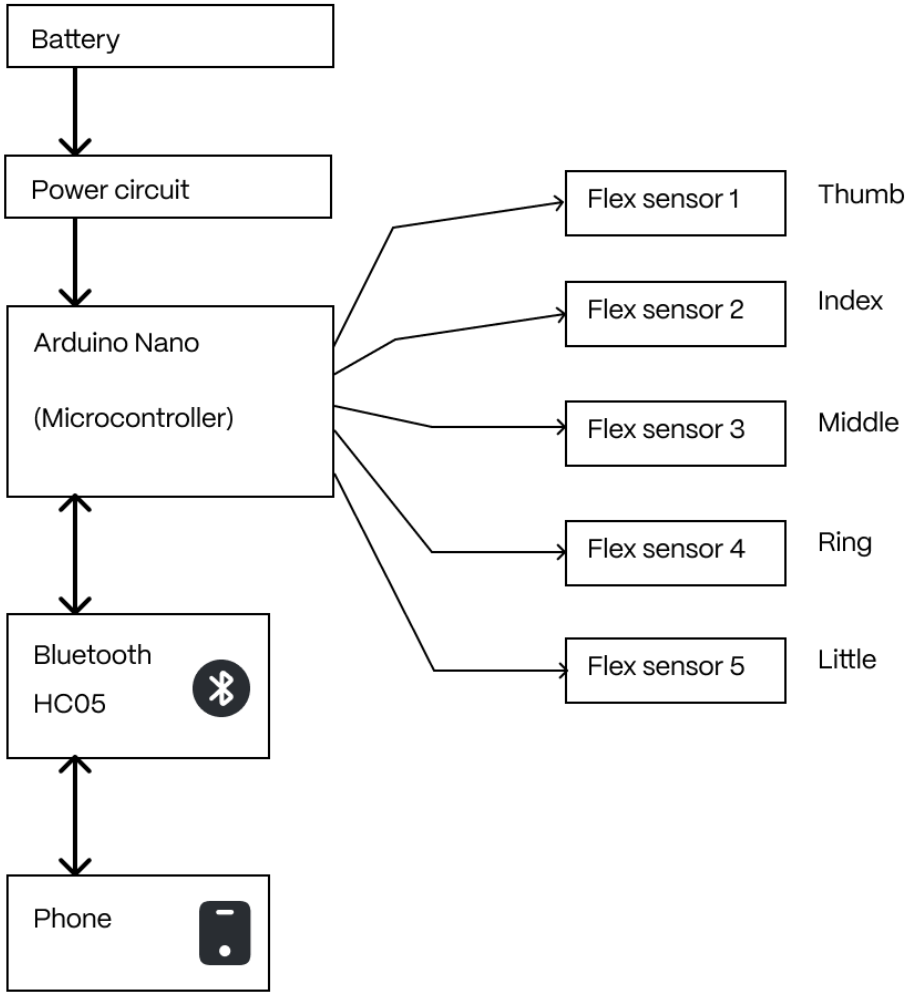
FINAL CONCEPT FEATURES


TEXTURE 1
SOFT PROTECT
SOFT PROTECT
HARD KNUCKLE
" TEXTURE, HARD, SLIDE "
LIGHT INDICATOR FLOW
WRIST WRAP
[BOA/STRAP]
[D RING]?
SOFT PROTECTOR
SENSING AREA
CUSIONING + GRIP
HARD SLIDER
SOFT PROTECTOR

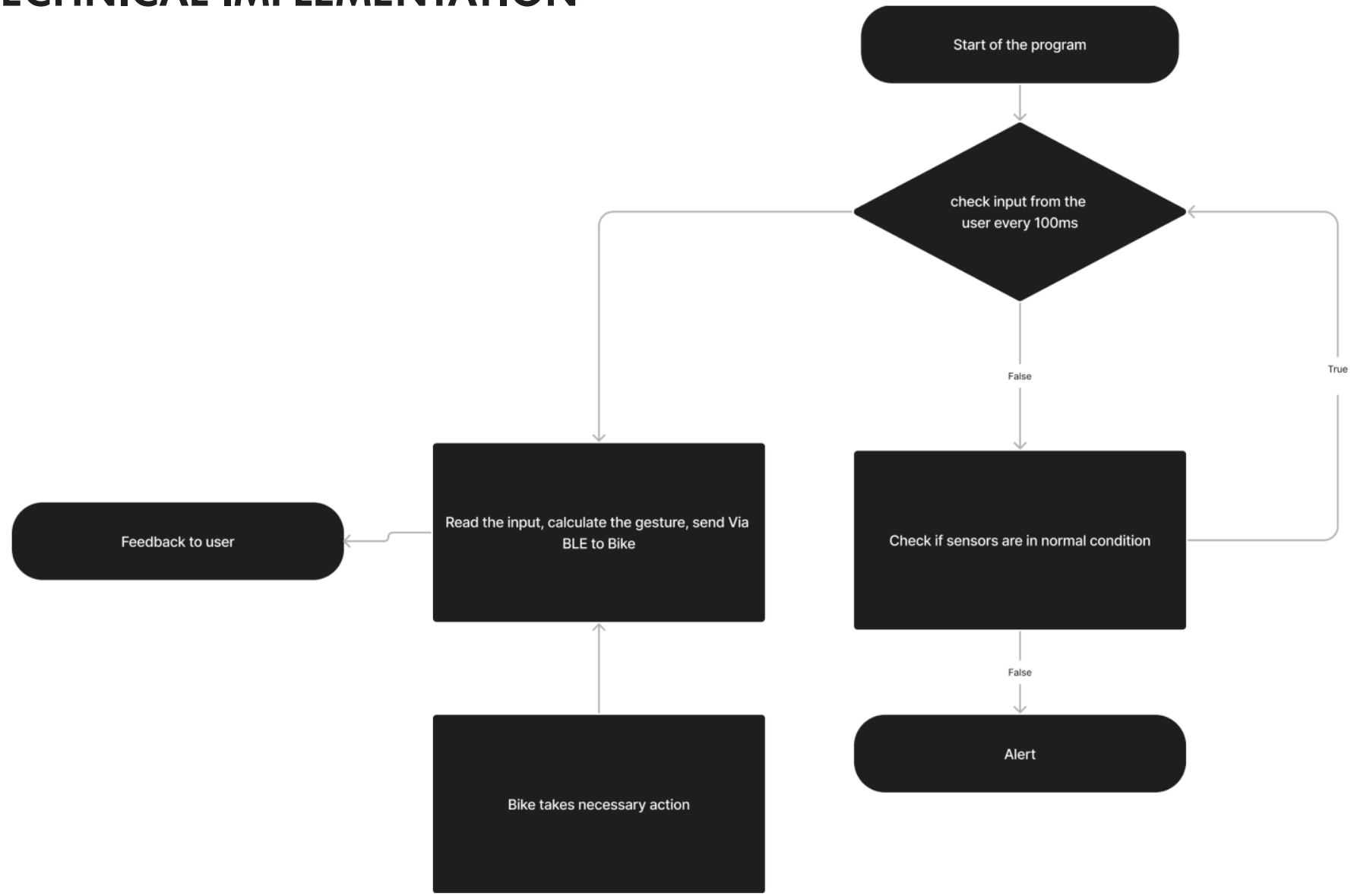
FINAL TECH FEATURES


CONF - 1
LRA (VIBRATION FEEDBACK)
ACCELERO METER (3 AXIS)
BEND SENSOR
PRESSURE SENSOR
CONDUCTIVE STRETCH FABRIC
MICRO CONTROLER + BLE + BATTERY
SMALL MOTOR
AUTO LOCKING MECHANISM
BOA LACE

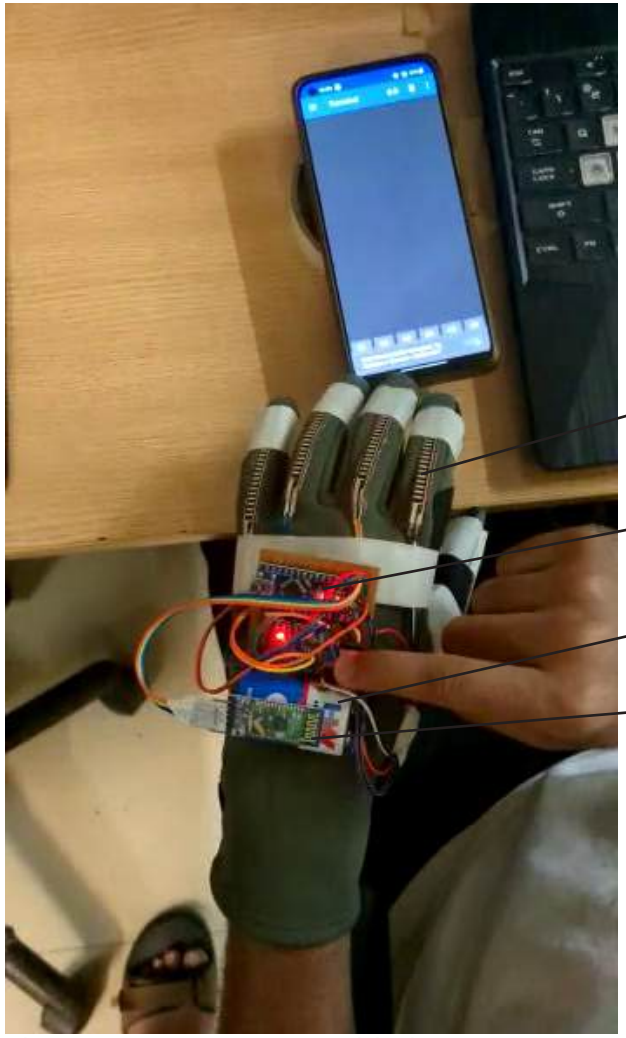
TECHNICAL IMPLEMENTATION



TECHNICAL IMPLEMENTATION



TECHNICAL IMPLEMENTATION



Electronic components added on existing glove to detect gestures

Continous gesture detection on phone via Bluetooth

Detection of 1 finger gesture

Detection of 2 finger gesture

Detection of 3 finger gesture

GLOVES IN THE MARKET

These gloves were used as an image board to understand the current glove features, form and colour schemes used.

Source: https://www.webbikeworld.com/motorcycle-riding-gear/

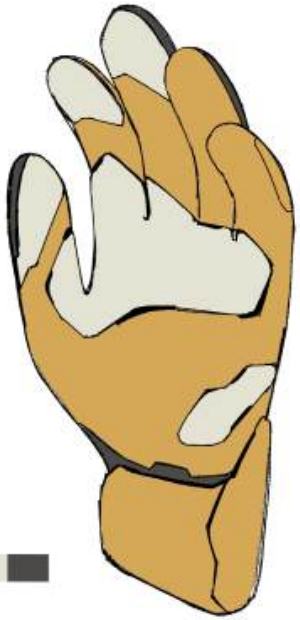
COLOUR BOARD

Keywords:
Endurance
Energetic
Balance
Challenging

COLOUR BOARD

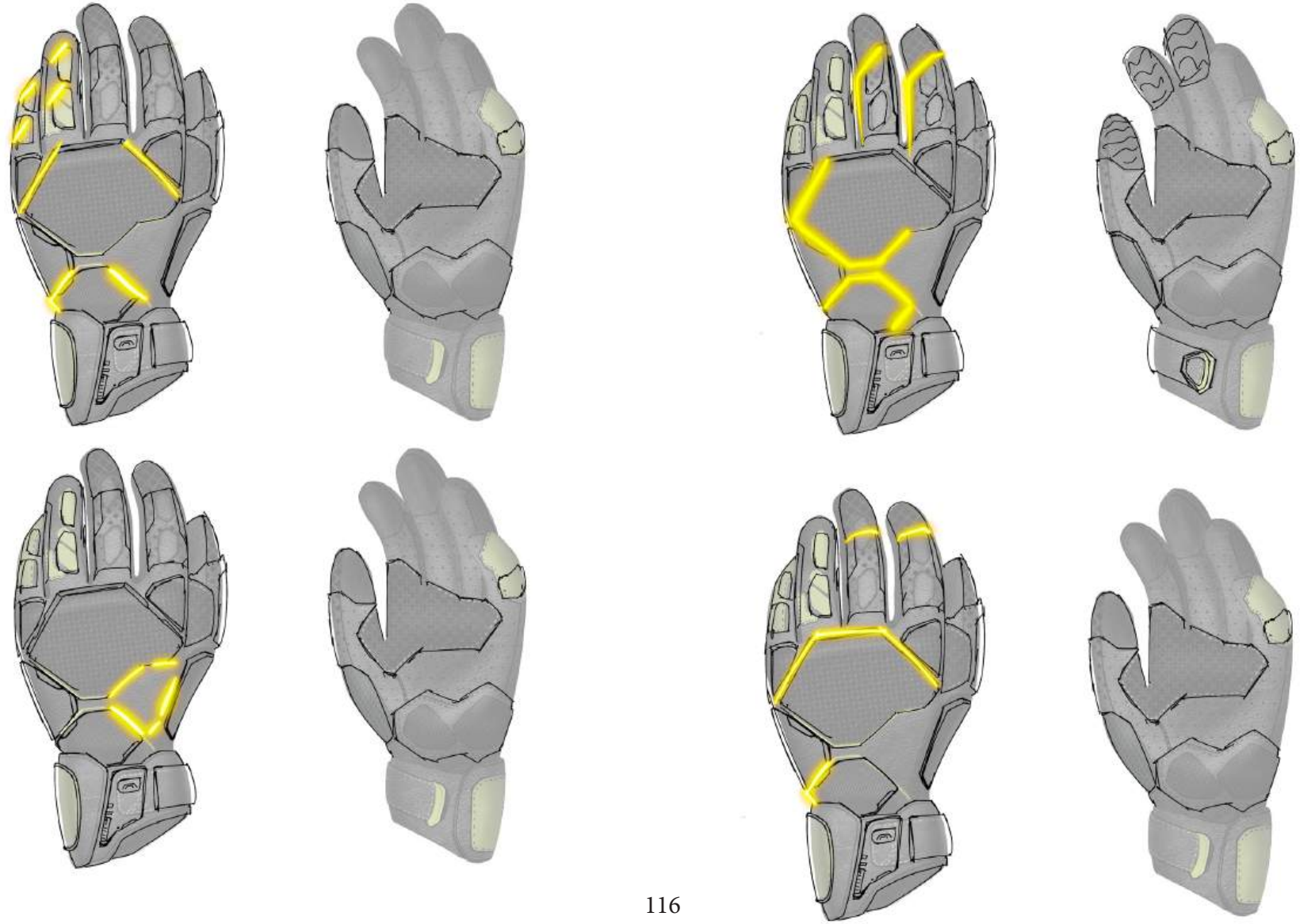
Keywords:
Adrenaline
Revolution
Bold
Eclectic

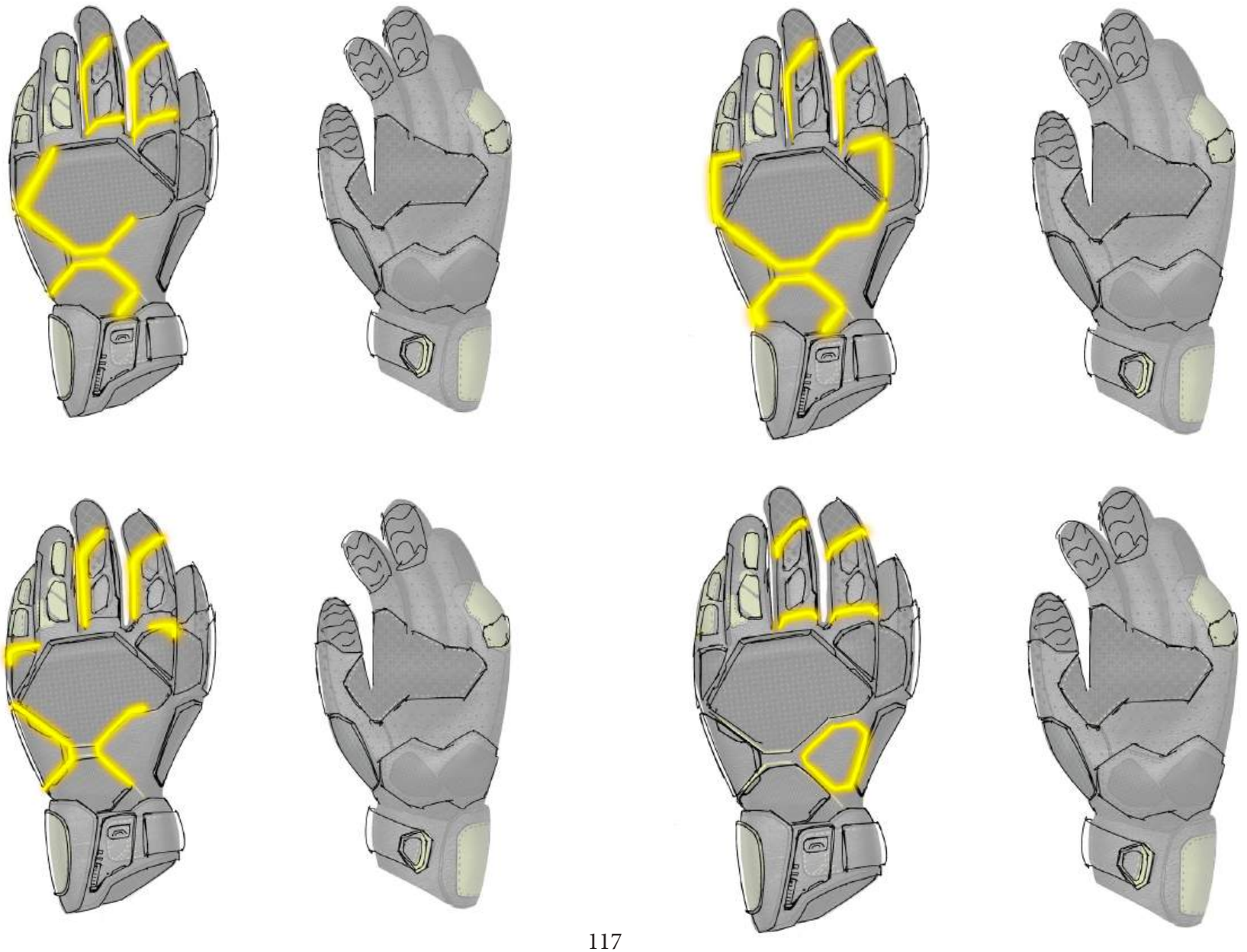
CONCEPT REFINEMENT

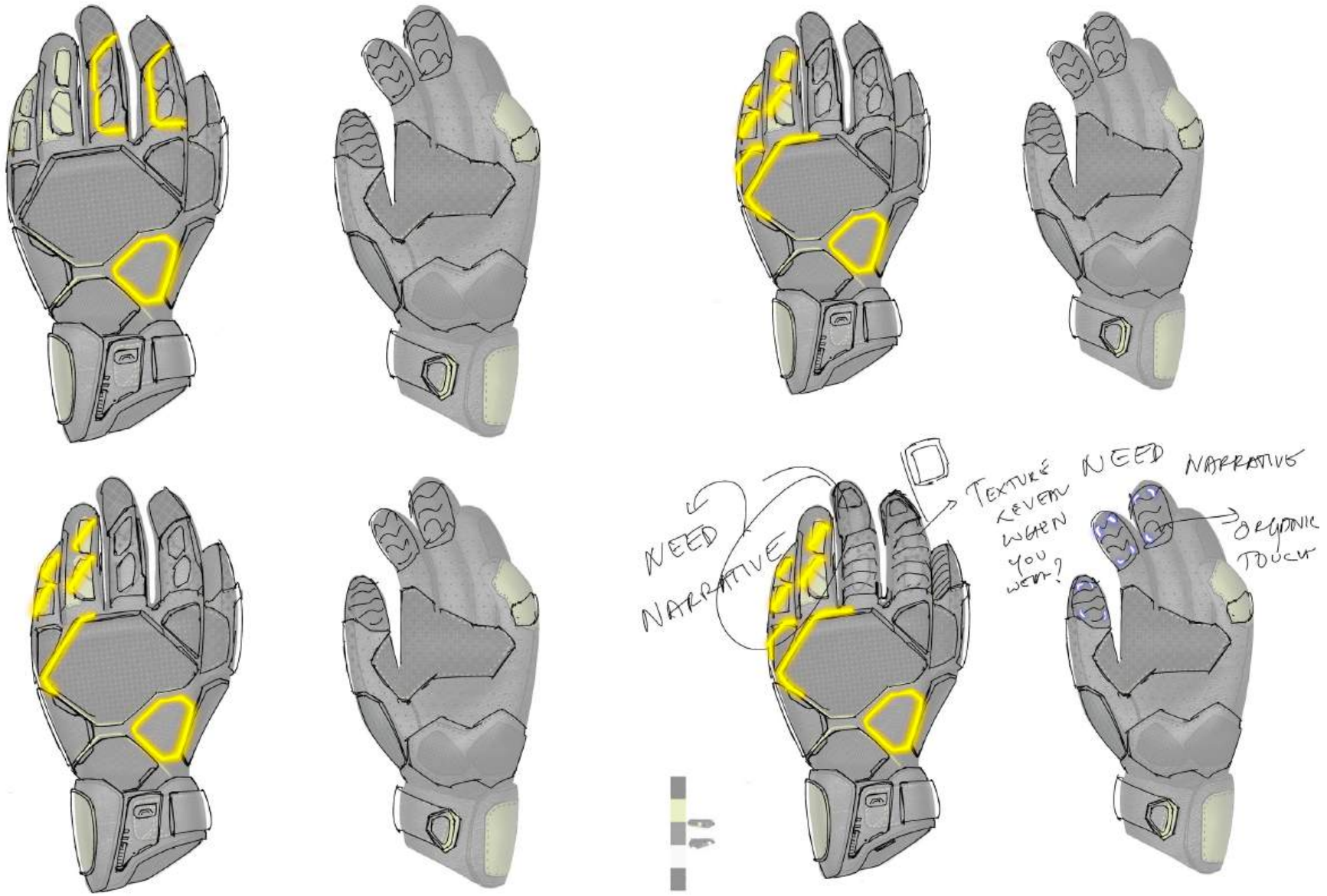


CONCEPT

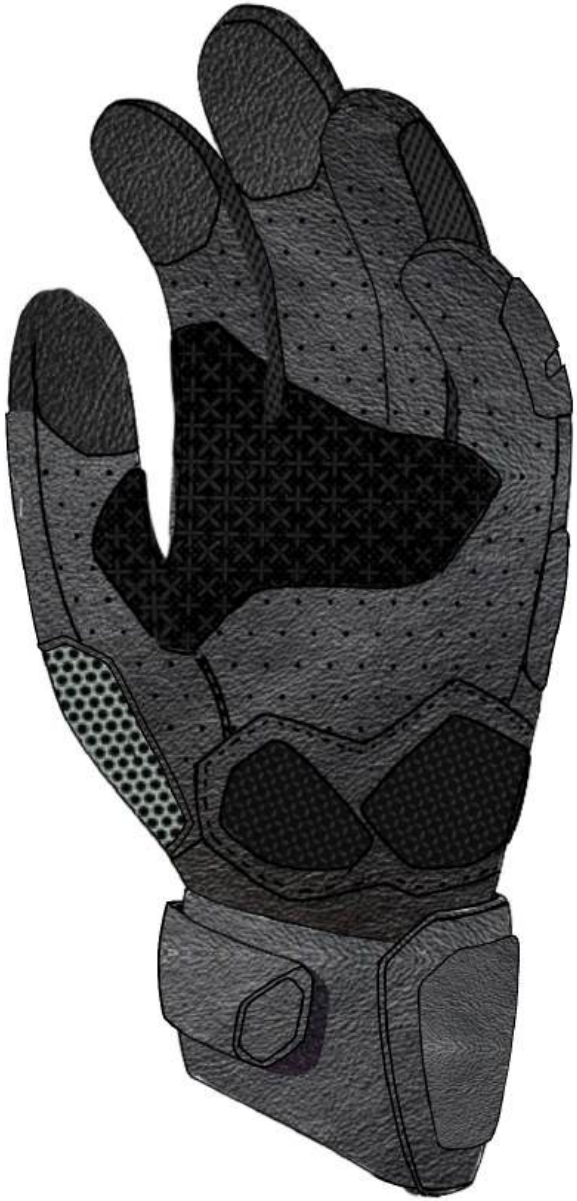
FURTHER REFINEMENTS






NEED
NARRATIVE
TEXTURE REVEAL WHEN YOU NEED?
NEED
NARRATIVE
ORGANIC TOUCH

FINAL FORM



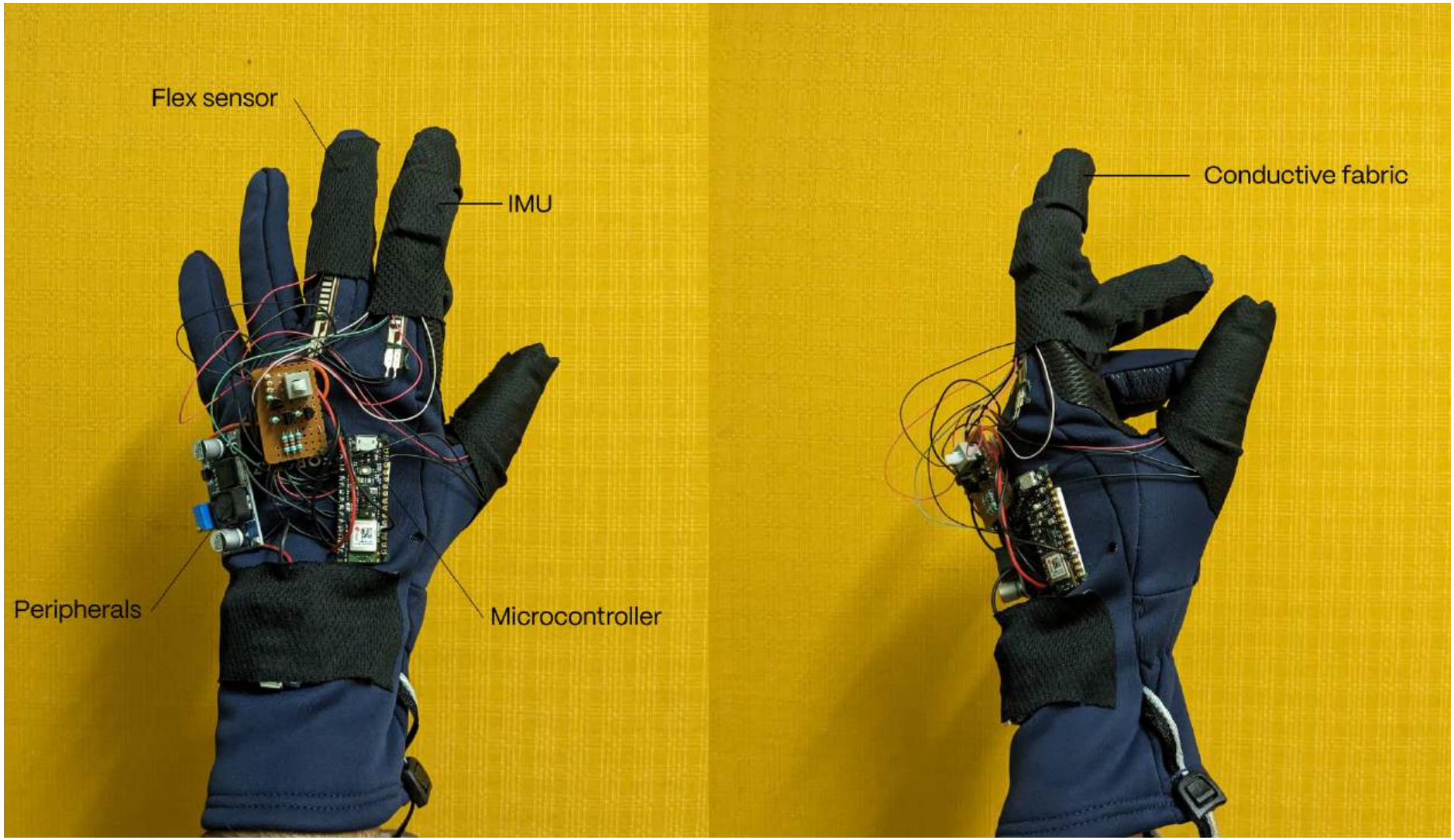
FINAL COLOUR SCHEME

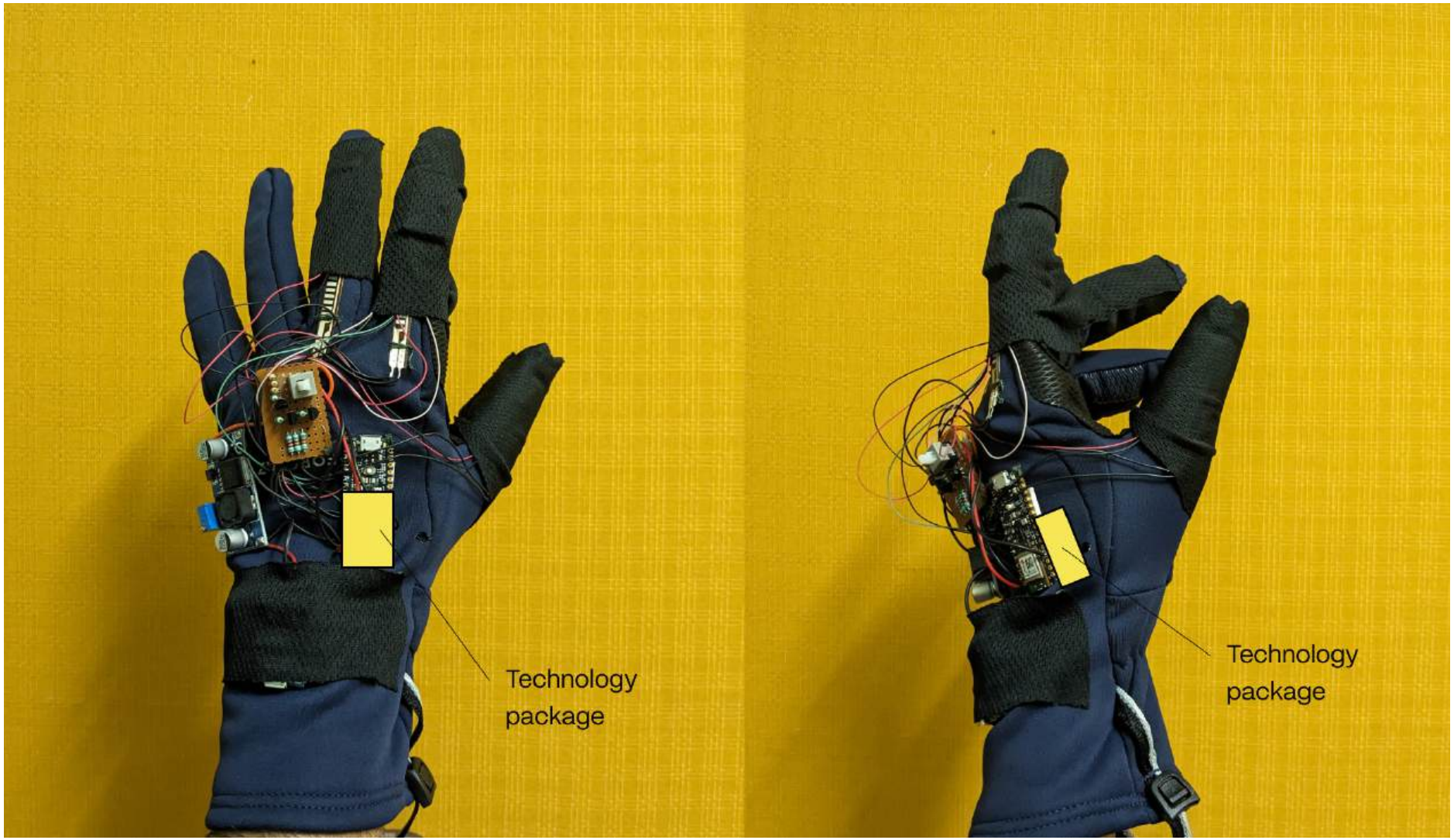
#0D0D0D #2B2F3A #D4DEDF #C8CEDA #5D7B93

DETAILING

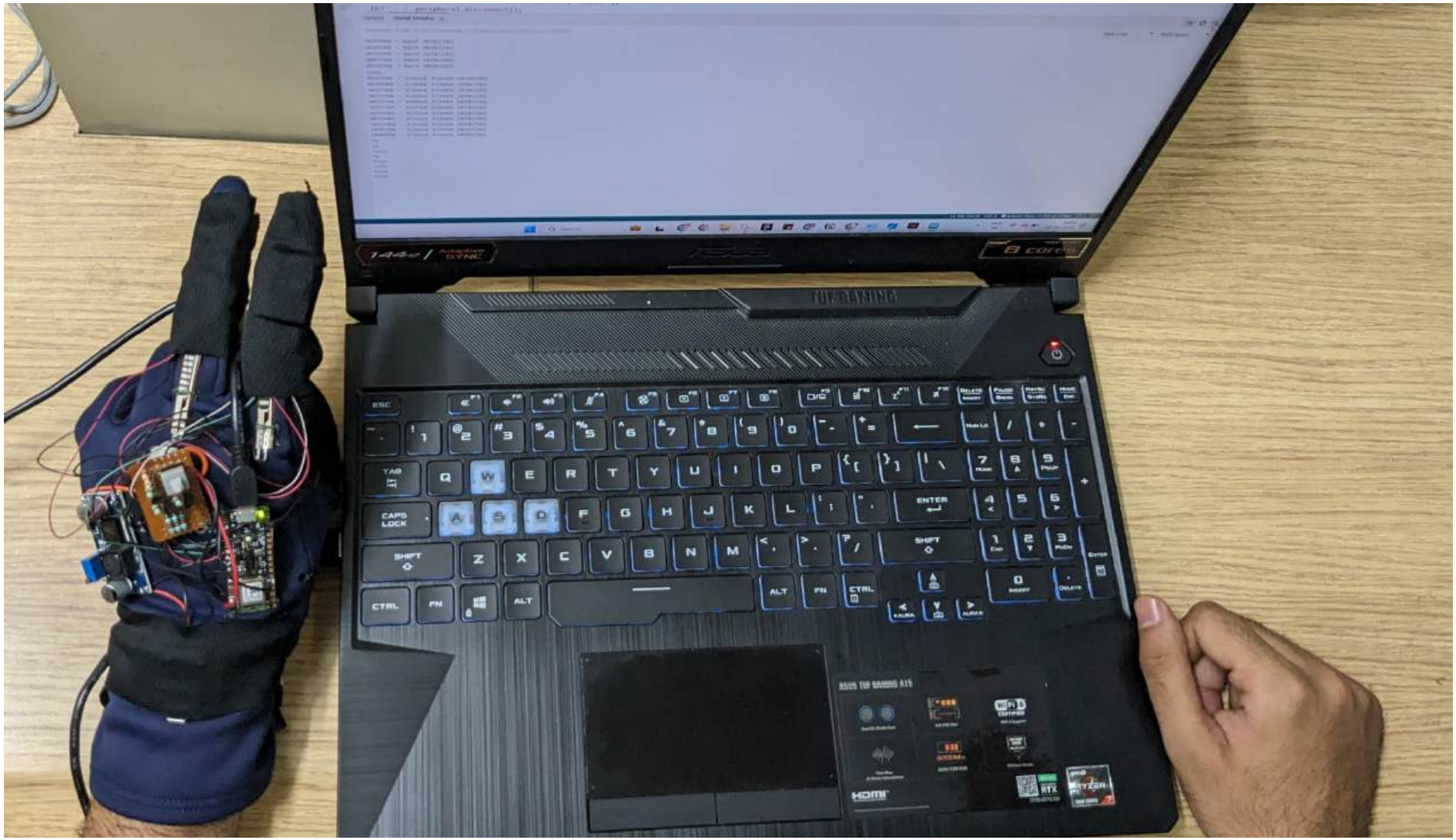
FINAL CONCEPT

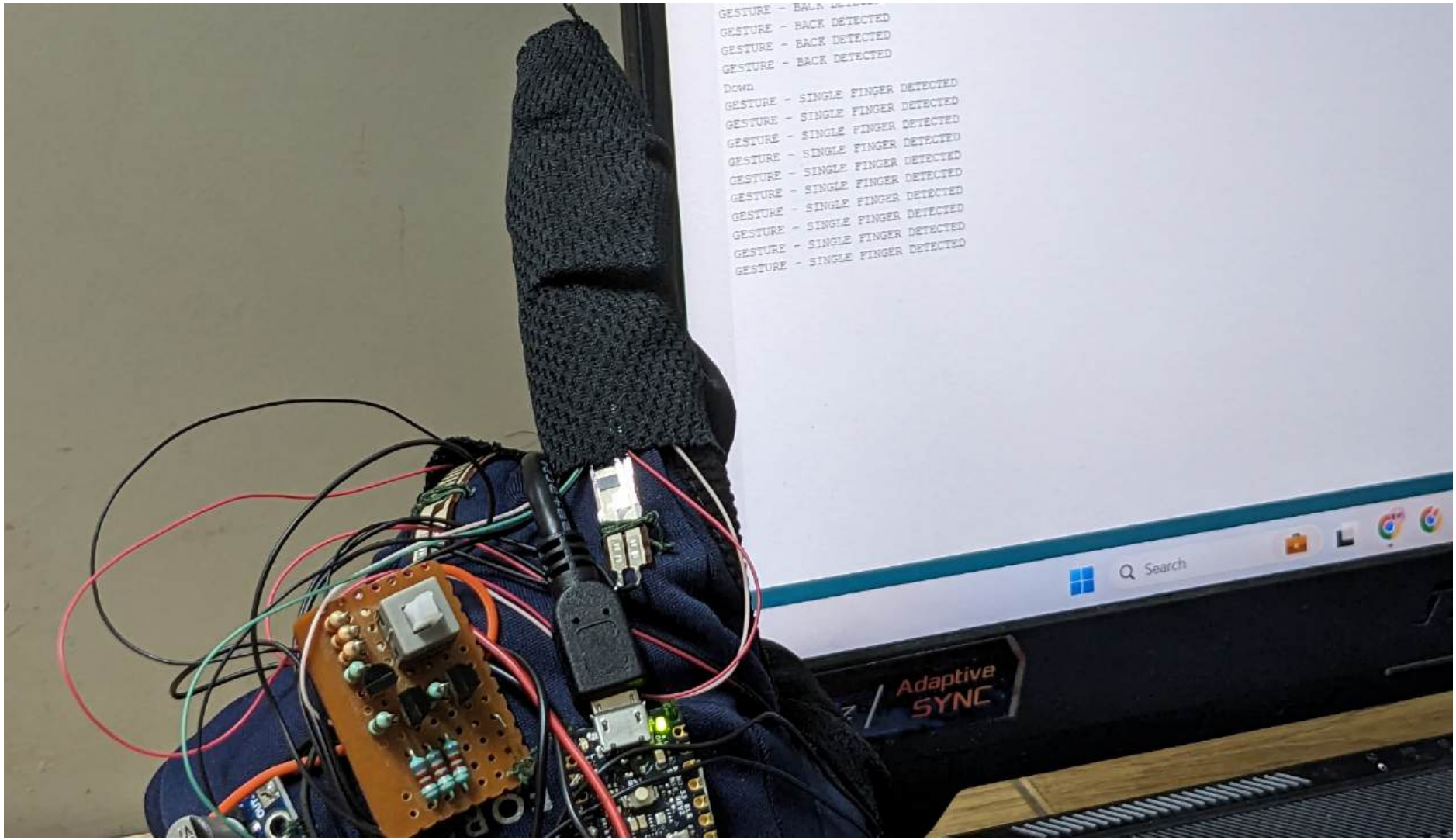
TECHNICAL IMPLEMENTATION




Technology
package
Technology
package

TESTING




GESTURE - BACK DETECTED
GESTURE - BACK DETECTED
GESTURE - BACK DETECTED
Down
GESTURE - SINGLE FINGER DETECTED
GESTURE - SINGLE FINGER DETECTED
GESTURE - SINGLE FINGER DETECTED
GESTURE - SINGLE FINGER DETECTED
GESTURE - SINGLE FINGER DETECTED
GESTURE - SINGLE FINGER DETECTED
GESTURE - SINGLE FINGER DETECTED
GESTURE - SINGLE FINGER DETECTED
GESTURE - SINGLE FINGER DETECTED
Search
Adaptive
SYNC

PRESENTATION OF WORK IN DDS ‘23


SMART GLOVES
ULTRAVIOLE
PDS23


SMART GLOVES


ONE
GLOVES
POWERED BY
ULTRAVIOLETTE
ddsidc.com/2023
DESIGN
DEGREE
Sh 23


KA•03KQ•7749


KA•03KQ•7749

WHAT NEXT?

FUTURE STEPS

1. Tech implementation of product and testing the said features.
2. Develop pattern for the glove design
3. Implement the said feature controls on F77 bike and test for functionality.
4. User testing and feedback.
5. Final Design + Tech revision.
6. Develop PCB design and fabrication
7. Plan for production

END OF REPORT