Innovative Motion Sensing System with Labview

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Abstract. Nowadays children's used to play and going near restricted areas like transformers and borewells due to that they are getting affected by such incidents ensure that we are performing a system called Innovative Motion Sensing with LabVIEW. This system will be built to instantly detect motion and send alerts or initiate actions according to the motion. LabVIEW software will be used for terminating this project. This Motion Detection System can be used for automotive safety in addition to restricted locations. The system's primary objective will be to detect motion in real time and send out notifications or start events according to the motion. Several motion situations will be used to test and evaluate the system, including performance measures like accuracy and detection, different motion situations will be used to test and validate the system, and performance metrics including accuracy and detection time will be assessed. In this project, a GSM module is utilized to communicate with a nearby CELL Tower and transmit the message to a mobile device. Intelligent Motion Detection System for effectively identifying movement or motion inside a predetermined area and prompt timely replies or actions. With the help of this system, security, monitoring, and automation are all intended to be improved in a number of applications, and motion-related events will be handled proactively.

Keywords: PIR sensor · Buzzer · Led · DAQ · GSM · LabVIEW · ARDUINO UNO · CELL TOWER

1 Introduction

The emergence of Innovative Motion Sensing with LabVIEW has advanced to the forefront of research and innovation as a consequence of the rapid introduction of smart technologies and increasing demands for improved security, automation, and human-computer connection. Identify, assess, and respond to motion events in real-time, these systems integrate advanced sensors, innovative data processing algorithms, and intelligent decision-making capabilities.

Numerous industries, including surveillance, healthcare, industrial automation, and others, use smart motion detection systems to enhance the quality of life, efficiency, and

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safety. This system can detect motion, track objects, and make sensible choices based on motion through integrating sensors, cameras, and logical algorithms. It finds applications across a variety of fields, including security, industrial automation, and smart homes, where it enhances safety, improves operations, and contributes to resource management effectively.

The Innovative Motion Sensing with LabVIEW is an essential element of the developing Internet of Things (IoT) landscape and plays an essential role in creating smarter, more responsive environments, and ultimately improving security, efficiency, and user experiences.

The Innovative Motion Sensing with LabVIEW, with a focus on its technological components, algorithms, and applications in the real world. We think the outcomes of this research will be informative and innovative. An Innovative Motion Sensing System can provide much use for Home security purposes and also it can be used in restricted areas and in vehicles for security purposes. The main objective of the system will be to detect motion in real time and provide alerts or trigger actions based on the detected motion. The system will be tested and validated using different motion scenarios, and the performance metrics such as accuracy and detection time will be evaluated.

2 Literature Survey

The Smart Security System based on Motion Detection Since the Arduino (Microcontroller) is a free source, we will be using it for this project. In essence, we're going to build a system that makes [1] use of sensors like PIR, MQ2, IR, Ultrasonic, and LDR. The system will use an MQ2 sensor to detect the leakage of LPG, CO, and CH4 and will then forward the flow to an Arduino UNO to determine the extent of the flame/fire coverage area. The user will then receive a notification that the obstacle is at a low or high level after this. To detect motion or objects, sensors such as ultrasonic, IR, and PIR are employed.

The Smart Parking Project for Smart City System offers a comprehensive and scalable solution to the problems [2] associated with managing urban parking in this paper, Smart Parking System. The project intends to optimize urban mobility, alleviate traffic congestion, and build a more sustainable and lively urban environment for the benefit of both inhabitants and visitors by utilizing IoT technologies, real-time data analytics, and predictive algorithms. Adopting smart parking initiatives is increasingly important for creating effective and livable urban spaces as cities continue to expand and change.

The automation of Smart Street Lights and the usage of LED luminaires that are controlled by operation time via a motion sensor is [3] the goal of the smart street light control for energy conservation via the Internet of Things (IoT). The core idea of smart street lighting control revolves around dynamically adjusting the intensity of streetlights based on current conditions and requirements. Smart lighting towers also include PM 2.5 sensors, IP cameras, and a Wi-Fi system controlled by a microcontroller.

LabVIEW-based Smart Assistant for Dumb and Deaf People, people who have trouble hearing and speaking can [4] communicate with one another through signing. They find it challenging to communicate with those who do not understand sign language. This problem has been addressed in our project proposal. This proposal suggests a design for

smart gloves with flex sensors for the identification of sign language. It can be used to treat individuals with limited finger movement who are partially paralyzed and have lost their ability to speak. As a result, we were able to decode all 26 (A-Z) American Sign Language letters and create words up to six letters long with an audio output.

Technology has grown to the point where it may be quite useful for residential applications, such as Smart Home Control Systems [5]. The hub of our domestic life is our home, where we can use technological solutions to manage our daily routines. Our way of life is made easier and simpler by automating household tasks. A smart home is a home with a smart control system.

3 Existing vs Proposed

The performance of an Innovative Motion Sensing With Labview can be analyzed in terms of Speed Of Detection, Range Of Detection, and Sending Data Using Gsm, Power Consumption. The Power consumption is very low and Sending the data to the user from the Gsm module is very accurate. Hence we can see above are some Comparision for Existing Vs Proposed Prototypes (Table 1).

Table 1. Comparative Analysis

Existed Prototype	Proposed Prototype
The existing prototype is based on an IoT-based smart motion detecting System	The Proposed Prototype is of an innovative Motion Sensing is based on the LabVIEW Tool kit
A motion Detection system is used to detect the obstacle only in the existing prototype	An innovative Motion Sensing System will sense the physical quantity and activate the buzzer
The demonstration has proven the capability of the system to Detect the motion if any obstacle has been detected or not. The Power Consumption is more here it consumes a huge amount of power and the Obstacle Detection is not very accurate	The system would use intelligent detection that can detect the Obstacle an if the Obstacle is detected it is used to show whether it is high or low and it activates the buzzer and GSM module and sends the alerts to the user

4 Methodology and Approach

4.1 System Infrastructure

As we are using components like Sensor, GSM module, and Buzzer, are been connected with the Arduino Uno and the Arduino uno has been interfaced with the LabVIEW using the LINX library, as we can see here how the circuit has been connected according to the logic. The Arduino Uno has a PIR Sensor associated with it. Now this Arduino Uno has logic as to how the process needs to be done step by step. We also connect the Buzzer to the Arduino Uno. When the motion has been detected the buzzer will get activated.

4.2 Design and Implementation

This system will be designed to detect motion in real time and provide alerts or trigger actions based on the detected motion. The system will be tested and validated using different motion scenarios, and the performance metrics such as accuracy and detection time will be evaluated. If any obstacle has been identified by the system then the PIR sensor will sense the physical quantity and sends the data to the LED if the LED glows brightly then the message will be sent to the owner and the buzzer will get activated. This project is mainly helpful in the fields where the borewells are located. In this project, we also use a GSM module that connects to the nearby CELL Tower and sends the message to the mobile phone. This project will be done by using the LabVIEW software. This Innovative Motion Sensing with LabVIEW can be extended from Restricted areas to vehicle security (Fig. 1).

5 Block Diagram

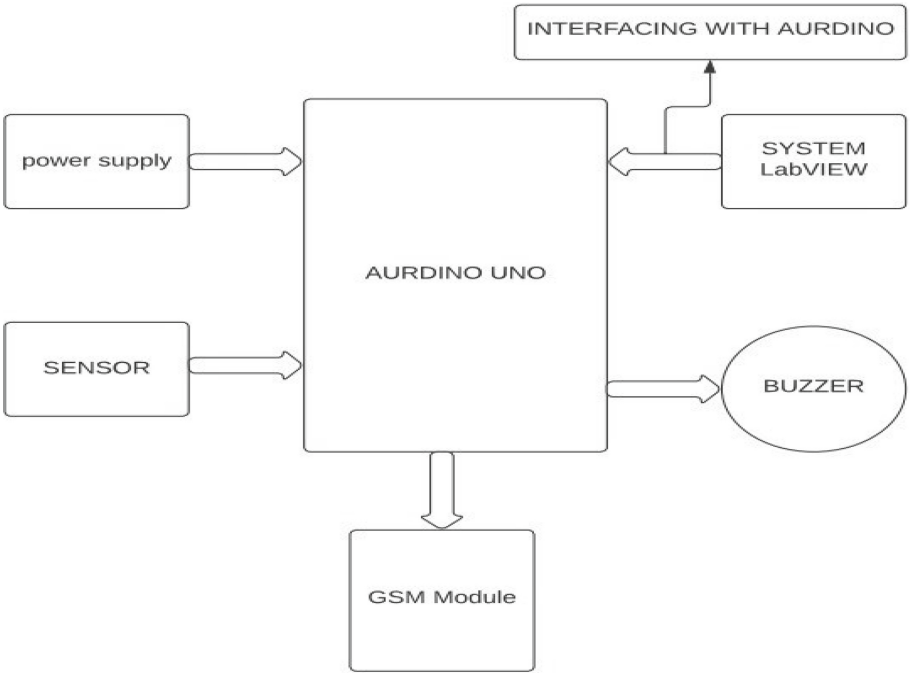

Fig. 1. Block Diagram

6 Execution Flow and Working Prototype

6.1 Execution Flow

The system will sense the physical quantity if it is present the LED will glow if the Physical sensing is high then the LED will glow high and then the buzzer will get activated. Then Gsm module will get activated and send an alert to the user.

The system designed with the components mentioned will furthermore make sure that any unauthorized movement or action detected when you are not there will be projected the information to the dashboard by noticing a movement or action.

In this project, we use a GSM module that connects to the nearby CELL Tower and sends the message to the mobile phone. This project will be done by using the LabVIEW software.

It can be used in many applications ranging from home security to vehicle security (Fig. 2).

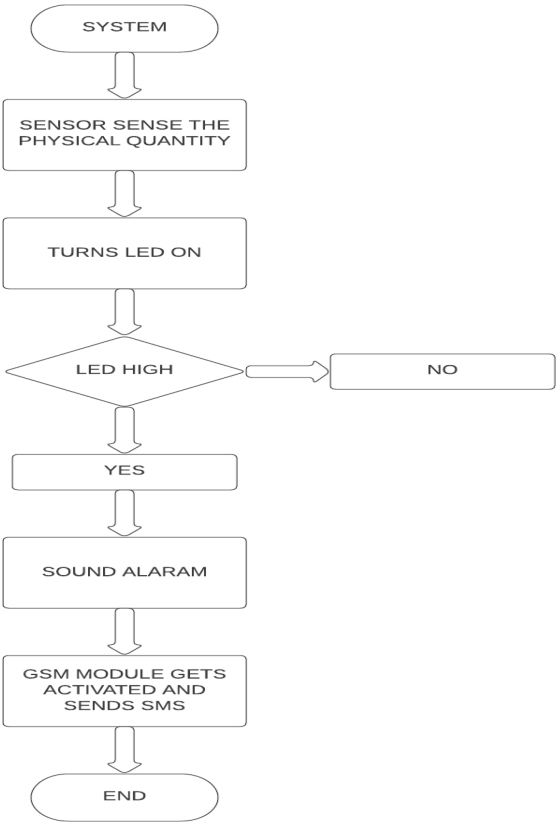

Fig. 2. Flow Chart.

6.2 Working Prototype

- Designing Innovative smart sensing using an IR (Infrared) sensor in LabVIEW involves interfacing the IR sensor with a microcontroller, reading its output in LabVIEW, and implementing motion detection logic. In this example, we'll use an Arduino board and an IR motion sensor (PIR sensor) to detect motion and display the results in LabVIEW. The designed Smart motion detection system can be simulated and works well while the device is placed. The infrared sensor comes to the active mode when the physical quantity is according to their weight and height.
- It calculates weight and height so that the IR sensor light will glow based on the physical quantity sensing. The buzzer will come to active mode while the physical quantity is detected according to the condition. The GSM module will send the message to the respective owner or nearby police control room. This project can be extended from home security to vehicle security and from supermarket monitoring to data analysis. The system will be designed to detect motion in real time and provide alerts or trigger actions based on the detected motion.

6.2.1 Pin Connections

PIR Sensor:

– Pin Connections:

- Connect the VCC pin of the PIR sensor to the +5 V output of ARDUINO UNO.
- Connect the GND pin of the PIR sensor to the GND (ground) of ARDUINO UNO.
- Connect the A0 pin of the PIR sensor to one of the analog input channels (e.g., AI0) of ARDUINO UNO (Fig. 3).

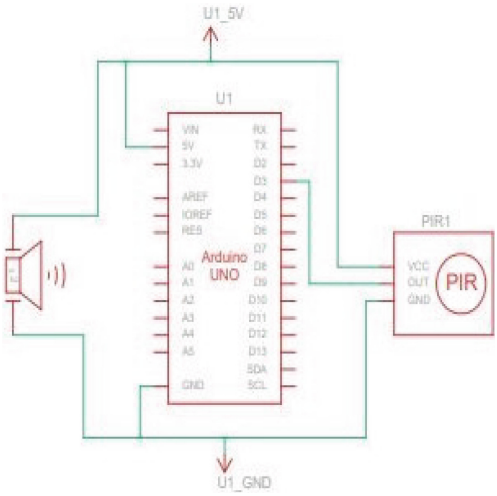

Fig. 3. Schematic level view

- The power consumption of the Innovative Smart Sensing System using PIR Sensor was typically more efficient than the other types of Sensors. As we can see here the schematic level view of the Circuit.
- Ensure that you are using the appropriate LabVIEW drivers
- and modules to interface with ARDUINO UNO and read sensor data accurately (Fig. 4).

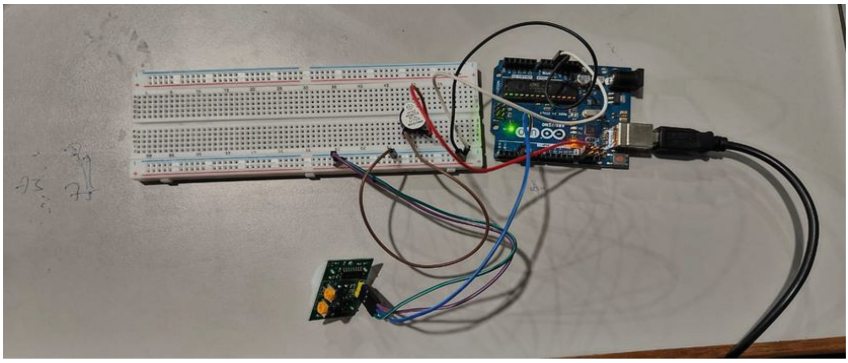

Fig. 4. Working Prototype

- As we can see here the front panel logic circuit as per the working principle. Here we used the Arduino Uno so to interface the Arduino uno with LabVIEW we need to use the makerhub LabVIEW driver in the makerhub we need to install Linx with the help of linx we can dumb our logic in to the Arduino Uno for working Prototype.

    - Always refer to the datasheets and documentation provided by the sensor and ARDUINO UNO manufacturers for precise pin connections, voltage levels, and calibration procedures.

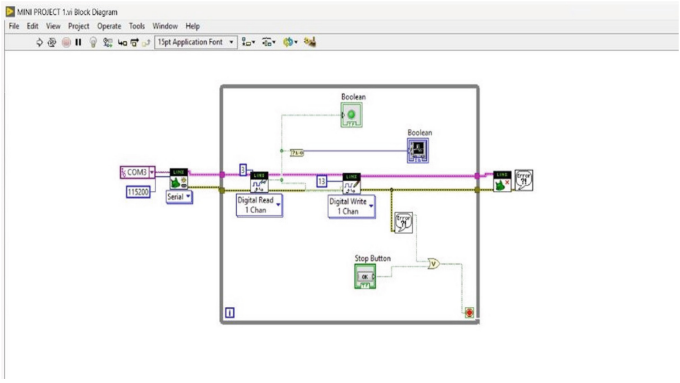

Fig. 5. Block Diagram

- Remember to follow safety guidelines when working with gas sensors and electrical components. If you are unsure about any aspect of the connections or sensor handling, consult with a qualified expert or refer to professional resources (Fig. 5).

7 Results and Discussions

7.1 Results

- The Output of the Innovative Motion Sensing With Labview By the graph, we can observe whether there is an Obstacle has been detected or not. Here when the obstacle is detected it will show the output in the form of square graph when obstacle is detected it will fluctuates from 0 to 1 when there it no obstacle it will remain constant 0. When the Obstacle has been detected then the light will be glowing and the graph will occur as we can observe below. When after the immediate Blink of the light. Gsm will immediately gets activated and Sends the sms to the mobile. Here we can see the output when the obstacle is detected. We can observe the output as square graph when the obstacle detected (Fig. 6).

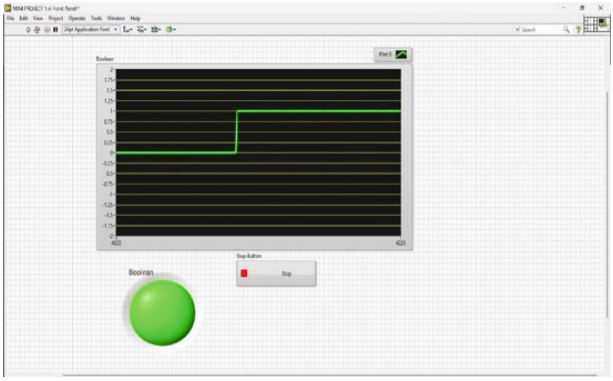

Fig. 6. Front panel

Output when the Object has been detected Continuously, we can see the below graph (Fig. 7).

- For the digital output from the PIR sensor, LabVIEW can use the Digital Input functions to read the state of the sensor's output. You can use this digital information to detect the presence or absence of an object or trigger specific actions in LabVIEW. When the Obstacle has been detected the alert.
- It will the send data to the mobile in the form of sms to the user. In some cases it used to send the Obstacle height and width so that the user can easily understand whether it is a person or not. As we can see it in the above Fig. 8.

Fig. 7. Output when the body detected continuously

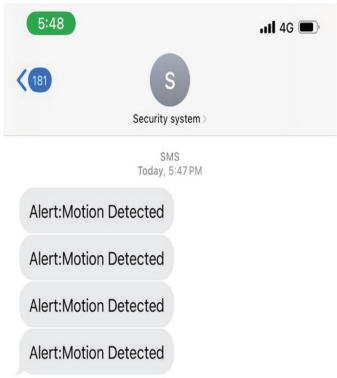

Fig. 8. GSM Alert Message.

7.2 Discussions

In this project, we use a GSM module that connects to the nearby CELL Tower and sends the message to the mobile phone of the owner or police control room.

This system can detect and output information about when and where motion is detected. This could be in the form of timestamps or frame numbers along with the coordinates or regions where the motion occurred. This Sensing System can trigger alarms or alerts when motion is detected. These alerts can be in the form of visual indicators, sound signals, or notifications to connected devices.

8 Conclusion and Future Scope

8.1 Conclusion

A practical and affordable approach for numerous applications is to implement an innovative motion-detecting system utilizing Arduino in LabVIEW. Using LabVIEW's logical graphical programming environment and Arduino's microcontroller capabilities, developers may build a reliable and scalable motion detection system.

Different motion situations will be used to test and validate the system, and performance metrics including accuracy and detection time will be assessed. This project can be used mostly in off-limits locations for young children. If any child enters the forbidden area, the PIR sensors detect physical quantities and transmit data to LEDs. If the LEDs shine brightly, a message is delivered to the owner and the buzzer is also turned on. The fields where the borewells are placed are the principal beneficiaries of this initiative. In this project, a GSM module is used to transmit the message to the mobile phone by connecting to a nearby CELL Tower.

Overall, LabVIEW's innovative motion sensing system shows off the potential of contemporary sensor-based technology with graphical programming, offering a smart and effective solution for motion detection and monitoring needs across a variety of industries and applications.

8.2 Future Scope

In the Future smart sensing technology For more precise and consistent motion detection in complicated situations, combine data from numerous sensors, such as PIR and ultrasonic sensors. It can Investigate the application of machine learning techniques to enhance motion detection precision, decrease false positives, and identify certain motions or objects. It Reduces latency and enables local data processing by optimizing the system for edge computing capabilities, especially in applications where real-time reaction is crucial. To enable remote monitoring and control of the motion detection system, use wireless communication protocols (such as Wi-Fi or Bluetooth).

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