

Model Program Book



SEMESTER INTERNSHIP

Designed & Developed by



**ANDHRA PRADESH
STATE COUNCIL OF HIGHER EDUCATION**

(A STATUTORY BODY OF GOVERNMENT OF ANDHRA PRADESH)

INTERNSHIP REPORT ON
“Arduino powered hand gesture computer control system”

VSM COLLEGE OF ENGINEERING
RAMACHANDRAPURAM - 533255



AN ISO 9001:2015 CERTIFIED INSTITUTION
PERMANENTLY AFFILIATED TO JNTUK A NAAC
ACCREDITED INSTITUTION

DEPARTMENT OF COMPUTER SCIENCE &
ENGINEERING

PROGRAM BOOK FOR
SEMESTER INTERNSHIP

Name of the Student:

G. Devi Srinivas

Name of the College:

VSM COLLEGE OF ENGINEERING

Registration Number:

213B1A0520

Period of Internship:

2months

From:

14/06/2024

To:

07/08/2024

Name & Address of the Intern Organization

OCEAN APP TECHNOLOGY

JNTUK University
2024

An Internship Report on

“Arduino powered hand gesture computer control system”

Submitted in accordance with the requirement for the degree of
“Bachelor of Technology”

Under the Faculty Guideship of

MR. KRISHNA KUMAR, (Associate Professor)

Department of

COMPUTER SCIENCE &ENGINEERING
VSM COLLEGE OF ENGINEERING

Submitted by:

G.Devi Srinivas

Reg.No: 213B1A0520

Department of **COMPUTER SCIENCE &ENGINEERING**

VSM COLLEGE OF ENGINEERING

Instructions to Students

Please read the detailed Guidelines on Internship hosted on the website of AP State Council of Higher Education <https://apsche.ap.gov.in>

1. It is mandatory for all the students to complete Semester internship either in V Semester or in VI Semester.
2. Every student should identify the organization for internship in consultation with the College Principal/the authorized person nominated by the Principal.
3. Report to the intern organization as per the schedule given by the College. You must make your own arrangements for transportation to reach the organization.
4. You should maintain punctuality in attending the internship. Daily attendance is compulsory.
5. You are expected to learn about the organization, policies, procedures, and processes by interacting with the people working in the organization and by consulting the supervisor attached to the interns.
6. While you are attending the internship, follow the rules and regulations of the intern organization.
7. While in the intern organization, always wear your College Identity Card.
8. If your College has a prescribed dress as uniform, wear the uniform daily, as you attend to your assigned duties.
9. You will be assigned a Faculty Guide from your College. He/She will be creating a WhatsApp group with your fellow interns. Post your daily activity done and/or any difficulty you encounter during the internship.
10. Identify five or more learning objectives in consultation with your Faculty Guide. These learning objectives can address:
 - a. Data and Information you are expected to collect about the organization and/or industry.
 - b. Job Skills you are expected to acquire.
 - c. Development of professional competencies that lead to future career success.
11. Practice professional communication skills with team members, co-interns, and your supervisor. This includes expressing thoughts and ideas effectively through oral, written, and non-verbal communication, and utilizing listening skills.
12. Be aware of the communication culture in your work environment. Follow up and communicate regularly with your supervisor to provide updates on your progress with work assignments.

13. Never be hesitant to ask questions to make sure you fully understand what you need to do your work and to contribute to the organization.
14. Be regular in filling up your Program Book. It shall be filled up in your own handwriting. Add additional sheets wherever necessary.
15. At the end of internship, you shall be evaluated by your Supervisor of the intern organization.
16. There shall also be evaluation at the end of the internship by the Faculty Guide and the Principal.
17. Do not meddle with the instruments/equipment you work with.
18. Ensure that you do not cause any disturbance to the regular activities of the intern organization.
19. Be cordial but not too intimate with the employees of the intern organization and your fellow interns.
20. You should understand that during the internship programme, you are the ambassador of your College, and your behavior during the internship programme is of utmost importance.
21. If you are involved in any discipline related issues, you will be withdrawn from the internship programme immediately and disciplinary action shall be initiated.
22. Do not forget to keep up your family pride and prestige of your College.

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Student's Declaration

I, _____ a student of _____
Program, Reg. No. _____ of the Department of _____
College do hereby declare that I have completed the mandatory internship from
_____ to _____ in _____ (Name of
the intern organization) under the Faculty Guideship of
_____ (Name of the Faculty Guide), Department of
_____, _____
(Name of the College)

(Signature and Date)

Official Certification

This is to certify that _____ (*Name of the student*) Reg. No. _____ has completed his/her Internship in _____ (*Name of the Intern Organization*) on _____ (*Title of the Internship*) under my supervision as a part of partial fulfillment of the requirement for the Degree of _____ in the Department of _____ (*Name of the College*).

This is accepted for evaluation.

(Signatory with Date and Seal)

Endorsements

Faculty Guide

Head of the Department

Principal

Certificate from Intern Organization

This is to certify that _____(*Name of the intern*)

Reg. No _____ of _____(*Name of the*

College) underwent internship in _____(*Name of the*

Intern Organization) from _____to _____

The overall performance of the intern during his/her internship is found to be

_____ (*Satisfactory/Not Satisfactory*).

Authorized Signatory with Date and Seal

Acknowledgements

I would like to thank **Sri M S R PRASAD, President and Correspondent**, V S M Group of Institutions, **Sri M S N MURTHY, M.S (USA)**, Vice President, V S M College of Engineering, & other officials of the organization for giving me opportunity and facilities according to carry out this internship.

I would like to express my sincere thanks to **Dr. K BALAJI, Principal (Academics)** V S M College of Engineering, Ramachandrapuram, for their support during and till the completion of the internship.

I'm really thankful to **Mrs. K SUREKHA, M.Tech (Associate Professor)** and Head of the Department, Computer Science & Engineering for providing the laboratory facilities to the fullest extent as and when required and also for giving me the opportunity to carry out the internship.

I'm profoundly grateful to express my deep gratitude and respect towards my guide **Mr. KRISHNA KUMAR (Associate Professor)** for his excellent guidance right from selection of the internship and his valuable suggestions throughout my work. His constant encouragement and support has been the cause of my success, in completing this internship.

I am very much thankful to **OCEAN APP TECHNOLOGIES** who helped me and responded on my every query throughout the internship. I am thankful to the team of **OCEAN APP TECHNOLOGIES** for giving me the most independence and freedom throughout various phases of the internship.

Finally, I would like to convey my heart full thanks to all technical Staff, for their guidance and support in every step of this internship. I convey my sincere thanks to all the faculty and friends who directly or indirectly helped me for the successful completion of this internship

Student name: Gannabattula Devi Srinivas

Reg no: 213B1A0520

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CHAPTER 1: EXECUTIVE SUMMARY

The internship report shall have a brief executive summary. It shall include five or more Learning Objectives and Outcomes achieved, a brief description of the sector of business and intern organization and summary of all the activities done by the intern during the period.

This report summarizes the internship project, Arduino-Powered Hand Gesture Computer Control System, outlining its objectives, outcomes, sector relevance, and key activities completed.

Learning Objectives

1. Understanding Gesture Control Systems: Study gesture recognition technology and its integration into user interfaces.
2. Arduino Programming Skills: Gain proficiency in coding for Arduino, including sensor data handling and serial communication.
3. Python Data Interpretation: Use Python to interpret sensor readings and translate them into computer commands.
4. Circuit Design and Sensor Integration: Build and connect circuits involving an ultrasonic sensor and Arduino Uno.
5. Troubleshooting Skills: Develop problem-solving skills to address calibration and code debugging challenges.

Outcomes Achieved

- Hands-On Embedded Systems Experience: Designed a gesture control system with Arduino and an ultrasonic sensor.
- Technical Skill Enhancement: Improved coding skills in Arduino and Python for real-time data handling.
- Insight into HCI Applications: Gained exposure to human-computer interaction, with applications in assistive and touchless technologies.
- Project Documentation: Developed skills in technical documentation and reporting.
- Circuit Assembly Confidence: Built confidence in hands-on circuit design and troubleshooting.

Business Sector Overview

This project aligns with “”Embedded Systems”” and “”Human-Computer Interaction (HCI)””, areas focused on innovative technology interfaces, including gesture control in consumer electronics, robotics, and healthcare. The hosting organization provides training in embedded systems and IoT, enabling practical skills in these technologies.

Summary of Activities

Key activities during the internship included:

1. Project Planning and Component Selection: Defined objectives and sourced components such as Arduino Uno and the ultrasonic sensor.
2. Hardware Assembly: Assembled circuits, configuring connections between the sensor, Arduino, and computer.
3. Arduino Programming: Developed code to capture sensor data and relay it to Python.
4. Python Gesture Interpretation: Created Python scripts to analyze sensor data and classify gestures for computer commands.
5. Testing and Troubleshooting: Conducted testing, adjusted code, and calibrated gestures for optimal accuracy.
6. Documentation and Reporting: Documented the project’s workflow, prepared a final report, and outlined recommendations.

This project fostered practical skills in embedded systems, gesture control, and technical problem-solving, enhancing my expertise in user-centric technology applications.

CHAPTER 2: OVERVIEW OF THE ORGANIZATION

A. Introduction of the Organization

OCEAN APP Technologies Pvt Ltd, specializes in automation and services. The company prioritizes high-quality, innovative solutions and aims to exceed customer expectations through a commitment to continuous improvement and strong quality management. As a humanitarian organization, OCEAN APP TECHNOLOGIES also focuses on reducing generational poverty by enhancing individual skill sets.

B. Vision, Mission, and Values

- Vision: To be a leading provider of innovative automation solutions and contribute to societal betterment.
- Mission: Deliver high-quality, value-priced products, fostering strong customer and supplier relationships.
- Values: Quality, commitment, continuous improvement, customer satisfaction, and social impact.

C. Internship Policy

Interns are expected to complete assigned tasks promptly, maintain quality, and align their work with the organization's focus on innovation and timely project delivery.

D. Organizational Structure

The organization operates with a collaborative team structure, emphasizing quality management and customer service, allowing streamlined work across automation, quality, and service departments.

E. Intern Role and Responsibilities

Interns are tasked with completing daily assignments and submitting them on time, supporting technical projects and OCEANAPP's broader social mission.

F. Performance of the Organization

Since its founding, OCEAN APP Technologies has achieved consistent growth in revenue, profits, and market reach, establishing a strong market presence in the automation sector.

G. Future Plans

OCEAN APP plans to expand its automation solutions and impact initiatives, with a focus on sustainable technology and skill-building programs that support underprivileged communities and contribute to social change.

CHAPTER 3: INTERNSHIP PART

Description of the Activities/Responsibilities in the Intern Organization during Internship, which shall include - details of working conditions, weekly work schedule, equipment used, and tasks performed. This part could end by reflecting on what kind of skills the intern acquired.

Equipment required:

1. Arduino Uno Board
2. Computer/Laptop with Arduino and Python IDE
3. USB Cable
4. Ultrasonic sensor(HC-SR04)
5. Jumper Wires

ACTIVITY LOG FOR THE FIRST WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day - 1	Researched the basics of gesture recognition and Arduino setup for sensors.	Understanding the principles of gesture recognition and sensor interfacing.	
Day - 2	Selected sensors (accelerometer, gyroscope) and hardware (Arduino model).	Gained knowledge of sensor selection and the role of each component..	
Day - 3	Installed the Arduino IDE, necessary libraries for sensors, and verified setup.	Became familiar with the Arduino development environment and libraries.	
Day - 4	Began writing basic Arduino code for initializing the sensors.	Learned to write Arduino code to interface with sensors..	
Day - 5	Tested sensors by reading raw data from accelerometer and gyroscope.	Gained experience with debugging and verifying sensor functionality.	
Day -6	Calibrated sensors to improve precision in data capture.	Learned how to fine-tune sensors for more accurate gesture detection.	

WEEKLY REPORT

WEEK - 1 (From Dt 14/06/2024 to Dt 19/06/2024)

Arduino Basics and Initial Research

Objectives:

1. Understand the fundamentals of gesture recognition and Arduino technology.
2. Research and select sensors (e.g., accelerometer, gyroscope) and appropriate Arduino models.
3. Install and configure the Arduino IDE and libraries for sensor interfacing.
4. Write basic code for initializing sensors and capturing raw data.
5. Test sensor functionality and calibrate them for accurate data capture.

Summary:

This week focused on the foundation of the project by exploring gesture recognition concepts and configuring the Arduino environment. Key activities included sensor selection, IDE setup, and initial coding to read raw sensor data. Testing and calibration ensured that the hardware components were functioning correctly, setting the stage for subsequent development.

ACTIVITY LOG FOR THE SECOND WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day - 1	Assembled the Arduino board and connected sensors.	Learned to wire and integrate components for proper functionality.	
Day - 2	Configured serial communication between Arduino and the PC.	Gained knowledge of serial communication protocols and configurations.	
Day - 3	Verified sensor connections and tested individual components.	Identified and fixed hardware connection issues.	
Day - 4	Researched optimal sensor placement for capturing gestures accurately.	Understood the impact of sensor placement on performance.	
Day - 5	Implemented basic circuit testing to validate the system.	Learned to troubleshoot circuit design problems.	
Day -6	Finalized hardware assembly and initial testing.	Ensured all components worked as expected.	

WEEKLY REPORT

WEEK - 2 (From Dt 20/06/2024 to Dt 26/06/2024)

Hardware Integration and Configuration

Objectives:

1. Assemble the Arduino board and connect sensors.
2. Configure serial communication between Arduino and a PC.
3. Verify hardware connections and troubleshoot component integration.
4. Research optimal sensor placement for accurate gesture capture.
5. Conduct initial tests to validate hardware and circuit functionality.

Summary:

This week involved assembling the hardware, ensuring all components were properly connected, and configuring serial communication. Extensive testing and troubleshooting were conducted to resolve any hardware issues. The placement of sensors was optimized to improve gesture detection accuracy, and the system was prepared for data capture.

ACTIVITY LOG FOR THE THIRD WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day - 1	Wrote Arduino code for capturing sensor data.	Learned programming techniques for reading sensor values..	
Day - 2	Tested Arduino code to ensure proper data transmission.	Debugged issues in real-time data capture.	
Day - 3	Developed Python script for logging sensor data from Arduino.	Learned Python scripting for serial communication.	
Day - 4	Conducted initial data logging to analyze sensor behavior.	Understood data patterns and sensor noise.	
Day - 5	Debugged errors in Python and Arduino communication.	Gained experience in handling cross-platform debugging.	
Day -6	Verified accuracy of logged data and prepared for gesture recognition.	Ensured data integrity for further processing.	

WEEKLY REPORT

WEEK - 3 (From Dt 27/06/2024 to Dt 03/07/2024)

Arduino Coding and Data Logging

Objectives:

1. Develop Arduino code for reading and transmitting sensor data.
2. Write Python scripts to log data from sensors via serial communication.
3. Analyze raw data for patterns and inconsistencies.
4. Debug communication issues between Arduino and Python scripts.
5. Verify data accuracy and prepare for preprocessing.

Summary:

The primary focus this week was on programming the Arduino to read and transmit sensor data and developing Python scripts for data logging. Issues in cross-platform communication were debugged, and data patterns were analyzed to identify noise or inconsistencies. The groundwork was laid for preprocessing and gesture detection in the next phase.

ACTIVITY LOG FOR THE FORTH WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day - 1	Preprocessed raw sensor data to remove noise.	Learned data preprocessing techniques.	
Day - 2	Implemented threshold-based gesture detection logic.	Gained knowledge of basic gesture recognition algorithms.	
Day - 3	Tested recognition for basic gestures (e.g., swipe up, down)..	Improved gesture detection through iterative testing.	
Day - 4	Adjusted thresholds for better accuracy in recognition.	Understood the role of fine-tuning in algorithm development.	
Day - 5	Analyzed false positives and refined detection logic.	Reduced errors in gesture detection.	
Day -6	Validated gesture recognition with multiple test cases.	Ensured consistent performance across various scenarios.	

WEEKLY REPORT

WEEK - 4 (From Dt 04/07/2024 to Dt 10/07/2024)

Gesture Recognition Development

Objectives:

1. Preprocess raw sensor data to remove noise.
2. Implement basic gesture detection using threshold-based algorithms.
3. Test and refine recognition for simple gestures like swipes and tilts.
4. Adjust detection thresholds for improved accuracy.
5. Analyze false positives and improve recognition logic.

Summary:

This week marked the beginning of gesture recognition development. Preprocessing techniques were applied to clean the data, and basic detection algorithms were implemented. Extensive testing helped refine thresholds and improve the accuracy of the system. Challenges with false positives were addressed, and the system was prepared for advanced gestures.

ACTIVITY LOG FOR THE FIFTH WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day - 1	Researched methods to link gestures to computer actions.	Learned about automation tools like pyautogui.	
Day - 2	Implemented gesture mappings to keyboard/mouse actions.	Gained experience in controlling computer actions programmatically.	
Day - 3	Tested gestures for common actions (e.g., volume control, cursor movement).	Ensured reliability of gesture mappings to system functions.	
Day - 4	Debugged synchronization issues between recognition and system actions.	Learned to optimize code for real-time performance.	
Day - 5	Enhanced Python script for additional system actions.	Expanded gesture mappings for diverse functionalities.	
Day -6	Validated system action responses for all gestures.	Ensured seamless interaction between gestures and system responses.	

WEEKLY REPORT

WEEK - 5 (From Dt 11/07/2024 to Dt 17/07/2024)

System Integration with Computer Controls

Objectives:

1. Map gestures to computer actions like volume control and cursor movement.
2. Research and utilize Python tools like `pyautogui` for system automation.
3. Debug synchronization issues between gesture recognition and computer actions.
4. Expand gesture mappings to include additional functionalities.
5. Test system performance with various gestures and actions.

Summary:

This week focused on integrating the gesture recognition system with computer controls. Gestures were successfully mapped to system actions using Python libraries, and testing was conducted to ensure responsiveness and accuracy. The scope of gestures was expanded to cover a broader range of functionalities, enhancing the system's utility.

ACTIVITY LOG FOR THE SIXTH WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day - 1	Conducted extensive testing of system on different setups.	Identified potential platform-specific issues..	
Day - 2	Adjusted sensor calibration for improved performance.	Improved gesture accuracy through fine-tuning.	
Day - 3	Fixed lag issues in gesture recognition and response.	Learned optimization techniques for faster execution.	
Day - 4	Collected user feedback on system performance.	Understood real-world usability concerns.	
Day - 5	Addressed bugs and refined gesture recognition logic..	Reduced errors and improved system reliability.	
Day -6	Validated system stability after refinements.	Ensured robust performance under various conditions.	

WEEKLY REPORT

WEEK - 6 (From Dt 18/07/2024 to Dt 24/07/2024)

System Testing and Optimization

Objectives:

1. Conduct comprehensive testing of the system on different setups.
2. Fine-tune sensor calibration for enhanced performance.
3. Optimize code to address lag and improve real-time response.
4. Collect user feedback on system usability and performance.
5. Implement feedback-driven improvements to ensure reliability.

Summary:

This week involved rigorous testing and optimization of the system. Calibration adjustments and code refinements addressed lag and improved gesture recognition. Feedback from users helped identify areas for improvement, leading to a more reliable and robust system.

ACTIVITY LOG FOR THE SEVEN WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day - 1	Designed basic GUI using Python's Tkinter library.	Learned GUI development techniques.	
Day - 2	Added live gesture recognition status display to the GUI.	Improved real-time feedback for users.	
Day - 3	Developed options for configuring gestures in the interface.	Enhanced user control over the system.	
Day - 4	Conducted usability testing of the GUI.	Learned about user experience design principles.	
Day - 5	Fixed synchronization issues between GUI and gesture system	Ensured smooth integration between GUI and recognition system.	
Day -6	Finalized GUI design and prepared for demo.	Delivered a user-friendly and polished interface.	

WEEKLY REPORT

WEEK - 7 (From Dt 25/07/2024 to Dt 31/07/2024)

User Interface Development

Objectives:

1. Develop a GUI using Python's Tkinter library.
2. Add real-time gesture recognition status display to the interface.
3. Enable gesture configuration options within the GUI.
4. Conduct usability testing for the GUI.
5. Resolve synchronization issues between the GUI and the recognition system.

Summary:

This week focused on creating a user-friendly graphical interface for the system. Real-time gesture recognition feedback was integrated into the GUI, and users were given control over gesture configurations. Testing and debugging ensured smooth operation, resulting in a functional and intuitive interface.

ACTIVITY LOG FOR THE EIGHTH WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day - 1	Polished codebase and added comments for clarity.	Improved code readability and maintainability.	
Day - 2	Created detailed documentation for setup and troubleshooting.	Learned to document complex systems effectively.	
Day - 3	Recorded a demo video showcasing the project.	Gained experience in project presentation techniques.	
Day - 4	Conducted final testing for all functionalities.	Validated complete system readiness.	
Day - 5	Prepared a presentation for project demonstration.	Developed skills in presenting technical projects.	
Day -6	Delivered the project and submitted all documentation.	Ensured successful completion and handover of the project.	

WEEKLY REPORT

WEEK - 8 (From Dt 01/08/2024 to Dt 07/08/2024)

Finalization and Documentation

Objectives:

1. Polish the codebase and add detailed comments for clarity.
2. Create comprehensive documentation for setup and usage.
3. Record a demo video showcasing the system's capabilities.
4. Conduct final system testing to ensure stability.
5. Prepare a presentation for project demonstration.

Summary:

In the final week, the focus was on finalizing the project. The codebase was polished, and detailed documentation was prepared to guide future users. A demo video and presentation highlighted the system's features and functionality. Extensive testing ensured stability, marking the successful completion of the project.

CHAPTER 5: OUTCOMES DESCRIPTION

Describe the work environment you have experienced (*in terms of people interactions, facilities available and maintenance, clarity of job roles, protocols, procedures, processes, discipline, time management, harmonious relationships, socialization, mutual support and teamwork, motivation, space and ventilation, etc.*)

In the internship program I have learn how to work with a team and incorporate various personal skills such as time management, group discussion for the project, interpersonal skills, communication and problem solving.

Describe the real time technical skills you have acquired (*in terms of the job-related skills and hands on experience*)

From the Arduino-Powered Hand Gesture Computer Control System project, I acquired several real-time technical skills and hands-on experience, particularly relevant to embedded systems and programming. Key skills gained include:

1. Arduino Programming and Hardware Control: Developed proficiency in coding for Arduino, managing data from sensors, and establishing stable serial communication for real-time data transfer.

2. Sensor Calibration and Gesture Recognition: Gained hands-on experience in calibrating the ultrasonic sensor for detecting hand gestures, learning to set distance thresholds to classify specific gestures accurately.

3. Python Integration for System Control: Learned to use Python for interpreting sensor data from Arduino, translating gestures into commands that control computer functions. This involved configuring Python libraries for serial communication, such as PySerial, and handling data processing.

4. Circuit Assembly and Troubleshooting: Acquired practical skills in assembling and testing the Arduino and sensor circuit, ensuring proper pin configuration, and resolving hardware issues related to connectivity and sensor sensitivity.

5. Debugging and Problem Solving: Enhanced my debugging capabilities by troubleshooting issues in both Arduino and Python code, adjusting parameters, and improving the system's response accuracy and stability.

This project provided a comprehensive experience in integrating hardware with software to create an interactive, gesture-based control system.

Describe the managerial skills you have acquired *(in terms of planning, leadership, team work, behaviour, workmanship, productive use of time, weekly improvement in competencies, goal setting, decision making, performance analysis, etc.*

I have acquired a number of managerial skills through my work experiences and training. These skills include:

- **Planning:** I am able to develop and implement effective plans to achieve goals. I can break down large projects into smaller, more manageable tasks, and I can set realistic deadlines for myself and others. I am also able to adapt my plans as needed, based on changes in the environment or new information.
- **Leadership:** I am able to motivate and inspire others to achieve their best. I am also able to build consensus and resolve conflict. I am comfortable making tough decisions, and I am always looking for ways to improve my team's performance.
- **Teamwork:** I am a valuable team player. I am able to listen to others and respect their opinions. I am also able to share my ideas and work collaboratively with others to achieve common goals.
- **Productive use of time:** I am an efficient and effective manager. I am able to manage my time effectively, and I am always looking for ways to get things done quickly and efficiently.

Describe how you could improve your communication skills (*in terms of improvement in oral communication, written communication, conversational abilities, confidence levels while communicating, anxiety management, understanding others, getting understood by others, extempore speech, ability to articulate the key points, closing the conversation, maintaining niceties and protocols, greeting, thanking and appreciating others, etc.,*)

These are some ways in which I could improve my communication skills:

Oral communication:

- Practice active listening. Active listening means paying attention to what the other person is saying, both verbally and nonverbally. It also means asking clarifying questions and summarizing what the other person has said to make sure you understand them.
- Improve my pronunciation and intonation. Pronunciation is the way you pronounce individual words, while intonation is the rise and fall of your voice. Good pronunciation and intonation can make your speech easier to understand and more engaging.

Written communication:

- Improve my grammar and punctuation. Good grammar and punctuation can make your writing easier to read and understand.

Understanding others:

- Listen attentively to what others are saying. This means paying attention to both the verbal and nonverbal cues that they are giving.
- Ask clarifying questions. If you don't understand something, ask for clarification.

Greeting, thanking and appreciating others:

- Greet others warmly and sincerely. A genuine smile and a warm handshake can go a long way in making a good impression.

Describe how could you could enhance your abilities in group discussions, participation in teams, contribution as a team member, leading a team/activity.

Group discussions:

- Improve my ability to understand and respond to complex ideas. I can do this by reading more challenging material, practicing summarizing complex arguments, and engaging in discussions with people who have different perspectives from my own.
- Develop a broader range of knowledge. I can do this by reading widely on a variety of topics, taking classes, and talking to people from different backgrounds.
- Become more comfortable with public speaking. I can do this by joining a public speaking group, practicing my speeches in front of others, and volunteering to give presentations.

Participation in teams:

- Be more proactive in identifying and solving problems. I can do this by paying attention to the team's progress, asking questions, and suggesting solutions.
- Be more collaborative and supportive of my teammates. I can do this by actively listening to others' ideas, providing constructive feedback, and celebrating team successes.

Contribution as a team member:

- Identify my strengths and weaknesses. I can do this by taking assessments, seeking feedback from others, and reflecting on my experiences.
- Use my strengths to benefit the team. I can do this by volunteering to take on tasks that I am good at, sharing my knowledge with others, and providing mentorship to new team members.
- Work on improving my weaknesses. I can do this by seeking out opportunities to develop new skills, taking classes, and practicing in my spare time.

Describe the technological developments you have observed and relevant to the subject area of training *(focus on digital technologies relevant to your job role)*

In the development of the Arduino-Powered Hand Gesture Computer Control System, several relevant technological advancements in digital technologies have emerged, especially in the fields of embedded systems, sensors, and human-computer interaction. Key developments observed include:

1. Advancements in Sensor Technology: Ultrasonic sensors have become more precise and affordable, making them viable for gesture recognition and other applications in embedded systems. This allows developers to achieve reliable gesture-based inputs in cost-effective ways, enhancing accessibility for hobbyists and small-scale applications.

2. Growth of IoT and Wearable Integration: The Internet of Things (IoT) has spurred advancements in communication between devices. With components like Arduino, it's now easier to implement gesture control systems that can integrate into IoT environments, enabling devices to interact with each other seamlessly.

3. Machine Learning in Gesture Recognition: Machine learning algorithms are increasingly used for gesture recognition, offering higher accuracy and adaptability to different gestures and environments. While this project uses a threshold-based approach, more advanced systems integrate machine learning for gesture classification, enabling smoother and more intuitive control systems.

4. Advances in Microcontrollers and Embedded Systems: Boards like the Arduino Uno have made embedded development highly accessible, with enhanced libraries and tools that allow even basic microcontrollers to support complex tasks, such as processing gesture data in real time.

5. Integration of Python in Embedded Systems: Python's popularity in the embedded world is rising, thanks to libraries that facilitate serial communication and real-time data handling. This integration makes it simpler to develop, test, and deploy gesture control applications, broadening accessibility for developers across skill levels.

These advancements in digital technologies are crucial to the growth of user-friendly gesture recognition systems, positioning them as viable alternatives to traditional input methods across consumer electronics, assistive devices, and even industrial applications.

Student Self Evaluation of the Short-Term Internship

Student Name:

Registration No:

Term of Internship:

From:

To :

Date of Evaluation:

Organization Name & Address:

Please rate your performance in the following areas:

Rating Scale:

Letter grade of CGPA calculation to be provided

1	Oral communication	1	2	3	4	5
2	Written communication	1	2	3	4	5
3	Proactiveness	1	2	3	4	5
4	Interaction ability with community	1	2	3	4	5
5	Positive Attitude	1	2	3	4	5
6	Self-confidence	1	2	3	4	5
7	Ability to learn	1	2	3	4	5
8	Work Plan and organization	1	2	3	4	5
9	Professionalism	1	2	3	4	5
10	Creativity	1	2	3	4	5
11	Quality of work done	1	2	3	4	5
12	Time Management	1	2	3	4	5
13	Understanding the Community	1	2	3	4	5
14	Achievement of Desired Outcomes	1	2	3	4	5
15	OVERALL PERFORMANCE	1	2	3	4	5

Date:

Signature of the Student

Evaluation by the Supervisor of the Intern Organization

Student Name:

Registration No:

Term of Internship:

From:

To :

Date of Evaluation:

Organization Name & Address:

**Name & Address of the Supervisor
with Mobile Number**

Please rate the student's performance in the following areas:

Please note that your evaluation shall be done independent of the Student's self-evaluation

Rating Scale: 1 is lowest and 5 is highest rank

1	Oral communication	1	2	3	4	5
2	Written communication	1	2	3	4	5
3	Proactiveness	1	2	3	4	5
4	Interaction ability with community	1	2	3	4	5
5	Positive Attitude	1	2	3	4	5
6	Self-confidence	1	2	3	4	5
7	Ability to learn	1	2	3	4	5
8	Work Plan and organization	1	2	3	4	5
9	Professionalism	1	2	3	4	5
10	Creativity	1	2	3	4	5
11	Quality of work done	1	2	3	4	5
12	Time Management	1	2	3	4	5
13	Understanding the Community	1	2	3	4	5
14	Achievement of Desired Outcomes	1	2	3	4	5
15	OVERALL PERFORMANCE	1	2	3	4	5

Date:

Signature of the Supervisor

CODE FOR THE PROJECT:

Arduino code:

```
#include <NewPing.h>

#define TRIGGER_PIN 9    // Trigger pin of the ultrasonic sensor
#define ECHO_PIN 10     // Echo pin of the ultrasonic sensor
#define MAX_DISTANCE 200 // Maximum distance we care about (in cm)

NewPing sonar(TRIGGER_PIN, ECHO_PIN, MAX_DISTANCE);

void setup() {
  Serial.begin(9600); // Start serial communication
}

void loop() {
  int distance = sonar.ping_cm(); // Read distance in cm

  if (distance > 0 && distance < 10) {
    Serial.println("VOL_UP"); // Volume up command if distance is < 10
cm
  } else if (distance >= 10 && distance < 20) {
    Serial.println("VOL_DOWN"); // Volume down command if distance is
between 10-20 cm
  } else if (distance >= 20 && distance < 30) {
    Serial.println("PLAY_PAUSE"); // Play/Pause if distance is between
20-30 cm
  } else if (distance >= 30 && distance < 40) {
    Serial.println("FORWARD"); // Forward command if distance is
between 30-40 cm
  } else if (distance >= 40 && distance < 50) {
    Serial.println("BACKWARD"); // Backward command if distance is
between 40-50 cm
  }

  delay(500); // Delay for a smoother read rate
}
```


Python code:

```
import serial
import pyautogui
import time

# Set up serial communication
try:
    ser = serial.Serial('COM3', 9600)
    time.sleep(5) # Wait for the serial connection to
initialize

    while True:
        if ser.in_waiting > 0:
            try:
                command =
ser.readline().decode().strip()

                if command == "VOL_UP":
                    pyautogui.press('volumeup')
                elif command == "VOL_DOWN":
                    pyautogui.press('volumedown')
                elif command == "PLAY_PAUSE":
                    pyautogui.press('space') # VLC
typically uses 'space' for play/pause

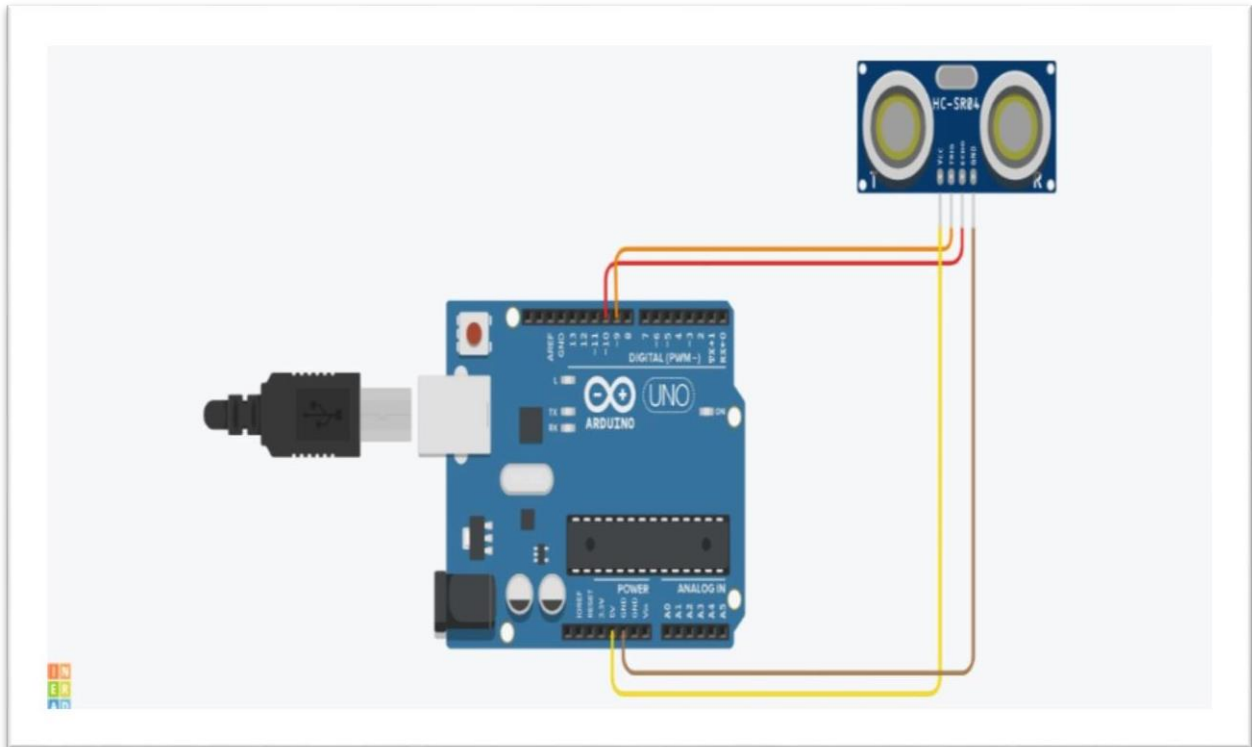
            except UnicodeDecodeError:
                print("Error decoding the data received
from Arduino.")

except serial.SerialException as e:
    print(f"Serial error: {e}")

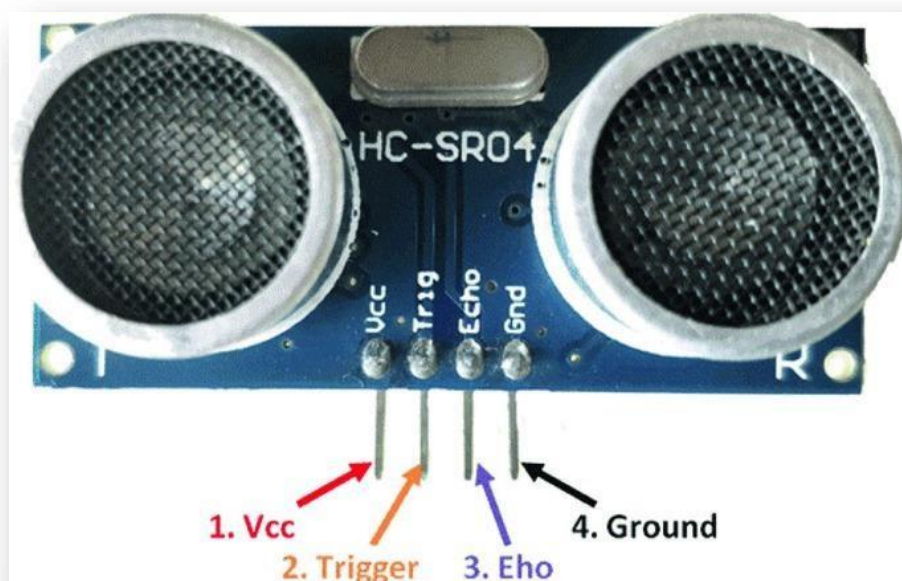
finally:
    ser.close()
```

PHOTOS & VIDEO LINKS

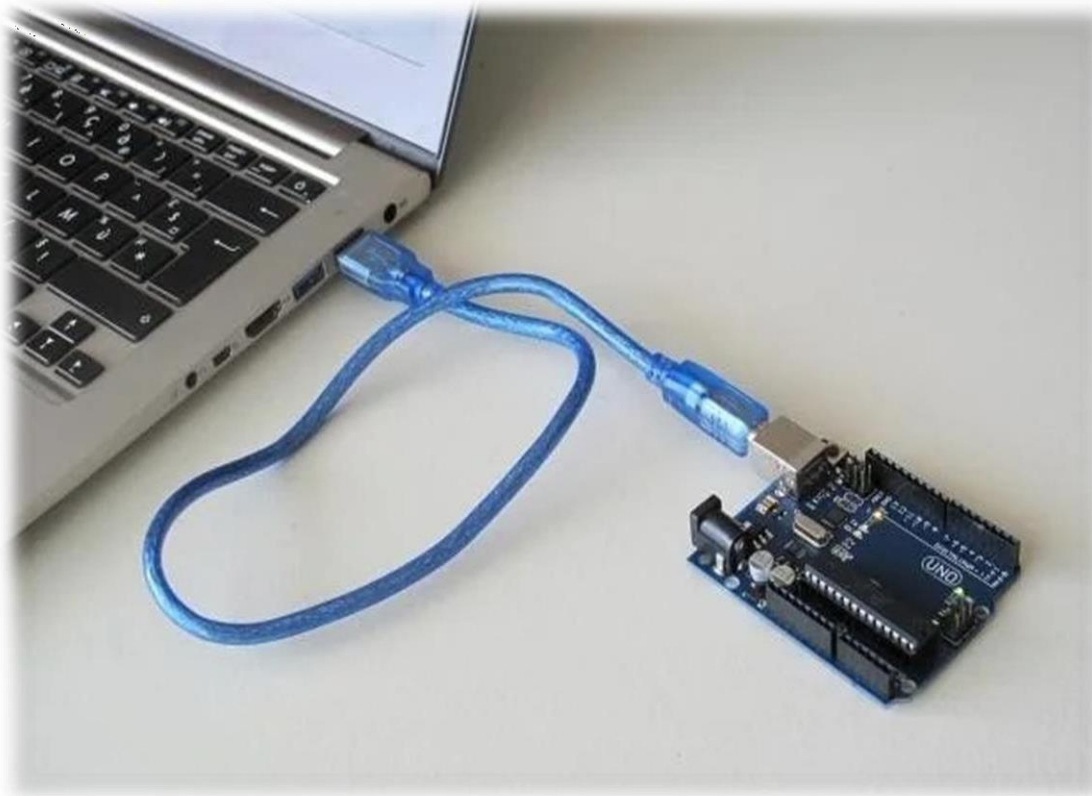
Circuit Diagram:



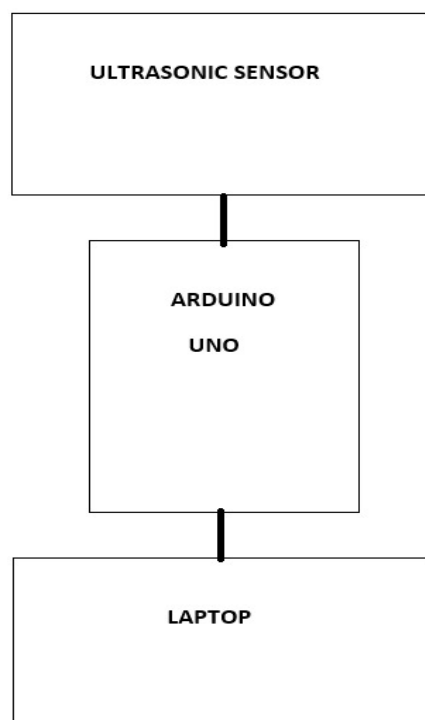
Ultrasonic sensor:



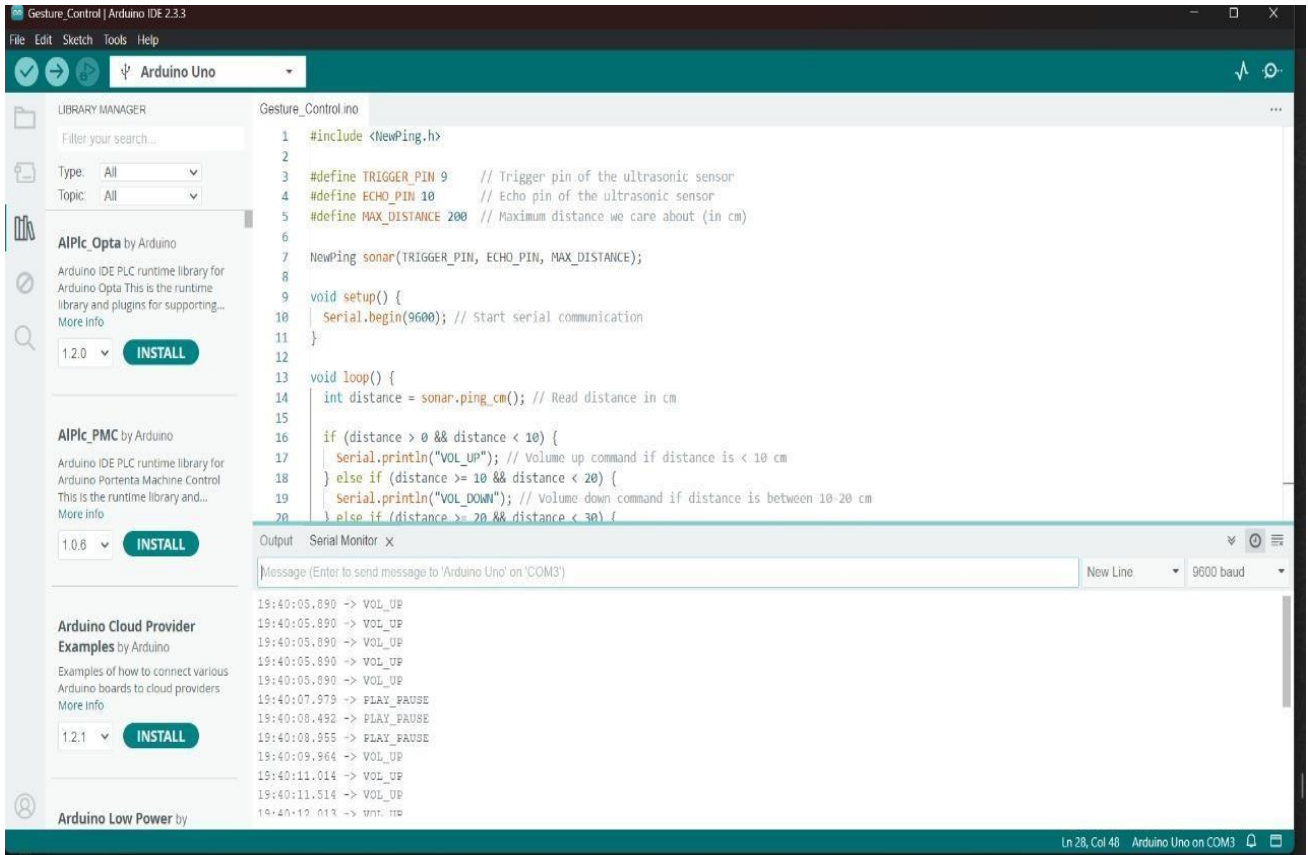
Power Supply and code setup:



Flow diagram:



Verify the output at serial monitor:



The screenshot displays the Arduino IDE 2.3.3 interface. The main editor shows the 'Gesture_Control.ino' sketch with the following code:

```
1 #include <NewPing.h>
2
3 #define TRIGGER_PIN 9 // Trigger pin of the ultrasonic sensor
4 #define ECHO_PIN 10 // Echo pin of the ultrasonic sensor
5 #define MAX_DISTANCE 200 // Maximum distance we care about (in cm)
6
7 NewPing sonar(TRIGGER_PIN, ECHO_PIN, MAX_DISTANCE);
8
9 void setup() {
10   Serial.begin(9600); // Start serial communication
11 }
12
13 void loop() {
14   int distance = sonar.ping_cm(); // Read distance in cm
15
16   if (distance > 0 && distance < 10) {
17     Serial.println("VOL_UP"); // Volume up command if distance is < 10 cm
18   } else if (distance >= 10 && distance < 20) {
19     Serial.println("VOL_DOWN"); // Volume down command if distance is between 10-20 cm
20   } else if (distance >= 20 && distance < 30) {
```

The left sidebar shows the 'LIBRARY MANAGER' with search filters set to 'All' for both 'Type' and 'Topic'. It lists several libraries, including 'AIPlc_Opita' by Arduino (version 1.2.0) and 'AIPlc_PMC' by Arduino (version 1.0.6), both with 'INSTALL' buttons. Below these are 'Arduino Cloud Provider Examples' (version 1.2.1) and 'Arduino Low Power'.

The bottom right pane shows the 'Serial Monitor' window, which is currently empty. The status bar at the bottom indicates 'Ln 28, Col 48' and 'Arduino Uno on COM3'.

Video link:

Reference 1 :<https://youtu.be/OjhrCr0zzgs?si=-GlwdoyrRZljOMXk>

Reference 2: https://youtu.be/05jDQV4_uXU?si=mFzLkHHfat1hWuD3

EVALUATION

Internal & External Evaluation for Semester Internship

Objectives:

- Explore career alternatives prior to graduation.
- To assess interests and abilities in the field of study.
- To develop communication, interpersonal and other critical skills in the future job.
- To acquire additional skills required for the world of work.
- To acquire employment contacts leading directly to a full-time job following graduation from college.

Assessment Model:

- There shall be both internal evaluation and external evaluation
- The Faculty Guide assigned is in-charge of the learning activities of the students and for the comprehensive and continuous assessment of the students.
- The assessment is to be conducted for 200 marks. Internal Evaluation for 50 marks and External Evaluation for 150 marks
- The number of credits assigned is 12. Later the marks shall be converted into grades and grade points to include finally in the SGPA and CGPA.
- The weightings for Internal Evaluation shall be:
 - Activity Log 10 marks
 - Internship Evaluation 30 marks
 - Oral Presentation 10 marks
- The weightings for External Evaluation shall be:
 - Internship Evaluation 100 marks
 - Viva-Voce 50 marks
- The External Evaluation shall be conducted by an Evaluation Committee comprising of the Principal, Faculty Guide, Internal Expert and External Expert nominated by the affiliating University. The Evaluation Committee shall also consider the grading given by the Supervisor of the Intern Organization.
- Activity Log is the record of the day-to-day activities. The Activity Log is assessed on an individual basis, thus allowing for individual members within groups to be assessed this way. The assessment will take into consideration

the individual student's involvement in the assigned work.

- While evaluating the student's Activity Log, the following shall be considered -
 - a. The individual student's effort and commitment.
 - b. The originality and quality of the work produced by the individual student.
 - c. The student's integration and co-operation with the work assigned.
 - d. The completeness of the Activity Log.
- The Internship Evaluation shall include the following components and based on Weekly Reports and Outcomes Description
 - a. Description of the Work Environment.
 - b. Real Time Technical Skills acquired.
 - c. Managerial Skills acquired.
 - d. Improvement of Communication Skills.
 - e. Team Dynamics
 - f. Technological Developments recorded.

MARKS STATEMENT
(To be used by the Examiners)

INTERNAL ASSESSMENT STATEMENT

Name Of the Student:

Programme of Study:

Year of Study:

Group:

Register No/H.T. No:

Name of the College:

University:

<i>Sl.No</i>	<i>Evaluation Criterion</i>	<i>Maximum Marks</i>	<i>Marks Awarded</i>
1.	Activity Log	10	
2.	Internship Evaluation	30	
3.	Oral Presentation	10	
	GRAND TOTAL	50	

Date:

Signature of the Faculty Guide

EXTERNAL ASSESSMENT STATEMENT

Name Of the Student:

Programme of Study:

Year of Study:

Group:

Register No/H.T. No:

Name of the College:

University:

<i>Sl.No</i>	<i>Evaluation Criterion</i>	<i>Maximum Marks</i>	<i>Marks Awarded</i>
1.	Internship Evaluation	80	
2.	For the grading giving by the Supervisor of the Intern Organization	20	
3.	Viva-Voce	50	
	TOTAL	150	
GRAND TOTAL (EXT. 50 M + INT. 100M)		200	

Signature of the Faculty Guide

Signature of the Internal Expert

Signature of the External Expert

Signature of the Principal with Seal



ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

(A Statutory Body of the Government of Andhra Pradesh)

2nd, 3rd, 4th and 5th floors, Neeladri Towers, Sri Ram Nagar, 6th Battalion Road

Atmakur (V)Mangalagiri (M), Guntur, Andhra Pradesh, Pin - 522 503

www.apsche.ap.gov.in