



Peripheral & Interfacing Lab Project

AUTOMATION OF MOVEABLE BRIDGE

SUBMITTED BY :

- 1. DIBBENDU SINGHA SOPTO (1407008)**
- 2. KAZI SAEED ALAM (1407011)**

Title:

Moveable Bridge Automation

Description:

A movable bridge is a bridge that moves to allow passage (usually) for boats or barges. The main idea of the project is to build a movable bridge that would automatically retract to give way for the ship to pass. The bridge will have a portion of the bridge, which would be in the center of the bridge that would automatically retract once it gets signal from the ships which is wished to pass through it. Bridges those have lower height needs this facility because sometimes making a bridge of more height will cause more money which is not possible to build. Moreover, in the rainy seasons, the water level of the river raises rapidly so the distance between the bridge and water level decreases. So a moveable bridge construction is a proper choice considering these conditions.

An advantage of making bridges moveable is the lower cost, due to the absence of high piers and long approaches. But doing it manually causes a hard labor and loss of energy. Moreover this is sometimes risky and will cause collision. So we have thought to make this automatic. It will save our

energy and labor. It will also lessen the possibility of risk and collision.

In this project we are going to develop a hardware prototype and software to simulate the moving bridge system across the rivers for the road/rail traffic as well as the mariners moving. For this, We have used Arduino uno and LDR module. LDR sensor module is used to detect the intensity of light. When there is light, the resistance of LDR will become high according to the intensity of light. The greater the intensity of light, the greater the resistance of LDR.

We have used this technique in our project. There are total 6 LDR modules, 3 each on the both sides of the bridge (front and backside). We have continuously made the resistance of the LDR module high by lighting them up by lasers. The first two LDR was used to detect the presence of the ship and notify the vehicles on the bridge by a siren and led blinking. And the third one in each side was used to move up the bridge to allow passage for the ship.

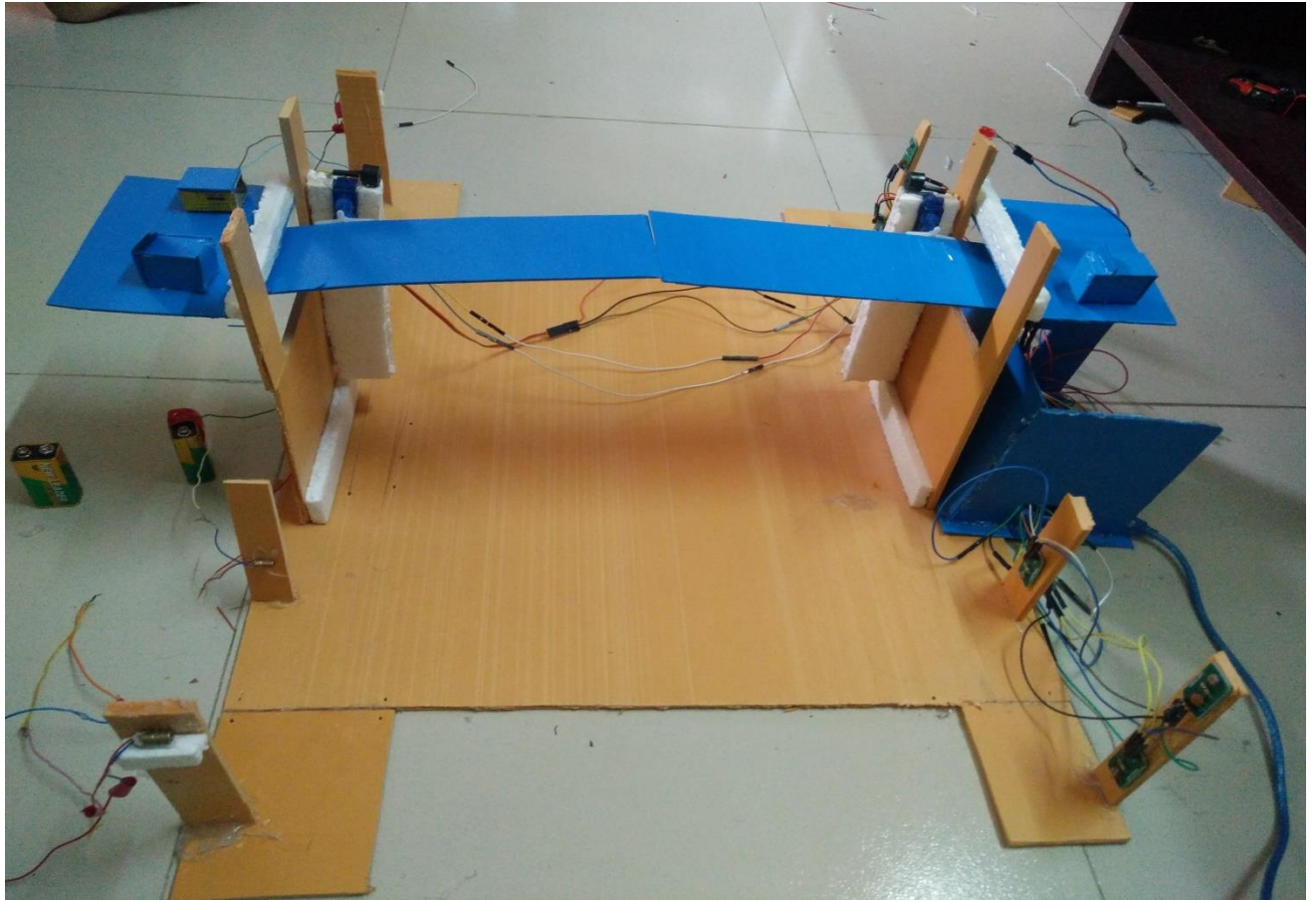


Fig 01 : Moveable Bridge Automation Structure

The structure of the model is made out of the PVC Board and plywood. We have used two servo motors for moving the bridge up and down, on passage of a certain body. When the third LDR will give a detection, the servo motors will pull the bridge up to make passage. After passing the ship on the other side, the next LDR will detect the ship and by this detection the servo motors will pull down the bridge to it's original position.

Objectives:

- ✓ The main objective of our project is to build an automatic moveable bridge.
- ✓ To build the automatic moveable bridge with the help of Arduino Uno.
- ✓ To implement the project in such a way that it will be efficient in detecting the presence of ships or barges.
- ✓ To make the project compact to ensure portability.
- ✓ To give accurate signals through LASER
- ✓ To detect the intensity of light through LDR module.
- ✓ To move up and down the bridge using servo motors.
- ✓ To ensure the cost of the total project to be as low as possible.
- ✓ To ensure the project to be user and environment friendly.

Hardware Equipment:

Main Equipments:

1. Arduino UNO
2. LDR Module
3. Laser
4. 9V Battery
5. Servo Motor
6. Connecting Wires
7. Bread Board

For power:

USB power bank with cable / Laptop

For visual output:

1 LED of red color.

For sound output:

2 Passive buzzers

For the structure:

PVC board, Super Glue , Scissors, Anti cutter etc.

Schematic Circuit Diagram:

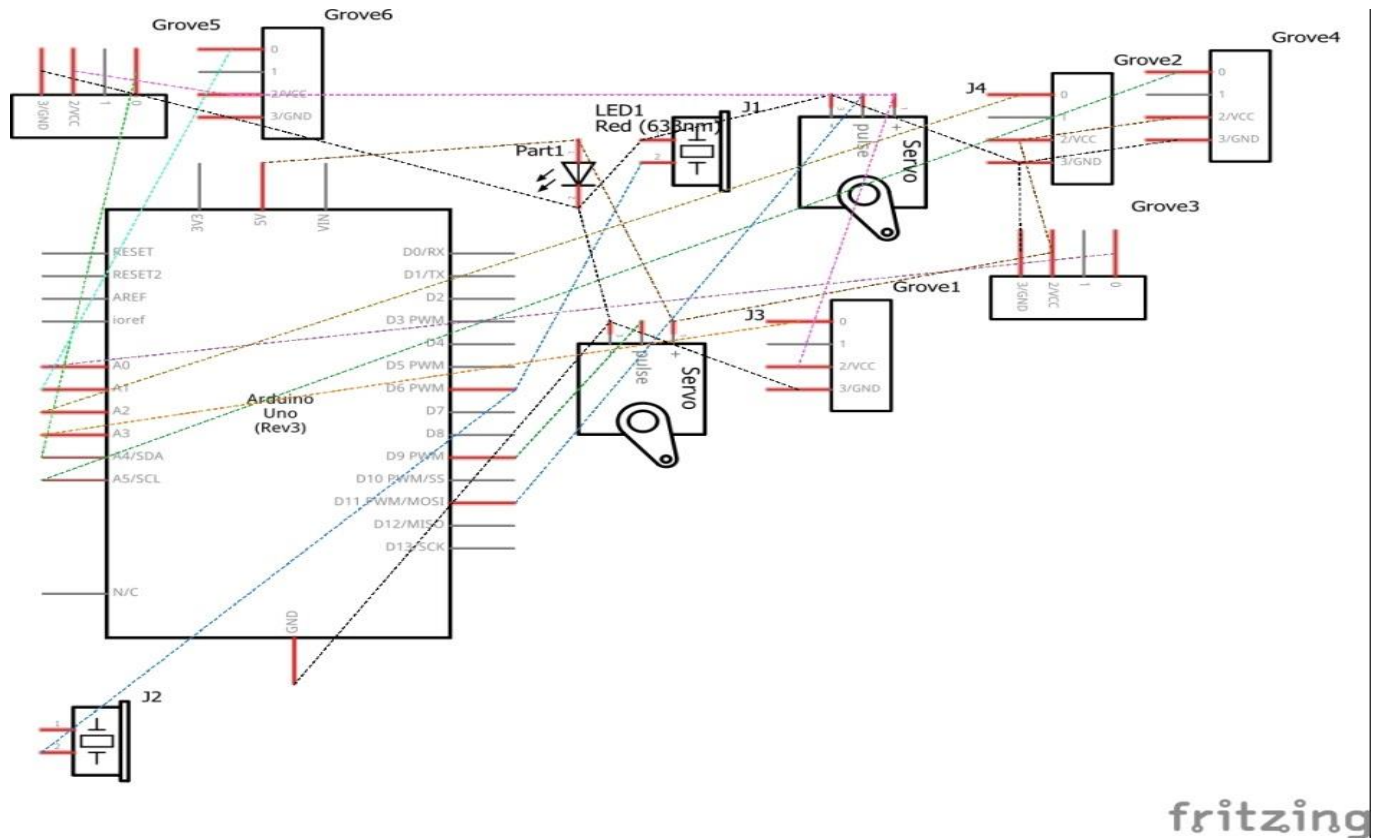


Fig 02 : Schematic Diagram of Moveable Bridge Automation

Applications:

Low cost:

An advantage of making bridges moveable is the lower cost, due to the absence of high piers and long approaches. It requires no counterweights.

Reduce labor:

Moving the bridge manually causes a hard labor and loss of energy. But in our process it saves a lot of labor and energy.

Reduce collision:

The chances of collision is greatly reduced in the presence of a rotating bridge.

Effective in Rainy Seasons:

In the rainy seasons, the water level of the river raises rapidly so the distance between the bridge and water level decreases. So for moveable bridge, it becomes possible for the ships and water vehicles to move.

Bridges with short height:

It is not possible for the ships to pass through bridges of short height. But moveable bridges make it possible.

Limitations:

- ✓ Our structure is not so strong and flexible.
- ✓ The Precision is not 100%.
- ✓ Sometimes the lasers move away from their actual direction which causes detection failure.
- ✓ Sometimes the servo motors become stable to their position after continuous shaking.

- ✓ The transportation facility of the project is vulnerable. We can't easily move along with it.

Future Improvements:

- ✓ We have a plan to make our structure stronger and flexible.
- ✓ We are looking forward to improving the precision of detecting ships or boats.
- ✓ We have thought of making the project more compact so that we can easily carry it and move along with it.
- ✓ Adding a display that will show the messages to the vehicles in the road and wishes to pass the bridge.
- ✓ Adding a gate control on each sides of the bridge to control the passing of vehicles on the bridge.

Conclusion:

Our objective was to implement a Moveable Bridge Automation with the help of Arduino and LDR module. We have successfully done that. During working on our project, we have to deal with different aspects of physics, electricity and peripheral devices which enrich our knowledge. We also got used to structure designing. Working on this Peripheral project was full of hard work and great enthusiasm. We have come to know the properties of different peripheral devices and known the techniques of interfacing them. So the main motto of this sessional course have been successful. We have gathered a lot of knowledge regarding to hardware. Moreover, It's our first hardware project. We wish to build more types of hardware projects with the help of our knowledge gathered from this project.