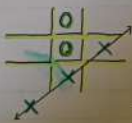" **OUTSIDE THE BOX** "

        - Design Thinking

- approach for creative
  problem solving

" Introduce the concept of Design thinking "

DESIGN THINKING

" Design thinking is a human-centred approach to innovation that draws from the designer's toolkit to integrate the needs of the people, the possibilities of technologies, and the requirement for business success."

        - TIM Brown IDEO

Design thinking is a human centered, non linear iterative process. Use to understand users, redefined problem, create innovation solution to prototype and test.

Design thinking is a methodology used by designers to solve complex problems and find desirable solutions for clients.

It's a human self centered approach to innovation that draws from the designer's

Design thinking involves Five stage.
· Empathize · Define · Ideate · Prototype and Test.

· Collaboratives

    Work as a team to look at the problem holistically and implement solution to improve people's experience.

· Show, don't tell

    Enable the user to experience the story through action, words, thoughts, senses and feelings rather than pure description

DESIGN THINKING IS NOT

· Only for the "creative" people or product designer

· A narrow equation to aesthetics and craft

· A "one day" process where problem can be solved in 24 hours

· An approach to replace analytical problem solving

needs and designing solutions accordingly

Stanford d.school established · IDEO's David Kelley and Roger Martin brought design thinking to Stanford, fostering its academic exploration.

Problem-solving frameworks developed: IDEO's "design kit" and Roger Martin's "thinking in systems" offered practical tools.

3. Maturation and Spread (1990S – Present)

· Global adoption

· Focus on empathy and iteration

· Digital tools and resources

4. Today and Beyond

· Continuous adaption
· social impact

BENEFITS

- Design Thinking Has a Lots of Awesome Benefits

- It Helps Us to understand people better, so we can create products and solutions that really meets their need.

- It encourage us to think creatively and come up with innovative ideas.

- It also helps us to solve problems faster because we test and iterative our solutions

- Plus. its a fun and collaborative process that brings people together to create something Amazing.

- So. The Benefits are like having a super powers that makes world a Better Place

Exp 2

AIM : Empathy Mapping Exercise

PROBELM : Bluetooth connectivity issue.

IDEA : Simplify the pairing process with clear step by step instruction. Provide visual aids or tutorials for guide uses through the pairing process.

Optimize Bluetooth firmware and software to reduce connection drop.

Upgrade Bluetooth hardware.

CONDUCT A NEEDFINDING INTERVIEW ?
- Ask open question :—
Q. Can you described a time you encountered this issues ?
Q. How did you troubleshoot and resolve ?
Q. Common reasons for this issue.
Q. How would you address them ?
Q. How would you improve them ?
Q. What strategies would you use to improve the range and signal strength of Bluetooth connection?

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Exp 1.

AIM : Ideation session : Have participants generate as many ideas as possible to solve the problem statement. Encourage wild, unconventional, and innovation ideas.
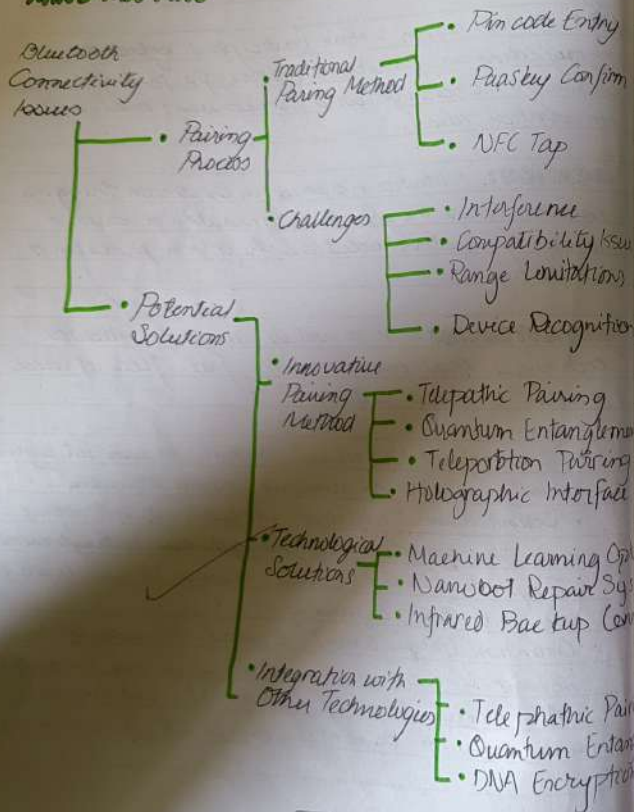
IDEATION : Ideation is a phase in the design thinking process, where the goal is to generate a diverse range of creative solutions to given problem or challenge.

BRAINSTORMING : is a widely recognized ideation technique that encourage the free flow of ideas within a group setting.

- "Bio Inspired Networking" : Mimic swarm intelligence seen in nature for dynamic communication.
- "Sound Waves" : Utilizes ultrasonic or infrasonic waves for communication alongside Bluetooth
- Telaphatic Pairing : Enable devices to pair based on user intention, bypassing
- Quantum Entanglement : Explore the possibility of instant communication via quantum entanglement
- AI-Powered Adaption : Develop AI that learns user behaviour to optimize Bluetooth connectivity

MIND MAPPING

Bluetooth
Connectivity
Issues

- Pairing Process
  - Traditional Pairing Method
    - Pin code Entry
    - Passkey Confirm
    - NFC Tap
  - Challenges
    - Interference
    - Compatibility Issues
    - Range Limitations
    - Device Recognition
- Potential Solutions
  - Innovative Pairing Method
    - Telepathic Pairing
    - Quantum Entanglement
    - Teleportation Pairing
    - Holographic Interface
  - Technological Solutions
    - Machine Learning Op...
    - Nanobot Repair Sys...
    - Infrared Backup Con...
  - Integration with Other Technologies
    - Telepathic Pair...
    - Quantum Entan...
    - DNA Encryption

29.

- Electromagnetic Field Mapping: Create a device to map interference and adjust Bluetooth frequencies accordingly.

- Holographic Networking: Use holographic projections for virtual device connections.

- Nano technology: Embedded nano scale transmitters for robust Bluetooth connections.

SCAMPER TECHNIQUE

is a powerful tool for generating innovative ideas.

a) Substitute :-
   Substitute traditional Bluetooth technology with a newer, more advanced version.
   Substitute bluetooth with an alternative wireless communication technology such as LiFi.

b) Combine :-
   Combine Bluetooth with Near Field Communication for quicker and more reliable pairing.
   Combine Bluetooth with AI to automatically troubleshoot and fix connection issues.

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- Keep the user in mind

- Plan the scope of testing

- Take action and fail fast

- Choose the right tools and fidelity

Record question for testing.

- Low-Fidelity Prototypes :— Telepathic Pairing Device

Objective: Design a low-fidelity prototype for a telepathic pairing device that eliminates the need for manual Bluetooth pairing by using brainwave technology.

Materials Needed:

Two paper cups, string, LED, Battery. Aluminium foils

Steps

- Poke a small hole in the bottom of each paper cup.
- Thread the string through the holes in the cups and tie knots to keep them in place.
- The represents the telepathic connection.
- Address Attach an LED to the end of the string inside each cups.

- Make one two brainwave sensor using aluminium foil.
- Attach one end of a wire to the aluminium foil and the other end to a battery.
- When user holds the aluminium foils, it completes the circuit, allowing the LED to lights up.
- When two users touch the aluminium foil with their fingers, completing the circuit, the LED lights up indicating successful telepathic pairing.

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'DON'T GET CAUGHT UP IN FANCY TOOLS'

Middle-Fidelity Prototype : Telepathic Pairing Device

Materials Needed: Arduinno EEG sensor
Bluetooth module, LED lights, Breadboard and
jumper wires, Small enclosure, Power source.

Steps:

· Setup and Connection
    Connect the EEG sensor and Bluetooth
module to the microcontroller using jumper
wires and a bread.

· Programming
    Write a program to read bramwave data
from the EEG sensor and interpret it for pairing
process. Program the Bluetooth module to send
pairing signal to nearby devices.

· Enclosure Design:
    Design a Simple enclosure using 3D
printing or cardboard to house the components.
Ensure that there are oppenings for the sensor
LED lights, and any necessary buttons or
switches.

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· Error Rate : Less than 10% of pairing attempts

· User satisfaction: Average user satisfaction rating of 4 out of 5.

· Testing Strategies : A good test strategies helps define a testing approach and establishes guidelines rules and parameters for the testing process.

For example:
· Alpha Testing : Test the accuracy of brainwave detection with the EEG sensor.

· Beta Testing : Recruit a group of users to test the prototype in different environment and situations.

· User acceptance Testing: Final testing with potential end-users

· Risk Assessment
Try to foresee all possible risks related to the project.

For example:
· Technical risks — Test for stability and compatibility with different devices.

- Usability risks — Provide clear instructions & guidance for the pairing process.

- Environmental risks — Test for interference from external factors. Also test the effective range of the telepathic pairing device.

Continuous Improvement and Adaptation

- Feedback Loops After each testing phase, gather feedback from users on their experience with Bluetooth connectivity issue.
      Regularly review and analyze feedback from users to identify areas for improvement in the Bluetooth connectivity solution.

- Iterative Development. Implement changes to the pairing algorithm or module based on user feedback. Then test the updated prototype with users to gather further feedback and make improvements.

- Evolving Technology
      Explore advancements in Bluetooth technology to improve connection stability and range.

FEEDBACK QUESTIONS

· Where did you like about the telepathic pairing device?
· What aspects of the prototypes did you find confusing or difficult to use?

· Were there any issue you encountered while using the prototype?

· Do you have any suggestions for improving the functionality or usability of the device?

· How likely are you to use a device like this in real life?

Responding to Users Feedback

· Continuous Iteration:
   Improve connection stability by ~~count~~ continuously updating the Bluetooth connection algorithm based on user feedback

· Agile Adaptation. Prioritize automatic troubleshooting of connection issues after identifying user requirement during a sprint review.

· Feedback Driven Development. Redesign the pairing interface to improve usability based on user feedback about confusion during the pairing process.

· Feedback Loop Closure: Inform via email (to users) about changes made based on their feedback ensuring transparency and accountability.

· Continuous Engagement: Actively respond to user concerns and suggested through a dedicated feedback channel to keep users informed and engaged.

Exp 7

AIM: Refine and Iterate on prototype: Based on the feedback, have participants refine and iterate on their prototype to improve its

1. Review User Feedback

   Participants review feedback gathered from testing sessions, including user interviews, surveys, and usability testing.

   Feedback highlights common pain points such as confusion during the pairing process and connection stability issue.

2. Identify Areas for Improvement.

   Participants identify specific areas for improvement based on user feedback:

   a) Simplify the pairing process to reduce user confusion.

   b) Improve connection stability to prevent frequent disconnections.

OUTCOMES: Participants will have to the opportunity to showcase their final telepathic pairing device prototypes, share their design process and insights and recieve feedback from their peers. This presentation session will foster learning, collaboration, and further refinement of the prototypes.

Reflection and Discussion:

- Now we have seen both prototypes,
- Both teams did a great job prioritising user experience
- We conducted extensive testing in various environments and implemented error handling mechanisms.
- Your feedback clearly played a significant role.
- Both prototypes could benefit from additional accessibility features.
- Kudos to both teams for their hard work and innovation.

Closing Remark.

Thanks to both teams for their insightful presentations and engaging discussion. It is clear that a tremendous amount of effort and creativity went into the development of these prototypes.

Let's continue to build on the momentum generated today as we work towards further refining and improving our telepathic pairing device solutions.

appreciated the simplicity and clarity of the pairing interface but emphasized the importance of clear instructions and visual feedback. We learned the importance of user centered design and value to of incorporating user feedback into our iterative design process.

Demonstration:

Let now demonstrate the NeuroLink device in action. As you can see, the interface provides clear instructions, guiding users through the pairing process with ease. Visual and auditory cues indicate the status of the pairing process, providing users with immediate feedback and reassurance.

Team 2 : Neuro Link

Good morning / afternoon / evening. We are team "Neuro Link" and we're excited to present our final telepathic pairing device prototype, designed to simplify the Bluetooth pairing process and enhance user experience. Our goal with the Neuro Link device is to provide users with a seamless and intuitive way to connect their devices.

Design Decisions :

Our design approach focused on streamlining the pairing process and providing real-time feedback to users. We implemented a user-friendly interface that guides users through the pairing process and ensures step by step, eliminating confusion and frustration. Additionally, we integrated visual and auditory feedback mechanisms to enhance user understanding and engagement.

Insights and Learnings :

Throughout the development process we conducted extensive user testing sessions to gather feedback and insight. Users

session. Users consistently praised the intuitive nature of the pairing interface but highlighted the importance of connection stability.

As a result, we dedicate significant effort to optimizing the Bluetooth connection algorithm to ensure reliable and robust pairing.

Demonstration

Now let's demonstrate the MindSync device in action. As you can see, the interface display a simple prompt instructing user to focus their attention on establishing a connection. Within seconds, the devices are paired and users can seamlessly transfer data without any interruptions or delays.

Prototype Presentation

Team 1 — "MindSync"

Good a morning/afternoon/evening, everyone. We are Team "MindSync", and we're thrilled to present our final telepathic pairing device prototype to you today. Our goal with the MindSync device is to revolutionize the Bluetooth pairing experience by leveraging EEG technology to establish a seamless connection between devices.

Design Decision

We began by focusing on simplicity and user friendliness. Our design incorporates a sleek, minimalist interface that guides users through the pairing process with ease. By analysing brainwave patterns, the MindSync device eliminates the need for cumbersome pairing codes or complicated setup procedures.

Insight and Learnings

Throughout our iterative design process, we gathered valuable insight from user testing

Exp 8

AIM: Presentation of final prototype : Have participants present their final prototype to their the rest of the group, explaining their design decisions, insights and learnings.

INTRODUCTION :-

Welcome, everyone, to the presentation of our final telepathic pairing device prototype. Over the pass weeks, our teams have been hard at work designing and refining innovative solutions to address the challenges of Bluetooth connectivity issues.

Throughout this journey, our teams have prioritized user-centric design, continuously iterating on our prototypes based on valuable feedback from testing sessions.

As we present our final prototypes, we invite you to explore the design decisions, insights and learnings that have shaped our solutions. We believe that this presentation session will not only highlight the creativity and ingenuity of our teams but also inspire further collaboration and refinement as we continue to innovate in the field of telepathic pairing technology.

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feedback from uses who find it much more user-friendly.

Users also report a noticeable improvement in connection stability with the optimized algorithm.

6. Finalize Prototype:
Participants make final adjustments to the prototype based on feedback from feedback session:

a) Fine tune the pairing interface based on additional user suggestions.
b) Further optimize the connection algorithm to address any remaining stability issues.

OUTCOMES

The telepathic pairing device prototype has been refined and iterated based on user feedback resulting in an improved version that is more user-friendly, functional and appealing. The final prototype is ready for further testing and presentation to stakeholders.

3. Refinement and Iteration
    Participants break into small groups to work on refining the prototype:

Group 1: Focuses on redesigning the pairing interface to make it more intuitive

Group 2: works on optimizing the Bluetooth connection algorithm to improve stability.

4. Prototype Testing:
    Refined prototypes are tested with users to gather immediate feedback:

a) Users find the redesigned pairing interface much easier to use and understand.

b) The optimized connection algorithm results in a significant reduction in connection drops.

5. Feedback and Discussion:
    Participants gather for a group discussion to discuss the effectiveness of the implemented changes:
    The redesigned pairing interface receives positive

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Gathering User Feedback.

Understanding User Needs
- User Centric Approach :
  - Persona Development : Create user personas (e.g "Tech Savvy Proffersional", Elderly User").
  - Conduct users interview to understand user feelings and challenges.

- Feedback Collection Methods :
  - Gather feedback on user experience with Bluetooth pairing
  - Users interviews
  - Observe users using prototype for usability issues.

- Identify Pain points
  - Observe user frustration during pairing process.
  - Analyze survey responses for common pain points.
  - Map out moments of frustration in the pairing process

Exp 6

AIM : Testing and feedback session : Have participants test their prototypes with potential users and gather feedback on what works, what doesn't and what could be improved.

Introduction : Testing the solution in Design Thinking involves validating prototypes with real users to ensure they effectively address the identified problem. Through testing sessions, diverse participants interact with prototypes, providing feedback and insights.

Defining a Successful Testing Approach

Establish Key Performance Indicators
· Identifying Metrics : Establishing the key performance indicators (KPI) and success metrics for the project is crucial.
For example:
· Success Rate : 90% of pairing attempts are successful.
· Time to Pair : Average pairing time is less than 30 seconds.

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Pairing process: When the user concentrates on a specific thought, the EEG sensor detects the brainwave pattern and sends a pairing signal via Bluetooth to nearby devices. LED lights provide feedback to the user during the pairing process.

OUTCOMES The low fidelity prototype demonstrate the concept of telepathic pairing for Bluetooth devices using simple materials, providing a tangible representation of the innovation idea.

The middle fidelity prototype demonstrate the feasibility of using brainwave technology for Bluetooth pairing, providing a more polished and functional representation of the innovative idea compared to the low fidelity prototype.

FIRST PRINCIPLE:

LOVE IT!   CHANGE IT!   LEAVE IT!

Human desirability

Economically feasibility

Technically implementability

Exp 5

AIM: Prototyping session : Have participant select one or more ideas as possible and create a low fidelity prototype to test their assumption and validate their ideas.

THEORY: A prototype is a preliminary version of a product or system that is used for testing, evaluation and experimentation. It can range from a simple mock or sketch to a more refined representation of the final product, depending on the stage of development and the goals of prototyping process.

Prototype are created to:
1. Test Assumption
2. Gather Feedback
3. Iteration Quickly
4. Reduce Risk

Types of prototypes:

- Low Fidelity: suitable for the early stage of the process
- Medium Fidelity: suitability for the last stage of prototype model.

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f) Eliminate :

Eliminate the need for manual pairing by implementing automatic connection protocols.

Eliminate interference by using a frequency - hopping spread spectrum technique.

g) Reverse / Rearrange :-

Reverse the connection process by making devices automatically search for available connections.

Rearrange Bluetooth protocols to prioritize connection stability over data transfer speed.

TECH.4 → 4W and 1H

1. What is the issue?
Ans :- Bluetooth connection drop keeps dropping
2. Why is the connection dropping?
Ans :- Due to weak Bluetooth signal.
3. When does the weak signal occur?
Ans :- During peak usage times or when multiple device are active.
4. Who is affected by this issue?
Ans :- Users of the Bluetooth enabled device.

5. How can this issue be resolved?
By implementing a frequency channel selection algorithm that automatically selects the least congested channel.

INSIGHT : Implementing an automatic frequency channel selection algorithm could potentially resolve the Bluetooth connectivity issues by reducing interference from other wireless devices.

"When was the last time we walked in our customer's shoes."

TECH.3 → Root cause analysis (5 Whys)

1. Why is there a Bluetooth connectivity issue?
Ans:- The Bluetooth connection keeps droping.

2. Why does the Bluetooth connection keep droping?
Ans:- The Bluetooth signal strength is weak.

3. Why is the Bluetooth signal weak?
Ans:- There is interference from other wireless devices.

4. Why is there interference from other wireless device?
Ans:- The Bluetooth device is operating on the same frequency as other nearby devices.

5. Why is the Bluetooth device operating on the same frequency as other nearby devices?
Ans:- The Bluetooth device is not automatically selecting the least congested frequency channel.

#INSIGHTS : Improving the Bluetooth device's frequency channel selection algorithm could potentially resolve the connectivity issues by reducing interference from other wireless devices.

This analysis helps identify the root cause of the Bluetooth connectivity issue and provides insight into potential solutions.

Exp 3

AIM :- Define the problem statement : Based on empathy mapping exercise, have participants synthesize their findings and a pedefine a problem statement.

TECH-1 → POV Template

User	Needs	Insights.
As a college student, I am encountering frequent Bluetooth connectivity issues (such as pairing failure, connection drops etc).	I need a reliable solution to resolve these connectivity issue. Some of needs are improved pairing stability, reduced connection drops. et	Resolving these Bluetooth connectivity issues is crucial for ensuring smooth and uninterrupped user experience which in turn enhance overall device usability.

TECH.2 → POV MADLIB

As a student who used the bluetooth earpiece headphone need a solution that will help me establish stable Bluetooth connections a resolving pairing issues. Understanding the root cause of this issue will improve user experience or enhance device functionality.

Fig. Empathy map.

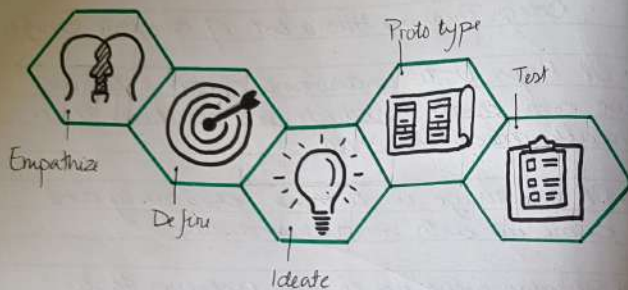| ~ "My Bluetooth keeps disconnecting randomly." ~ "I can't pair my phone with the Bluetooth speaker." ~ "I always have trouble connecting my headphones to different devices."	~ "I wonder if there's something wrong with my phone's bluetooth setting". ~ "Why does this always happen when I'm in middle of something important ?" ~ "Maybe I need to update my device's firmware".
SAYS	**THINKS**
DOES	**FEELS**
~ Tries to reconnect multiple times ~ Searched online for trouble shooting tips ~ Resets Bluetooth setting on the device.	~ "It is so annoying when my Bluetooth drop out " ~ "I'm a I'm worried I won't be able to connect in time ~ "I don't understand why it's not working, it was fine yesterday.
PAIN	**GAIN**
~ Unreliable connection causing frustation and inconvenience ~ Lack of clear troubleshooting steps from the device manufacture ~ Difficulty connecting to multiple devices seamlessly.	~ When the Bluetooth connection work seamlessly it enhances the overall user experience. ~ Convenient wireless connectivity allow users to enjoy music make calls etc.

CONCLUSION

Design thinking offers a human-centered approach to problem-solving that encourage empathy, creativity, and iteration. By prioritizing the needs and experiences of users, it fosters innovative solutions and promotes collaboration across disciplines. Embracing design thinking can lead to more effective and sustainable solutions in a wild range of contexts, from product design to social innovation.

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Five Phases of Design Thinking.

Empathize — Define — Ideate — Proto type — Test

OVERALL PROCESS

· Empathize :—
    Understand the needs, desires and pain points of the target users.

· Define :—
    Clearly articulate the problem and identify the users needs

· Ideate :—
    Generates a wide variety of ideas to address the problem

· Prototype :—
    Create low-fidelity representation of the ideas to test with users.

· Test
    Gather feedbacks from users to refine and improve the prototypes.

HISTORY OF DESIGN THINKING

Design thinking has a rich and fascinating history evolving from its roots in design methodologies to the widely adopted human-centred approach of is today. The journey was filled with ups and down but ultimately led to growth and learning

• Early Seeds (1950s - 1960s)

Psycological studies on creativity :- Pioneering work by Alex Osborn and others laid the groundwork for understanding creative processes.

Method of Design: Studies explored design processes across various field, laying the foundation for structured approaches.

Wicked problems defined: Herbert Simon introduced the concept of complex, interrelated problems requiring iterative solutions accordingly.

• Taking Shape (1970s - 1980s)

Human Centred design emphasized :- Designers like John Arnold focused on understanding user

· Human centered

· Iterative

· Highly creative

Hands - on

· Collaborative

· Shaw. don't tell

"ITERATIVE" meaning that the stages are often revisited as ideas are refined and solutions are developed.

UNIQUE OF DT

· Human centered
  Discover people's reals needs and wants
  Be able to gain deep insights of their motivations
  and share the feelings of others

· Iterative
  Repeat each phase backwards and forwards
  and arrive at each decision or desired result
  after rounds of learning and discovery

· Highly - creative
  Looks at situations direct differently.
  Push past obvious solutions and existing
  alternatives to get to breakthrough ideas.

· Heads
· Hands- on
  Ideas are made tangible through prototyping
  Build rough or lo-fi prototypes to learn how
  to make ideas better.

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c) Adapt :-

    Adapt Bluetooth protocols to be more adaptive to different environmental conditions.

    Adapt Bluetooth to work seamlessly with other wireless technologies like Wi-Fi.

d) Modify :-

    Modify Bluetooth antennas and transmitters for better range and signal strength.

    Modify Bluetooth software to allow for easier manual connection when automatic fails.

e) Put to another use :-

    Use Bluetooth connectivity for more than just audio, like data transfer and device synchronization.

    Utilise Bluetooth beacons for indoor navigations and location-based services.