Anti-Travel Bridge System in High Flood

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Abstract: Most of the people in this world die in road accidents. And most of these accidents are due to natural calamity. Some of these accidents are involved in the deaths due to flood-related accidents. We need a way that can prevent such accidents. Therefore, to avoid these accidents, we have adopted a design of methodology that can help in this. The design has been provided with the help of simulation in proteus simulation software with the help of Arduino software. In this, we have used a humidity sensor to detect the flood level and the servo motor has used for resistor on the road to stop the vehicles on the road in high flood conditions. we have used solar as power input, so it saves more electricity.

Index Terms **- Arduino, Proteus simulation, Anti-travel bridge system, Flood.**

I. INTRODUCTION

In today's world, most accidents are occurred due to natural disasters. Some of these accidents also include deaths due to floods related accidents. During the rainy season, the water of the rivers, ponds increases more and it comes on the way. At this point, the driver's liability problem arises and drivers try to move too fast before the flooding problem becomes serious, which can also lead to accidents.

This leads to increases traffics on-road and increased vehicle load on the bridge compared to the bridge load handling capacity. So, it can make it unsafe. Vehicles traveling in high flood conditions may damage the car's electrical system, which results in short-circuits and hazards occurred. Due to the overload of the bridge life of the bridge may reduce. We need a way that can prevent such problems.

To avoid these problems, we have provided a solar-powered system in software design which will help to reduce flood-related accidents problems and also it helps to increase the life of the bridge.

II. LITERATURE REVIEW

This Research Paper provides information about the behavior of people in the event of floods. He said that people are unaware of the flood situation and people run the risk of going on the flooded road. In this paper, some theoretical methods of decision making are given in the event of the flood[1]

In this paper, we have studied the information about the effect of floodwater on vehicle speed. This paper gives some information about the effect of different flood levels on different vehicles. The images we have seen in this literature have provided images of the actual flood conditions along with the results of vehicle movement at their various flood levels.[2] This paper provides information on flood conditions in Australia and the driving experience of drivers in flood conditions. In this paper, we have studied that most of the accidents in flood conditions are due to the underestimation behavior of the driver regarding the flood situation.[3]

This research paper has provided a prototype model of a security wall. This means that they have provided a model in which the stress on the wall is determined during flood conditions and indicates the human avoidance of its damage.[4]

Another research paper discusses the dangers of flooding in coal mines. They have provided information about that risk management in coal mines is responsible for flood hazards. They have given some precautions for the flood situation.[5] Another research paper has discussed flood detection and flood warning systems. In this paper, they have provided a video management system on flood situations. In which they have provided real-time monitoring of flood situations and flood warning signals to humans for safety in a high flood situation.[6] We have studied all this literature which helped us to design our project

III. BLOCK DIAGRAM AND PROGRAM EXECUTION

3.1 Block Diagram:

Fig 1 shows the block diagram of the operation of the Anti-travel bridge system. In this, to controller our system we have used an ATmega328 microcontroller with the help of Uno Arduino. For power input 12v dc battery source is used with the solar panel input through the charging unit. The charging unit is a power control circuit between the solar panel and battery. Here we have used one input and two outputs from the microcontroller. In the input, we have provided a humidity sensor to sense the water level and give the signal to the microcontroller. In the output section, we have used an LCD Display to display flood conditions and a Servo motor to close entry on the bridge.

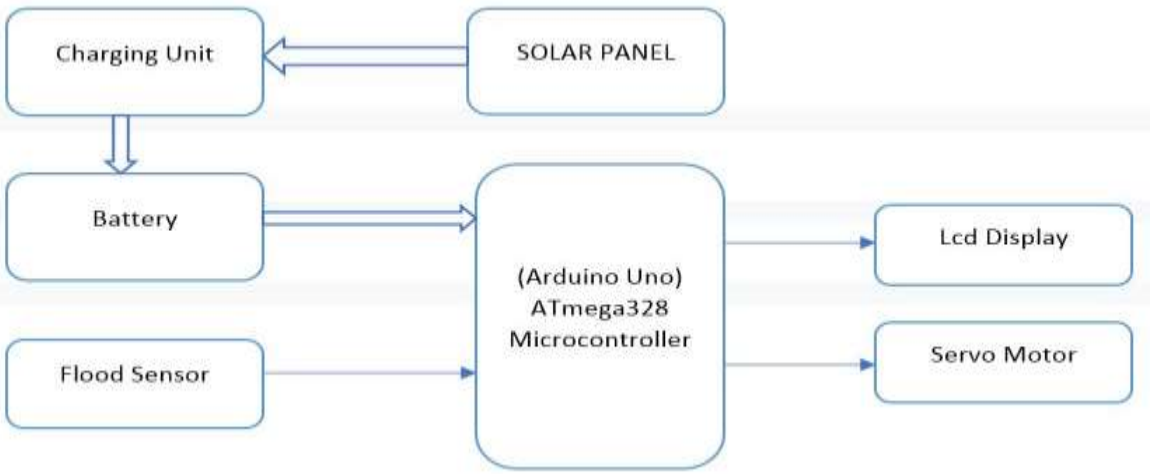

Fig.1 Block Diagram

3.2 Program Execution:

Fig 2 shows a flowchart of the simulation operation of the Anti-travel bridge system. In practice, a humidity sensor (Flood sensor) is placed near to bridge to sense the water level. In the microcontroller, we have set the value of normal water level conditions. So, if the water level increased as compared to our set value, then it is sensed by the Flood sensor. if the flood sensor senses the increased water or flood then it gives the signal to the microcontroller. Then microcontroller receives input from the Flood sensor and gives signal output to the servo motor to rotates at a 90-degree angle. Here a resistance for the bride connected to that servo motor. So due to servo motor 90-degree angle rotation, the entry on the bridge is closed by that bridge resistance and it is displayed on LCD by Text of "NO ENTRY- FLOOD CONDITION". Then system check continuously the flood sensor input value and perform according to that input. According to that if the water level is in normal condition, then no flood condition consider by the flood sensor and hence system allows the entry of vehicles on the bridge and it is displayed on LCD Display by "WELCOM" text.

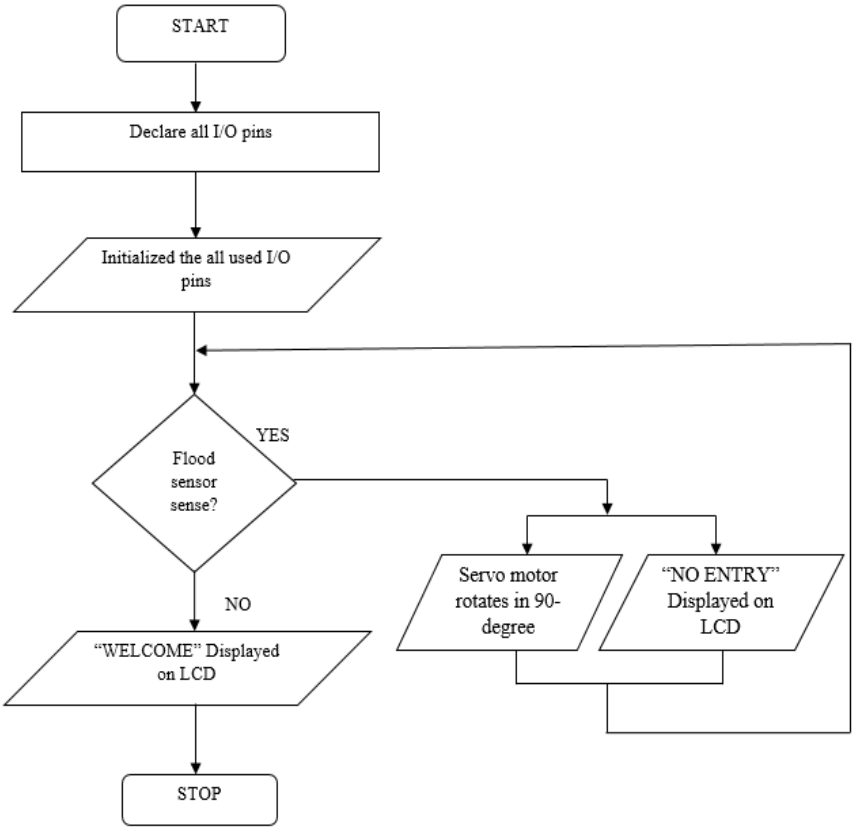

Fig.2 Flow chart of simulation

IV. SIMULATION DESIGN

In this simulation design, we have presented the simulation design of our Anti-travel bridge system. We have designed our simulation, based on Uno Arduino in Proteus Simulator Software with the help of Arduino programming software as shown in the below figure. In this simulation, we have used one input and two outputs. In which input Pin 8 of Arduino is used to connect flood sensor input switch. In output pin 7 is connected to the PWM pin of the servo motor to rotates at the desired angle. Other output pins 2,3,4,5,11,12 are used for LCD, which has used to the indication of flood conditions.

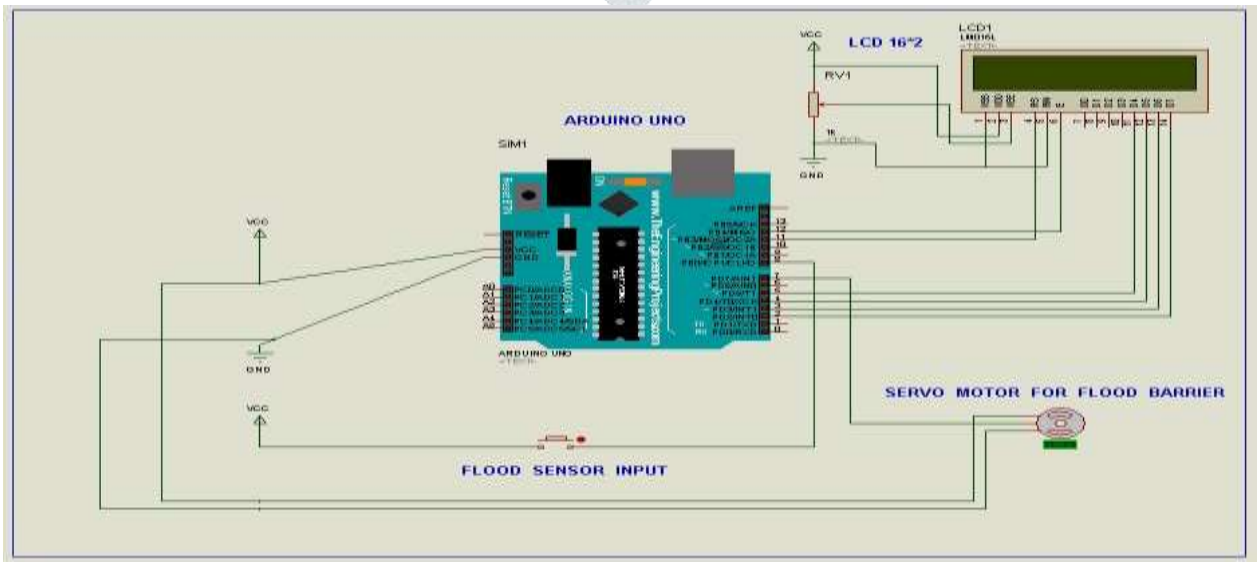

Fig.3 Simulation design of Anti-Travel bridge system

V. RESULTS AND DISCUSSION

5.1 Case 1: No Flood Condition:

In Case1: In this case, we have used Switch as an input of Flood sensor, which is connected to pin 8 of the Arduino. Here we can see the result at No flood condition. In this, when No Flood condition, then at that condition we have used Flood sensor switch is in on condition. means one (+5ve) input is applied to pin 8 of Arduino. Then at that condition, we can see the result on LCD, the System allows vehicles by displaying "WELCOME" text on LCD. And servo moto is in original angle position.

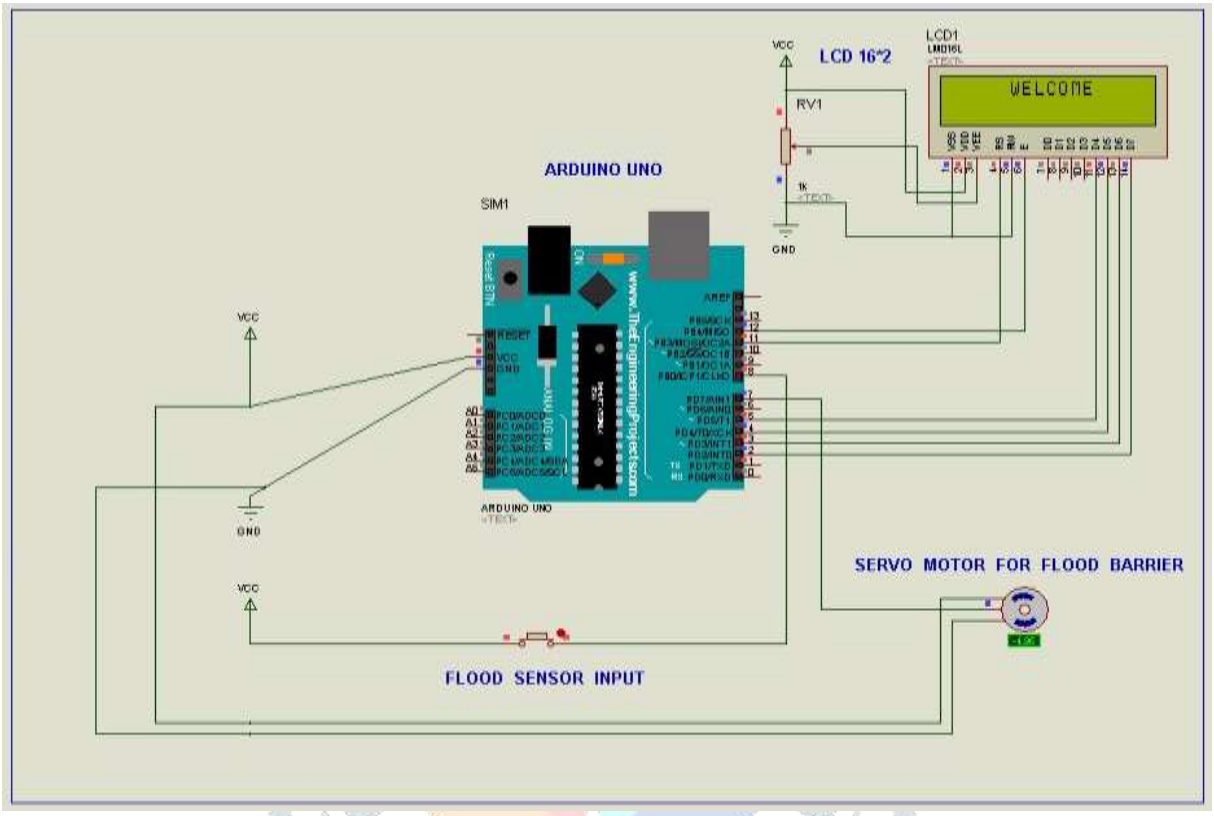

Figure 4. Simulation operation result at "No Flood condition"

5.2 Case2: Flood Condition:

In Case 2: In this case, we can see the result of flood conditions. In this, when Flood condition, then at that condition we have used Flood sensor switch is in off condition. means one (0) input is applied to pin 8 of Arduino. Then at that condition, we can see the result on LCD, the System does not allow vehicles by displaying "NO ENTRY-FLOOD CONDITION" text on LCD. And servo moto has rotated in a 90-degree angle position to close bridge Entry.

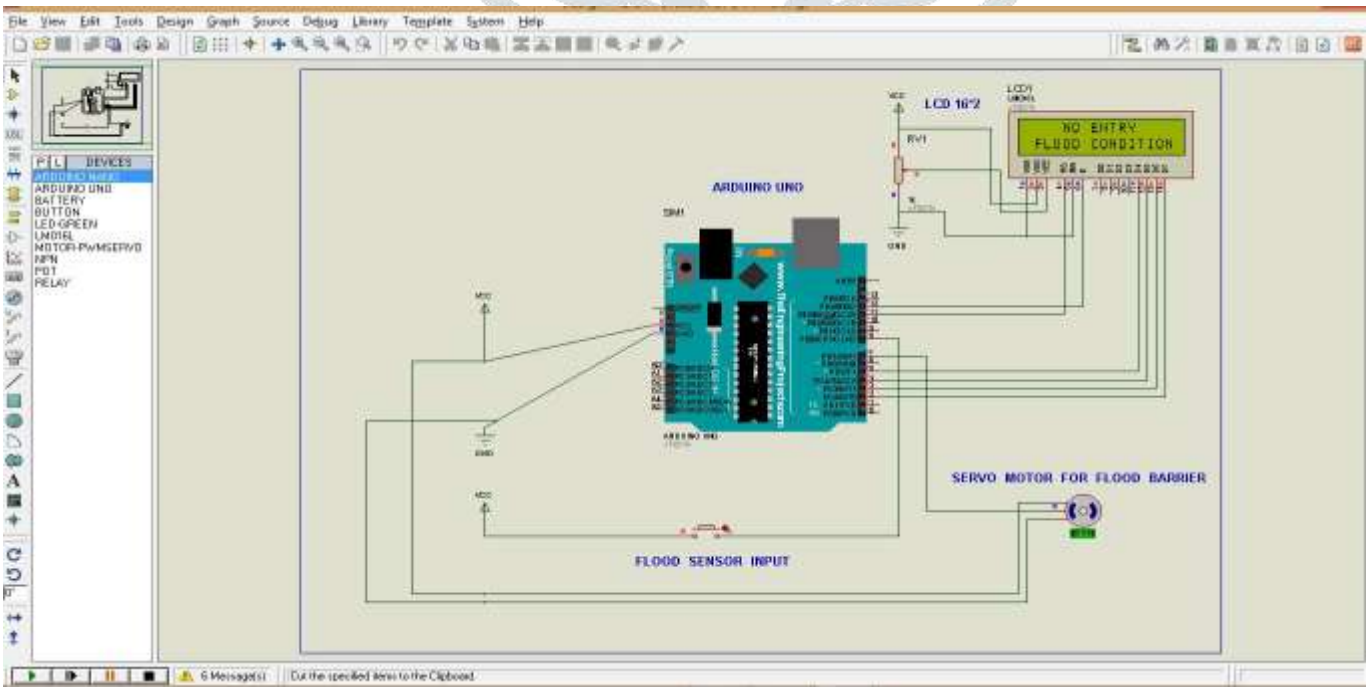

Figure 5. Simulation operation result at "Flood condition"

5.3 Result Table:

Table 5.3: Simulation Result for Flood condition and No Flood condition

Case No	Case	Action	
		LCD	Servo motor
Case1	No Flood Condition	Welcome	Servo motor is in original angle
Case 2	Flood Condition	No Entry-Flood Condition	Servo motor rotated in 90-degree angle position

VI. CONCLUSION

In this project, we have designed the Simulation design of the "Anti-Travel Bridge System in High Flood". This project helps to avoid accidents related to flood conditions. It could help to reduce the number of overload vehicles and contribute to the more efficient and effective use of roadways and reduces crashes and serious damage to people's lives and property. Therefore, this system is simple and convenient to know the vehicle load and solve the problem of vehicle overloading in flood conditions. It also helps to maintain the bridge load and its life. It is an automated system so it saves more time to manage road vehicles. So, it can be used for RTO's system management for road vehicles. This system is also used for flood water monitoring systems. We have used solar power to run our system. So it saves more electricity. In our design of simulation, all operating conditions are done by using Proteus Simulator software and Arduino Software.

VII. ACKNOWLEDGMENT

We are pleased to bring you the "Anti-Travel Bridge System in High Flood" We are thankful to our project guide, Prof. **M. M. Kamble** sir, Principal **Prof. (Dr.) A.C. Bhagali**, sir, our HOD, **Mr. D.S. Bhangari** sir, and we take this opportunity to thank all those who supported us for this project. We have used various research papers and books as a reference, so thank you to all the authors in it.

REFERENCES

[1] J. S. Becker, H. L. Taylor, B. J. Doody, K. C Wright. 2015. A Review of People's Behavior in and around Floodwater. Weather, Climate, and Society Volume 7.

[2] Maria Pregnolato, Alistair Ford, Sean M. Wilkinson, Richard J. Dawson. 2017. The impact of flooding on road transport: A depth-disruption function. Elsevier, Science Direct, Transportation Research Part D 55,67-81.

[3] Kyra Hamilton, Jacob Keech, Amy Elizabeth Peden, Martin Hagger.2017. Drivers' experiences during floods: Investigating the psychological influences underpinning decisions to avoid driving through floodwater. International Journal of Disaster Risk Reduction, December 2017.

[4] Huang Jinlin, Li Huokun. 2011.Safety Evaluation and Feedback Analysis of Guide Wall Structure under Flood Discharge Excitation. 2011. IEEE, 978-1-4244-9439-2.

[5] Hui-Xia, Bo Liu, Luo. 2010. Risk analysis of accidents in coal mines-The case of Kenbo Mining flooding accident. IEEE, 978-1-4244-5326-9.

[6] Priya Menon K, Kala L. 2017. Video Surveillance System for Realtime Flood Detection and Mobile App for Flood Alert. Proceedings of the IEEE International Conference on Computing Methodologies and Communication (ICCMC).