** B.P.PODDAR INSTITUTE OF MANAGEMENT AND TECHNOLOGY**

**Department of Electronics & Communication Engineering**

**Academic Year: 2021 - 2022**

# **Report for Midterm Assessment of**

# **Mini Project/ Electronic Design Workshop (EC681)**

Title of project

**Automatic Alarm using Piezo Sensor**

Name of the Supervisor:

**Ms. Ankita Indu & Mr. Mostafa Sheikh**

# Submitted by

# **GROUP NO. 11**

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**DEPARTMENTAL MISSION, VISION, PEO, PO, PSO:-**

## **Departmental Vision:**

To emerge as a premier department for studies in Electronics and Communication Engineering.

## **Departmental Mission:**

* Imparting innovative educational program through laboratory and project-based teaching-learning process for meeting the growing challenges of industry and research.
* Providing an inspiring and conducive learning environment to prepare skilled and competent engineers and entrepreneurs for sustainable development of the society.
* Creating a knowledge centre of advanced technologies committed to societal growth using environment-friendly technologies.

## **Program Educational Objectives (PEOs):**

* Graduates of Electronics and Communication Engineering will be able to use latest tools and techniques to analyze, design and develop novel systems and products to solve real life problems.
* Graduates of Electronics and Communication Engineering will have strong domain knowledge, skills, and attitude toward employment in core and allied industries, higher studies and research or will become successful entrepreneurs.
* Graduates of Electronics and Communication will exhibit ethical values, professionalism, leadership, communication and management skills, teamwork, and multi-disciplinary approach to adapt current trends in technology through life-long learning.

## **Program Outcomes (POs):**

1. Engineering Knowledge: Apply the knowledge of Mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design / Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct Investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Life-long Learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## **Program Specific Outcomes (PSO):**

* Students will acquire knowledge in Advance Communication Engineering, Signal, and Image Processing, Embedded and VLSI System Design.
* Students will qualify in various competitive examinations for successful employment, higher studies, and research.

**TITLE:-** To design Automatic Alarm using Piezoelectric Sensor

**PO& PSO MAPPING:-**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **P012** | **PSO1** | **PSO12** |
| **3** | **3** | **3** | **3** | **2** | **3** | **2** | **3** | **3** | **3** | **2** | **3** | **3** | **3** |

##### Note: Correlation levels are as defined: 1: Slight (Low) 2: Moderate (Medium)

##### 3: Substantial (High).If there is no correlation, put “-”

**JUSTIFICATIONS OF MAPPING:-**

|  |  |  |
| --- | --- | --- |
| **PO/PSO MAPPED** | **LEVEL OF MAPPING** | **JUSTIFICATION** |
| PO1 | 3 | Apply knowledge of engineering fundamentals, mathematics, science and an engineering specialization |
| PO2 | 3 | Identify, formulate, review research literature and analyze complex engineering problems |
| PO3 | 3 | The design solution for complex engineering problems that meet the specific needs with appropriate consideration for the public safety |
| PO4 | 3 | Use research-based knowledge and research methods to analyze, interpret and synthesis of the information to provide valid conclusion |
| PO5 | 2 | Create, select and apply appropriate techniques, resources and modern engineering and IT tools to predict and model complex engineering activities with an understanding of the limitations |
| PO6 | 3 | Apply to reason informed by the contextual knowledge to safety relevant to the professional engineering practice. |
| PO7 | 2 | Understand the impact of professional engineering solutions and demonstrate the knowledge of, and need for sustainable development |
| PO8 | 3 | Apply ethical principles and commit to professional ethics and responsibilities |
| PO9 | 3 | Function effectively as an individual, and as a member or leader |
| PO10 | 3 | Comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions |
| PO11 | 2 | Apply knowledge to one’s own work, as a member or leader in a team, to manage projects |
| PO12 | 3 | Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning |
| PSO1 | 3 | Acquire knowledge in Embedded and VLSI System Design |
| PSO2 | 3 | Qualify in higher studies and research |

**ABSTRACT:-**

In this report, we have discussed about our project “Automatic Alarm using Piezoeletric Sensor”. The circuit of automatic alarm on knocking uses a thin piezoelectric plate, senses the vibration generated on knocking a surface (such as a door or a table) to activate the alarm and can also be used to safeguard motor vehicles. The piezoelectric plate is used as the sensor. Piezoelectric material is used at the input in order to convert any mechanical vibration into electrical variation, it avoids false triggering.

A sensor which works on the principle of **piezoelectricity** is known as a piezoelectric sensor. Where piezoelectricity is a phenomenon where electricity is generated if mechanical stress is applied to a material. Not all materials have piezoelectric characteristics. There are various types of piezoelectric materials. Examples of **piezoelectric materials** are natural available single crystal quartz, bone etc. Artificially manufactured like PZT ceramic etc.

The commonly measured physical quantities by a piezoelectric sensor are Acceleration and Pressure. Both pressure and acceleration sensors work on the same principle of piezoelectricity but the main difference between them is the way force is applied to their sensing element. In the pressure sensor, a thin membrane is placed on a massive base to transfer the applied force to the **piezoelectric element**. Upon application of pressure on this thin membrane, the piezoelectric material gets loaded and starts generating electrical voltages. The produced voltage is proportional to the amount of pressure applied.

So, we here use piezoelectric sensors that use piezoelectric effect in order to measure acceleration, force, pressure by its conversion into electric signals. Which then notifies with making the buzzer On. So whenever any Visitors arrive there is no need of any doorbell doormat can automatically detect visitor and notify on their behalf. With the Piezo sensor built-in, Mat is able to actively monitor any time whether there’s a change in pressure from someone or something standing.  
It’s not only a doormat, either. It’s a weight touchy layer of smart foam that you can set under your doormat or practically anyplace in your home you need pressure-sensitive responses.

**ACTIVITY CHART:-**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **JOB** | **1st -15th Mar** | **16th -31st Mar** | **1st -24th Apr** | **25th -30th Apr** | **1st –**  **15th May** | **16th –**  **31st**  **May** |
| 0th Review |  |  |  |  |  |  |
| Studying related research papers on Project |  |  |  |  |  |  |
| Understanding Circuit Diagram |  |  |  |  |  |  |
| Midterm report preparation |  |  |  |  |  |  |
| Implement the Circuit Diagram |  |  |  |  |  |  |
| Report writing and project presentation |  |  |  |  |  |  |

**INTRODUCTION:-**

In this modern world everyone wants something new, something different, so instead of using a switch to ring the doorbell just an alarm is produced by knocking the door which people feel more luxurious. The circuit of automatic alarm on knocking uses a thin piezoelectric plate, senses the vibration generated on knocking a surface (such as a door or a table) to activate the alarm and can also be used to safeguard motor vehicles. The piezoelectric plate is used as the sensor. Piezoelectric material is used at the input in order to convert any mechanical vibration into electrical variation, it avoids false triggering.

Piezoelectric pressure sensors exploit this effect by measuring the voltage across a piezoelectric element generated by the applied pressure. When a force is applied to a piezoelectric material, an electric charge is generated across the faces of the crystal. This can be measured as a voltage proportional to the pressure.

**WORK PROGRESS TILL DATE:-**

**Implementation of hardware**

**NO**

**Getting signals from sensors**

**Is all sensors provide signals**

**YES**

**Storing energy via Piezoelectric Sensor**

**Conversion of energy to electrical energy**

**Providing electrical energy to device**

**RESULT & DISCUSSION:-**

Piezoelectric Sensor is an effective and efficient new vibrational source which can be used as suitable renewable energy source. Upon application of pressure on this thin membrane, the piezoelectric material gets loaded and starts generating electrical voltages. The produced voltage is proportional to the amount of pressure applied. The electrical energy makes the buzzer on. The frequency of the buzzer depends on amount of pressure which is given.

**FUTURE PLAN:-**

Using more appropriate Piezo sensor we can make precise automatic alarm sensing system which used for advanced security purpose.

**REFERENCES:-**

Journal paper:

1. MARADAMMA Y, RAJIV K, NISSARAHMAD N, SATTYASHREE M, KANDAGAL S. S. (2016,June.) .GENERATION AND STORAGE OF

ELECTRICITY BY AMBIENT VIBRATIONS AND PRESSURE BY USINGPIEZOELECTRIC DEVICES, *ICITER-C117[online], pp. 874- 880*

Website:

1. [**https://nevonprojects.com/peizo-based-visitor-sensing-welcome-mat/**](https://nevonprojects.com/peizo-based-visitor-sensing-welcome-mat/)
2. [**https://www.elprocus.com/what-is-a-piezoelectric-sensor-circuit-specifications-and-applications/**](https://www.elprocus.com/what-is-a-piezoelectric-sensor-circuit-specifications-and-applications/)
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