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| To be filled by Student | | |
| **Course** | Embedded Systems Workshop (CPE345) | |
| **Instructor** | Mr. Akbar Afridi | |
| **Project Title** | Gesture Based Computer Controlling Using Arduino | |
| **Submitted By** | **Ammar FA19-BCE-001**  **Muhammad Kaleem Ullah FA19-BCE-007**  **Hamza Umar FA19-BCE-026** | |
| **Project Proposal Summary** | In recent years, there has been a growing interest in developing natural and intuitive ways to interact with computers. One such method is gesture-based control, which allows users to control their computers using simple hand gestures. This project aims to develop a gesture-based computer control system that utilizes an Arduino microcontroller and ultrasonic sensors.  The project proposal is for the design and development of a gesture-based computer control system using an Arduino microcontroller and ultrasonic sensors. The objectives of the project include designing and developing the system, testing and evaluating its performance, and investigating potential applications in various fields such as gaming, accessibility, and home automation. Methods include programming the Arduino to recognize specific gestures and translating them into computer commands, calibrating and testing the system for accurate gesture recognition, and investigating potential applications. Expected outcomes include a working prototype of the system, evaluation of its performance, and identification of potential applications and future directions for the technology. The project aims to improve the way we interact with computers by providing a natural and intuitive way to control them using hand gestures. | |
| Recommendations by Instructor | | |
| Range of Complex  Problem Solving | Range of Conflicting Requirements | The conflicting requirements for the proposed project of "Gesture-Based Computer Control Using Arduino" include:   * **Accuracy vs. ease of use:** The system should be able to accurately recognize gestures, but should also be easy for users to understand and use. * **Complexity vs. simplicity:** The system should have advanced features, but should also be simple to set up and use. * **Customizability vs. standardization:** The system should allow for customization of gestures to suit the user's needs, but should also be standardized enough to work with a variety of devices and systems. |
| Depth of Analysis Required | The depth of analysis required for the proposed project of "Gesture-Based Computer Control Using Arduino" will depend on the specific goals and objectives of the project. However, some of the key areas that will require a deep analysis include:   * **Gesture recognition:** A thorough analysis of different gesture recognition algorithms and techniques will be required to ensure accurate and reliable gesture recognition. This will involve studying the different types of sensors that can be used, such as ultrasonic sensors, and their limitations in terms of gesture detection and recognition. * Hardware and software design: A deep analysis of the hardware and software design of the system will be required to ensure that it is cost-effective, user-friendly, and performs well. This will involve analyzing the different types of microcontroller boards that can be used, such as the Arduino, and their capabilities and limitations. |
| Depth of Knowledge Required | * Microcontroller programming: A deep knowledge of microcontroller programming and programming languages such as C is required to program the Arduino microcontroller to recognize specific gestures and translate them into corresponding computer commands. * Hardware design: A deep knowledge of hardware design, including circuit design and electronics, is required to design and build the system's hardware components such as ultrasonic sensors, and interface them with the microcontroller. |
| Interdependencies | * **Sensors:** Ultrasonic Sensor * **Embedded Systems Controller:** Arduino UNO * **Programming Languages:** Python   All above mentioned components acts as a subsystems and work independently. However, in the proposed system they will act and coordinate as a single system to provide the desired results. |
| Range of Complex Problem Activities | Range of Resources | **Hardware resources:**   * Microcontroller board (such as Arduino) * Ultrasonic sensors   **Software resources:**   * Programming software (such as the Arduino IDE) * Development tools (such as libraries and frameworks) |
| Level of Interactions and Innovations | * The project use the innovative idea of electrical and computer engineering with high social impact. |
| Consequences of Society | * The projects involves the daily activities and behavior of a person so it may cause the privacy leakages. So, the data should be collected and shared with consents. |
|  | Familiarity | * The project deals with a new, unfamiliar area for electrical engineers. Necessary to document and communicate how principle-based approaches address the project requirements |