

**Team Name: JBDS Dynamites**

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**Note:**

1. One can participate either as a part of a team or an individual basis. Switching teams is not allowed.
2. The uploaded ideas will be screened to go to the second round.
3. Judging: competition entries shall be judged, or winners selected based on the following criteria
  - Is the problem worth solving
  - How innovative or novel is the idea
  - Scientific accuracy
  - Social impact
  - Scalability
4. Decisions of IIC JSSSTU in respect of all matters to do with the competition will be final and no correspondence will be entertained.
5. In second round, the selected teams will have to present their idea in front of the jury panel.
6. Idea should be submitted in **.pdf** format.

**Abstract**

Floods: A problem wanting a solution desperately. It is researched that India has 12.5% of its total area affected by floods every year and atleast hundred people losing their lives, leave aside the financial burden caused due to this calamity.

There are efforts made into solving this problem like building dams, reservoirs, weirs etc. but the problem still exists. Therefore an approach of building houses with which be able to minimize the damage should be adopted. Lifting houses is not a very unfamiliar technique in construction where it is used for maintenance, restructuring etc. The basic principle of this project comes from the above idea and an effort is made using the latest technologies of IoT, structional engineering and electronics to build a house which can withstand floods.

The initial financial view might seem overwhelming but in the long run it'll be highly beneficial financially as well as socially.

## Introduction

Floods are the foremost frequent sort of natural disaster and occur when an overflow of water submerges land that's usually dry. Floods are mainly caused by heavy rainfall, snowmelt or tsunamis in coastal areas. Floods can cause widespread devastation, leading to loss of life and damages to public as well as non-public property. People who reside in floodplains or non-resistant buildings, or lack warning systems and awareness of flooding hazard, are most vulnerable to floods<sup>[1]</sup>. The water entering the house can totally be devastating to the electronic gadgets such as refrigerator, washing machine, television, etc. and also weakens the basement of the house. This can also lead to the growth of moulds on the inner walls which can cause respiratory-related diseases<sup>[2]</sup>. Flooded water entering the car engine through the air vent can cause major damage to the engine and in case the insurance company does not cover the damage due to natural calamity then we are so done. So, to overcome this problem, we have come up with a solution which involves lifting the house to a safe height above the ground level during the time of the flood.

## Motivation

India is a country filled with rivers and surrounded by water. As per the data, 12.5% of the total area is under the flood prone area. Every year people living near the river banks face the damages caused by the floods and are forced to resettle. The problem here is that in a country like India the population doesn't allow resettlement.

The traditional methods of preventing floods like reservoirs, weirs etc. are not effective. Hence an alternative method needs to be employed which is feasible and economical. So the idea of portable house was introduced which can prevent damages of houses during floods.

Though this idea might seem expensive initially, however in the long run it is beneficial and only the maintenance cost has to be borne. The technology involved here is still developing and is a popular area of research.

## Methodology

The idea of house lifting can be achieved by using the following technology:

1) Constructional redesigning: As a general principle, the lighter the house, the easier it is to lift the house. Most houses can be lifted within a day however big the size might be. Usually, the process of house lifting is done slowly to avoid cracks and damage to the house<sup>[3]</sup>. A few constructional redesigning has to be taken into account if we plan to lift house automatically. These include:

- a) Hydraulic jacks need to be placed on top of the foundation and the house needs to be built on it.





Images of hydraulic lifting platform type jacks operating

- b) Trenches have to be built around the house to accommodate the hardware components like water level indicator system, cribbing and hydraulic jacking system.

2) Automation and linking: The idea of automatic house lifting is with reference to automatic car lifting [4] with the modification that multiple automatic hydraulic jacks are linked together for lifting the house. A wireless switch is connected to the inputs of all the hydraulic jacks and upon signal from the water level indication system and the weather station the homeowner gets a warning message and accordingly he can switch on the automatic hydraulic jack and the lifting process begins. For automation, SCADA (Supervisory control and data acquisition system) software is used. SCADA systems are basically used to automate complex processes wherever human control is impractical<sup>[7]</sup>. SCADA is a system that collects data from various sensors and then sends this data to a central computer which manages and controls the data. A SCADA system usually includes signal hardware

(input and output), controllers, networks, Human Machine Interface (HMI), communications equipment and software. [8]

3) Water Level indication system: An IoT based water level indicator module is set up and monitored. It gives the information of the water level in the Blynk platform and ESP8266-01 Wi-Fi module is used for uploading data into the internet. Ultrasonic sensor or IR module based IoT device is used to measure the water level. The data is sent to Arduino as well as the ESP8266 WIFI module. [5]

Code: The Arduino is coded such that when the distance falls below a certain limit (i.e., water level rises) which is determined using the ultrasonic sensor a message is sent to the Blynk platform. As such the user gets a notification and then can switch on the hydraulic jack system.

Note: The user should have a Smartphone and a good internet connection.

4) Weather station report: It is required that the nearest weather station is connected to the people of the locality. Therefore, an app can be developed which will indicate beforehand the chances of flooding in the area, amount and time of rainfall etc, and accordingly, the house lifting process can be initiated.

Note: Such apps are already present in the industry. [6]

5) Once the house is lifted to a desired height it remains there till the flood water is cleared. After that the house can be brought back to its original place by rescrewing the jack which is down automatically by the automatic hydraulic jack system. This process also should be done with care and usually should be done slowly.

## Social Impact

- People residing in the flood plain are very much benefitted from this project.
- West Bengal, Orissa, Bihar and few most flood prone states can directly implement this project.
- On yearly basis, Government spends lots of funds to give compensation for flood hit families and also on reconstruction of infrastructure. Instead, the same money can be given as subsidy to build house as per our project so that the extra money to be sent on Hydraulic lifters is recovered and in a long run it is a huge benefit for both resident of the house and the government.

## Market Survey

New building can directly implement this method in flood prone areas. Government spends a lot of funds on post disaster phase, instead that money could be used as subsidies for construction. The model works efficiently in long run. A sense of safety increases in costal and flood prone dwellers.

The methods mentioned above has certain limitations. It should be made affordable. The challenges regarding drainage should be properly addressed, since it depends on the locality. Compressible pipe can be used for this cause. Major money drainer is hydraulic lifters. Compete rehabilitation is not affordable for all.

## References:

- 1) [https://www.who.int/health-topics/floods#tab=tab\\_1](https://www.who.int/health-topics/floods#tab=tab_1)
- 2) <https://en.wikipedia.org/wiki/Flood>
- 3) <https://modelremodel.com/2016/08/house-lifting/>
- 4) <https://youtu.be/KYtlw-OlocQ>
- 5) <https://www.iotstarters.com/iot-based-water-level-indicator-using-esp8266>
- 6) <https://www.weatherstationlab.com/personal-weather-station-software/>
- 7) <https://www.dpstele.com>
- 8) <https://instrumentationtools.com/introduction-to-scada/>
- 9) <https://mashtips.com/android-weather-station-app/>