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Automatic Smart Home Security System

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Abstract: - The Smart Security System for Homes is a microcontroller-based project designed to provide a cost-effective and reliable solution for residential intrusion detection. System integrates two key sensors: an ultrasonic motion detector and a load cell for weight sensing. These sensors work together to accurately identify unauthorised access or suspicious presence in a monitored area. The ATmega328 microcontroller processes sensor data and triggers alerts when both motion and abnormal weight are detected, ensuring high accuracy and minimal false alarms. A GSM module is used to instantly notify the homeowner via SMS, eliminating the need for internet connectivity. The system also includes a local alert mechanism with LEDs, a buzzer, and an LCD for real-time feedback. This dual-sensor approach enhances security by validating threats through multiple parameters, making the system suitable for homes, offices, and remote properties. Its modular design enables future scalability, ensuring adaptability as smart home technologies evolve.

Index Terms: Smart Home Security, Home Automation, Load Cell, GSM-Based Home Security, Arduino Nano, Ultrasonic Sensor.

I. INTRODUCTION

Natural disasters are the main cause of accidents in today's world. Deaths from flood-related accidents are also included in some of these accidents. Amount of water in rivers and ponds increases during the rainy season. Driver liability problems arise, and drivers try to move too rapidly before the flooding problem becomes more severe, which might cause accidents. As a result, there is increased traffic on the road and more vehicles on the bridge than it can manage. Thus, it may be a risk. Travelling under high flood conditions may damage an automobile's electrical system, which can lead to short circuits and other hazards. Life may be lost as a result of the bridge's overload. We have to discover a solution to avoid such problems.

To prevent such problems, we have included a solar-powered system in the software design, which will help to extend the bridge's durability and reduce flood-related accident problems.

II. LITERATURE REVIEW

Information regarding human behaviour during floods is provided in this research paper. He claimed that people face risks when travelling on flooded roads because they are unaware of flood conditions. Some theoretical methods pertaining to making decisions in the event of a flood are presented in this paper [1]

The information regarding the impact of floodwater on vehicle speed has been examined in this research. The impact of varying flood levels on various vehicles is discussed in this research. Images of the actual flood conditions and the effects of vehicle movement at different flood levels are presented in the literature.[2] Flood conditions in Australia and driver experience are addressed in this research. Analysis in this paper found that most flood-related accidents are caused by drivers underestimating the circumstances.[3]

A security wall prototype model has been provided in this research paper. They have presented a model that determines wall stress during floods and human avoidance of damage.[4]

The dangers of flooding in coal mines are addressed in another study. They have revealed that flood hazards in coal mines are caused by risk management. They provided flood precautions.[5] Flood warning systems and flood detection have been studied in another research paper. They have included a video management system for flood situations in this study. whereby they have given individuals the ability to use flood warning signals and real-time flood situation monitoring to ensure their safety in high-risk flood situations.[6] We examined this literature to design our project.

III. BLOCK DIAGRAM AND PROGRAM EXECUTION

3.1 Block Diagram:

The block diagram for the Anti-travel bridge system's operation is displayed in Figure 1. In this case, we used an Arduino Uno in combination with an ATmega328 microprocessor to control our system. A 12-volt DC battery supply is utilised for power input, and the solar panel is connected to the charging unit. Between the battery and solar panel, the charging unit functions as a power control circuit. In this case, the microcontroller has one input and two outputs. A humidity sensor is included in the input to detect the water level and provide a signal to the microcontroller. We used a servo motor to close the

bridge's entrance and an LCD display to demonstrate flood conditions in the output section.

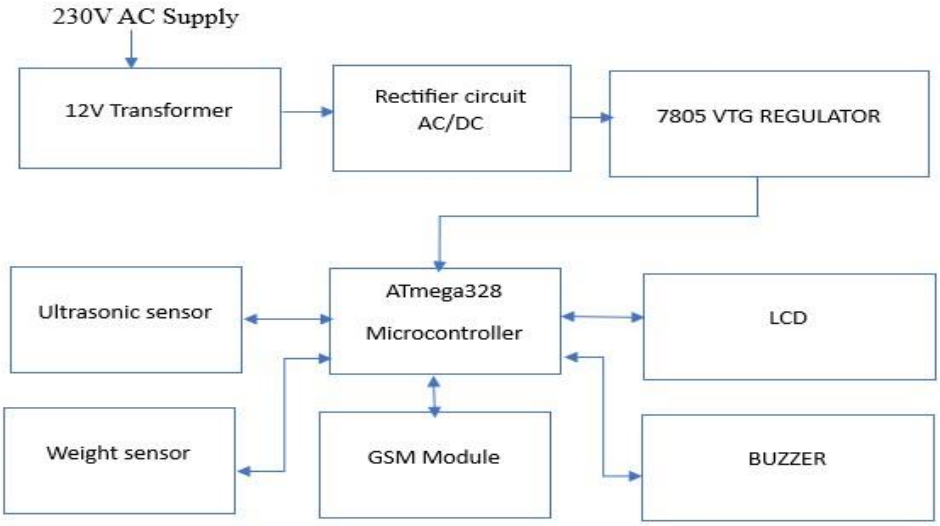

Figure. A: Block Diagram

3.2 Program Execution:

A flowchart of the Anti-travel bridge system's simulation operation is displayed in Figure B. To detect the water level, a humidity sensor, also known as a flood sensor, is positioned close to the bridge. The standard water level conditions have been determined in the microcontroller. Therefore, the flood sensor detects an increase in water level if it exceeds our predetermined value. The microcontroller receives a signal from the flood sensor if it detects an increase in water level or a flood. After receiving data from the flood sensor, the microcontroller outputs a signal that causes the servo motor to rotate to a 90-degree angle. Here, the servo motor is connected to a resistance for the bridge. As a result of the servo motor rotating to a 90-degree angle, the bridge resistance closes the entry, and the text "NO ENTRY-FLOOD CONDITION" displays on the LCD. The system then continuously checks the flood sensor input value and operates in accordance with that input. Accordingly, if the water level is normal, the flood sensor will not detect a flood. As a result, the system permits vehicles to enter the bridge, and the "WELCOM" text will be displayed on the LCD display.

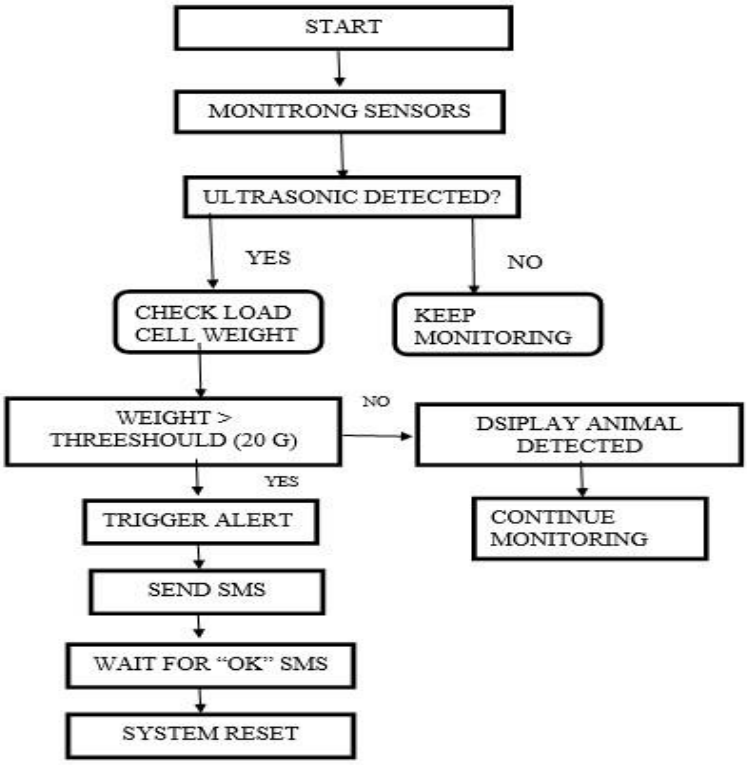

Figure B: Flow chart of the System

IV. RESULTS AND DISCUSSION

4.1 Hardware Results:

Case 1: Normal Condition (No Intrusion)

LCD shows real-time readings. No SMS or alerts are triggered. System remains idle in monitor mode

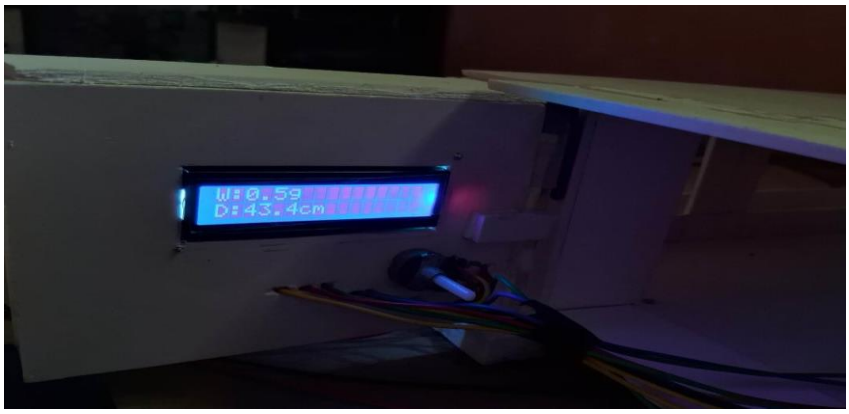

Fig. C: Normal Condition (No Thief)

Case 2: Animal Movement Detected

Ultrasonic sensor detects motion. Load cells do not detect sufficient weight. LCD shows “Animal Detected”. No SMS is sent

Figure D: Animal Detected

Case 3: Human Intrusion Detected

Ultrasonic sensor detects movement. The load cell detects weight over threshold. And LCD displays “ALERT: YOUR HOME IN DANGER”. Both LEDs and buzzers are activated.

SMS is sent to two predefined numbers.

Fig. 16: HUMAN OR THEAF DETECTE

Figure E: Thief Detected

Case 4. System Reset

User replies "OK" via SMS. System resets and continues monitoring. The result analysis confirms the accuracy of the dual-sensor verification system in reducing false alarms and providing timely alerts.

Figure F: Thief Detected

4.2 Result Analysis:

Result Table 1

Case Number	Case	Action	
		LCD	GSM Response
Case1	**Normal Condition (No Intrusion)**	System remains in Monitor mode	No SMS triggered
Case 2	**Animal Movement Detected**	"Animal Detected" SMS shown on LCD	No SMS triggered
Case 3	**Human Intrusion Detected**	"YOU'RE HOME IS IN DANGER" SMS displayed on LCD	SMS Triggered as "YOUR HOME IS IN DANGER"
Case 4	**System Reset**	Displayed "OK", received from GSM	Received "OK" Command From GSM

V. CONCLUSION

The Smart Security System for Homes successfully integrates motion and weight sensors to detect unauthorised access. The use of GSM technology ensures timely alerts without internet dependency, enhancing its utility in remote and rural areas. The modular design allows future upgrades, and the system is cost-effective, easy to install, and reliable. It demonstrates how embedded systems can be effectively used for smart and responsive home security.

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