K. J. Somaiya College of Engineering, Mumbai-77
(A Constituent College of Somaiya Vidyavihar University)

Batch: C2 Roll No.: 160-10121110

Experiment / assignment / tutorial No

Grade: AA / AB / BB / BC / CC / CD /DD

Signature of the Staff In-charge with date

TITLE : Follow design process for designi

AIM : To implement different stages of Design Thinking.

Expected OUTCOME of Experiment:

CO 3: Apply the concepts of Design thinking for development of product/ service.

Books/ Journals/ Websites referred:

1 "Design Thinking", Gavin Ambrose Design Paul Harris

Theory:

- **The design process engages a high degree of creativity but in a way that is controlled and directed by the process so that it is channeled towards producing a viable, practical solution to the design problem, meeting or excelling the stated aims of the brief.**
- **While creativity in design is important, design is an activity that serves economic as well as creative goals.**
- **Within the design process, seven steps can be identified:**
    - **Define**
    - **Research**
    - **Ideate**
    - **Prototype**
    - **Select**
    - **Implement**
    - **And learn**
- **First, the design problem and the target audience needs to be defined.**
- **The research stage reviews information such as the history of the design problem, end-user research and opinion-led interviews, and identifies**

potential obstacles.

- **Ideate is the stage where end-user motivations and needs are identified and ideas are generated to meet these, perhaps through brainstorming.**
- **Prototyping sees the resolve or working-up of these ideas, which are presented for user-group and stakeholder review, prior to being presented to the client.**
- **Selection sees the proposed solutions reviewed against the design brief objective. Some solutions might be practical but may not be the best ones.**
- **Implementation sees design development and its final delivery to the client.**
- **Learning helps designers improve their performance and, for this reason, designers should seek client and target audience feedback and determine if the solution met the goals of the brief.**

Title of Application: Video Motion amplification Camera System

Abstract of Application: Video motion amplification camera is used to detect camouflage enemies by amplifying subtle motion in video frames. It is a hardware based system on IoT devices. It magnifies small movements to help detect them better.

Define – Objectives
- Develop a comprehensive video motion amplification camera system tailored for security and surveillance applications.
- Amplify video footage to identify imperceptible movements that could indicate hidden threats.
- Establish a robust methodology for real-time video amplification with minimal latency.
- Set performance benchmarks, including detection accuracy and response time.

Research – Gathering Background Information
- Conduct a thorough literature review of existing video motion amplification algorithms, identifying strengths and weaknesses.
- Investigate current products available on the market to determine gaps and opportunities for innovation.
- Review patents to analyze competitor technologies and avoid potential infringement.
- Analyze research papers to explore contemporary methods, particularly in real-time processing and noise reduction techniques.
- Study advancements in IoT technology to enhance connectivity and integration.

Ideate – Generating Potential Solutions
- Identify a range of real-time algorithms suitable for video motion amplification, including machine learning approaches.
- Determine optimal hardware configurations that balance performance and cost-effectiveness.
- Explore various processor options, considering factors like processing speed, power

consumption, and compatibility.
- Develop ideas for circuitry design, focusing on power efficiency and miniaturization.
- Conceptualize the chassis design to ensure durability and ease of use in diverse environments.
- Brainstorm potential user interface designs for intuitive operation and accessibility.

Prototype – Developing Solutions
- Create a prototype of the algorithm, implementing iterative testing and refinement based on initial results.
- Build a prototype of the hardware, ensuring that all components work seamlessly together.
- Design and prototype the circuitry, optimizing for both size and efficiency.
- Develop a preliminary user interface for feedback during testing.

Select – Making Decisions
- Choose components based on performance, availability, and cost-effectiveness.
- Determine the layout of the circuit to minimize interference and maximize efficiency.
- Finalize the processor selection based on comprehensive evaluations.
- Confirm the algorithm and its hyperparameters through simulation and testing.
- Decide on materials that enhance durability and reduce weight, considering environmental factors.
- Prepare a detailed bill of materials, including estimated costs for each component.

Implement – Delivering Solutions
- Conduct a pilot test of the system in controlled environments to validate functionality.
- Gather feedback from potential stakeholders through structured questionnaires and interviews, focusing on:
  - Functional requirements (e.g., detection range, amplification levels).
  - Non-functional requirements (e.g., ease of use, maintenance needs).
- Analyze feedback to identify areas for improvement and additional features.
- Test the system’s robustness in real-world scenarios, including varied lighting conditions and environmental challenges.
- Develop a comprehensive user manual and support documentation based on the feedback gathered.
- Plan for scalability and potential future upgrades, considering evolving user needs and technological advancements.

Post Lab Descriptive Questions

1, Describe the Research stage in detail with respect to drivers and barriers.

Drivers

1. Business Requirements:
    - Understanding the goals and objectives of the organization helps ensure that the architecture aligns with business needs.
2. User Needs:
    - Researching user requirements, preferences, and behaviors can guide decisions on usability, functionality, and performance.
3. Technology Trends:
    - Keeping abreast of the latest technologies, frameworks, and tools can inform choices that enhance efficiency and competitiveness.
4. Compliance and Standards:
    - Identifying relevant regulations and industry standards can drive the selection of architectural patterns and practices.
5. Scalability and Performance:
    - Anticipating future growth and performance needs can lead to the adoption of architectures that can scale effectively.
6. Cost Considerations:
    - Analyzing cost implications of various architectural decisions ensures that the chosen solutions fit within budget constraints.
7. Stakeholder Input:
    - Gathering insights from stakeholders, including developers, product managers, and customers, can lead to more informed architectural choices.
8. Risk Assessment:
    - Evaluating potential risks related to technology, market changes, and

project feasibility helps to guide architecture decisions toward minimizing vulnerabilities.

Barriers

1. Lack of Clear Requirements:
   - Vague or changing requirements can lead to confusion and misalignment in architectural design.
2. Technological Complexity:
   - The vast array of technologies and frameworks can make it difficult to choose the best options, potentially leading to analysis paralysis.
3. Resource Limitations:
   - Constraints on budget, time, and personnel can hinder thorough research, impacting the quality of architectural decisions.
4. Resistance to Change:
   - Stakeholders may be resistant to adopting new technologies or methodologies, limiting innovative solutions.
5. Insufficient Stakeholder Engagement:
   - Failing to involve key stakeholders in the research process can result in an architecture that does not meet all user needs or expectations.
6. Inadequate Skills and Knowledge:
   - A lack of expertise in emerging technologies or architectural patterns can prevent the team from making informed decisions.
7. Overemphasis on Technology:
   - Focusing too much on technology rather than user and business needs can lead to a misaligned architecture.
8. Risk Aversion:
   - Fear of potential failures or setbacks may lead to overly conservative architectural choices that stifle innovation.

Date: 11 Oct 24 **Signature of faculty in-charge**