SMART BRIDGE – AN AUTOMATIC HIGH LIFT UP WHILE FLOODING

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ABSTRACT

Floods increase the vulnerability of residents of flood-prone areas and affect their everyday life. Minimizing the impact of flood requires an adaptation plan, especially at the community level. Cities and communities need a synergized response plan. A study based strictly on technical science would not arrive at the essential meaning of adaptation planning as experienced by a vulnerable people. The planning knowledge of adaptation that is generated from the flood experiences of urban poor- the most vulnerable group -- must be disclosed. We need to know more about the lived experiences of people's adaptation to floods and the meaning that these people ascribe to their everyday life. Therefore, only a people-centered approach can ascertain how the urban poor adapt to the floods.

This paper found that there is more than one kind of adaptation planning to flood in Jakarta. At the city level, the plan is to control the floods; at the community level, the plan is to live with them. This divergence is caused by discrete departure points, different planning methods, and varying sources of knowledge. It thus interferes with the institutionalization of planning because the divergent worlds between city and kampung are not connected. As an agglomeration of kampungs, Jakarta should understand the relationship between floods and urban poor within kampung. Even though KMB has the greatest flood risk and is the poorest settlement in Penjaringan sub-district, the recurrent floods do not discourage migration into and the spread of housing in KMB. Instead, inundation events have become flood incidents due to KMB's high-density settlement and poor drainage system.

INTRODUCTION

A bridge is a construction made for carrying the road traffic or other moving loads in order to pass through an obstacle or constructions. The required passage may be for JSPM'S RSCOE Poly pedestrians a road, a railway, a canal, a pipeline etc. Bridges are important structures in modern highway and railway transportation systems and generally serving as lifelines in the social infrastructure systems. Design of bridges vary depending upon the function of the bridge, the nature of the terrain where the bridge is constructed and anchored, the material used to make it, and the funds available to build it. flooding situation or any natural disasters.

Main motive of construct smart bridge is to carrying road traffic and pedestrians during flooding situation or any natural disasters.

Objectives and scope

- To provide safety during flooding situation or any natural disasters.
- To provide security to all the users who are using it bridge.
- To provide reliability to the users.
- To maintain integrity of already built and old bridges in India.
- To help India for making it digitized. Smart city mission.
- To save the many lives.

Kerala Flood 2021 — An environmental case study

Manimalayar witnesses biggest flood in 64 years Being a coastal state of India and much of the land being part of the fragile Western Ghats, Kerala is very sensitive to climate change and unsustainable developments. Climate change affects the entire globe, but places like Kerala will be the first and the worst affected.

Kerala cannot copy the developments of Western countries. America and other countries have got a large proportion of plain land. Even Tamil Nadu, the neighboring state of Kerala,

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has enough level lands for their developments. But Kerala is just a strip of coastal area with 35 million people living in the folds of Western Ghats.

Yes, infrastructure developments have become a necessity in this modern world, but it has to be sustainable. In some regions, the consequence of unsustainable activities will be seen only after a long time, while for some regions the impacts are immediate. Therefore, places like Kerala have to consider sustainability more than others.

Maharashtra: A Case Study for Flood Management

For the simple, hardy people of Maharashtra's Kolhapur district, rivers have always been benign and bounteous while rains the harbinger of hope. Once they heaped misery, Kolhapur rose as one to face the challenge.

Though flash floods are routine in some villages in the district, people generally took them in their stride as they rarely caused any great harm, said Prasad Sankpal of Jaisinghpur.

The floods in 1994 stand out in recent memory in this sugarcane-rich district of south Maharashtra. But the rainfall percentage had shown a steady downward trend since then. The devastating floods of 2005 thus caught the people unawares. They submerged, partially or wholly, 42 of 52 villages in Shirol taluka (sub-district) and 19 of 62 villages in Hatkanangale.

Yet, it did not bother the people much as they thought water would recede as quickly as it rose. Indeed, the villagers were reluctant to get evacuated when the administration advised them to do so. Unfortunately, they were badly hit.

This taught everyone, including the district administration, a lesson they were unlikely to forget. In 2006, there was a sea change in their approach.

Mumbai Floods, 2005

- Mumbai, the 438 sq. km. metropolis of almost 2 crore population, is not only the largest city of India but its commercial, industrial and financial capital.

- Mumbai's airport handles 40 percent of India's international and 25 percent of the domestic passenger traffic.

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- Mumbai's seaports dominate the country's international trade. Its municipal corporation, established in 1872, is the richest civic body of the country and its budget surpasses that of several states in the country.

- Mumbai contributes the highest in the tax revenues of the nation.

- Mumbai is the home of the Nuclear establishment of the country and some of the top-notch academic and research establishments are located there.

- The defense forces in general and the Indian Navy in particular have their important bases there.

- Mumbai is the home of the country's most prominent business houses like Ambanis, Tatas, Wadias, Godrej and others.

- Physically speaking, Mumbai is a group of small coastal islands on the Konkan coast with connectivity to the mainland.

Climate change and flood situation in Sangli- A Case Study

Climate is sometimes mistaken for weather. But climate is different from weather because it is measured over a long period of time, whereas weather can change from day to day, or from year to year. The climate of an area includes seasonal temperature and rainfall averages, and wind patterns. Climate change refers to significant changes in global temperature, precipitation, wind patterns and other measures of climate that occur over several decades. Now it's not far away from us and its direct effect on society and environment are seen dangerously. A flood occurs when a river or stream overflows its banks. Social work intervention become essential when natural calamity like flood occurs and it make hazardous to society. Manavlok organization has done lot of social work in this situation and helped people to survive in very critical situation. Flood situation was very dangerous. It has alarmed about the drastic changes in environment. Along with the helping programs, Manavlok also conducted a national conference. The attempt is made to understand the concept of climate change.

Causes of Flood

- Water resources secretary Rajendra Pawar said, "The discharge from the dams was done according to 40-45 years statistics but no one expected a rainfall 400 percent above the normal."

- Meanwhile, a committee has been constituted to re-examine the flood-line norms

- Environmentalists disagree with the government's stand, blaming the massive construction in the prohibited zones of the floodplain of the rivers is the prime reason for floods and devastation.

- Activists blame the Maharashtra government for the recent deluge in Kolhapur, alleging that flood lines of the Panchganga River were redefined to provide benefits to the builders.

- Many people and even Maharashtra government believes that excessive rains triggered the floods.

- In 2005, Sangli experienced 200 percent rain in 31 days.

- In 2019, 750 percent of rainfall occurred in nine days alone.

- In Kolhapur, 31 days of 2005 recorded 160 percent rainfall while in 2019, Kolhapur saw 180 percent rainfall in nine days.

- The rainfall all over was unprecedented.

- The combined effect of the Krishna, Koyna and Panchaganga rivers caused the current flood situation.

Materials used:

A. Servo Motor

- A **servo motor** is a type of motor that can rotate with great precision.

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- Normally this type of motor consists of a control circuit that provides feedback on the current position of the motor shaft, this feedback allows the servo motors to rotate with great precision.

- If you want to rotate an object at some specific angles or distance, then you use a servo motor.

- It is just made up of a simple motor which runs through a **servo mechanism**.

- If motor is powered by a DC power supply then it is called DC servo motor, and if it is AC-powered motor then it is called AC servo motor.

- For this tutorial, we will be discussing only about the **DC servo motor working**.

- Apart from these major classifications, there are many other types of servo motors based on the type of gear arrangement and operating characteristics.

- A servo motor usually comes with a gear arrangement that allows us to get a very high torque servo motor in small and lightweight packages.

- Due to these features, they are being used in many applications like toy car, RC helicopters and planes, Robotics, etc.

- It consists of three parts:

  1. Controlled device

  2. Output sensor

  3. Feedback system

- It is a closed-loop system where it uses a positive feedback system to control motion and the final position of the shaft. Here the device is controlled by a feedback signal generated by comparing output signal and reference input signal

- Here reference input signal is compared to the reference output signal and the third signal is produced by the feedback system. And this third signal acts as an input signal to the control the device.

- This signal is present as long as the feedback signal is generated or there is a difference between the reference input signal and reference output signal.

- So, the main task of servomechanism is to maintain the output of a system at the desired value at presence of noises.

- A Servo Motor is a small device that has an output shaft.

- This shaft can be positioned to specific angular positions by sending the servo a coded signal.

- As long as the coded signal exists on the input line, the servo will maintain the angular position of the shaft.

- In the model we used servo motar as a lifters. In the actual bridge we can used many lifters .

- Location of lifter :- 1) Top surface of the pier

  2) starting of carriage way

  3) also use replacement of bearing
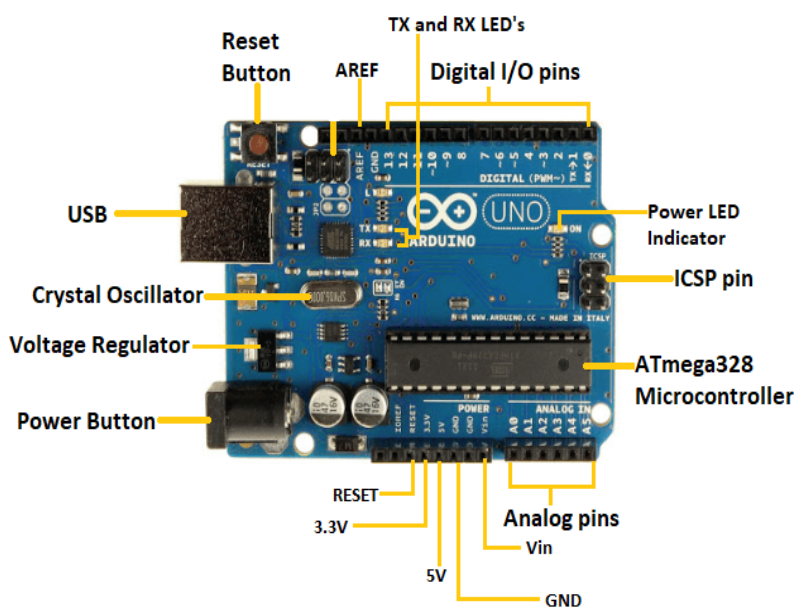
Soil moisture sensor
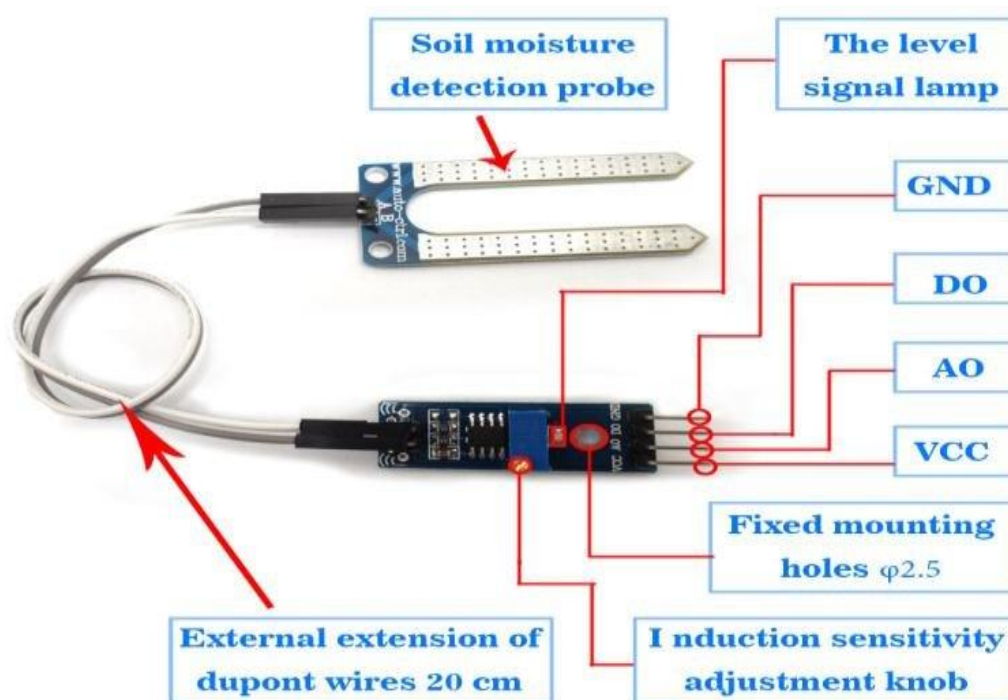
- The soil moisture sensor is one kind of sensor used to gauge the volumetric content of water within the soil.

- As the straight gravimetric dimension of soil moisture needs eliminating, drying, as well as sample weighting.

- These sensors measure the volumetric water content not directly with the help of some other rules of soil like dielectric constant, electrical resistance, otherwise interaction with neutrons, and replacement of the moisture content.

- The relation among the calculated property as well as moisture of soil should be adjusted & may change based on ecological factors like temperature, type of soil, otherwise electric conductivity.

- The microwave emission which is reflected can be influenced by the moisture of soil as well as mainly used in agriculture and remote sensing within hydrology.

- These sensors normally used to check volumetric water content, and another group of sensors calculates a new property of moisture within soils named water potential.

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- Generally, these sensors are named as soil water potential sensors which include gypsum blocks and tensiometer.

- This sensor mainly utilizes capacitance to gauge the water content of the soil (dielectric permittivity).

- The working of this sensor can be done by inserting this sensor into the earth and the status of the water content in the soil can be reported in the form of a percent.

- This sensor makes it perfect to execute experiments within science courses like environmental science, agricultural science, biology, soil science, botany, and horticulture.

- The Soil Moisture Sensor uses capacitance to measure dielectric permittivity of the surrounding medium.

- In soil, dielectric permittivity is a function of the water content.

- The sensor creates a voltage proportional to the dielectric permittivity, and therefore the water content water sensor is a device used in the detection of the water level for a diverse range of applications.

- Water sensors can come in many variations that include ultrasonic sensors, pressure transducers, bubblers, and float sensors.

- Water Sensor alerts you audibly, visually and with SMS and app notifications the moment it comes in contact with water.

B. Arduino uno

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- Arduino UNO is a low-cost, flexible, and easy-to-use programmable open-source microcontroller board that can be integrated into a variety of electronic projects.

- This board can be interfaced with other Arduino boards, Arduino shields, Raspberry Pi boards and can control relays, LEDs, servos, and motors as an output.

- Arduino UNO is based on an ATmega328P microcontroller.

- It is easy to use compared to other boards, such as the Arduino Mega board, etc.

- The board consists of digital and analog Input/output pins (I/O), shields, and other circuits.

- The Arduino UNO includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP (In-Circuit Serial Programming) header.

- It is programmed based on IDE, which stands for Integrated Development Environment.

- It can run on both online and offline platforms.

- There are 20 Input/output pins present on the Arduino UNO board.

- These 20 pins include 6 PWM pins, 6 analog pins, and 8 digital I/O pins.

- The PWM pins are Pulse Width Modulation capable pins.

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- The crystal oscillator present in Arduino UNO comes with a frequency of 16MHz.

- It also has a Arduino integrated Wi-Fi module. Such Arduino UNO board is based on the Integrated Wi-Fi ESP8266 Module and ATmega328P microcontroller.

- The input voltage of the UNO board varies from 7V to 20V.

- Arduino UNO automatically draws power from the external power supply. It can also draw power from the USB.

C. Arduino code

```
#include <Servo.h>

#include <Servo.h>

Servo tap_servo;

int sensor_pin = 4;

int tap_servo_pin =5;

int val;

void setup(){

 pinMode(sensor_pin,INPUT);

  tap_servo.attach(tap_servo_pin);  }

void loop(){

 val = digitalRead(sensor_pin);

 if (val==0)

 {tap_servo.write(0);

 }

 if (val==1)

 {tap_servo.write(90);
```

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}

D. Circuit Diagram

Final set up the all jumper wires in all connection then bridge can work easily. When water level touch to HFL of bridge . The sensers of bridge detect flood Then the height of the bridge will gradually increase by sounding the buzzer. Maximum Hight of increase depends upon the span of the bridge

Circut diagram

After a few weeks of continuous rain in Kerala, monsoon rains were almost about to end. Most of the water bodies and reservoirs were saturated and the soil's water-holding capacity was reached. The days were calm, but then spontaneously, a low-pressure system was observed in the east-central Arabian Sea on October 14. Because of this system, Kerala experienced very heavy to extremely heavy rain, with a record of 347 mm of rain in just 24 hours in Kottayam's Mundakkayam.

No dam was opened, still, there was a sudden rush of water downhill. Experts say that a mini cloudburst, 20 mm of rain in just 3 hours, happened over the border of Kottayam and Idukki districts, causing major landslides in Kottayam's Koottickal and Idukki's Kokkayar. It is reported that these clouds are formed due to the rise in temperature levels in the Arabian sea. At present, the temperature level in the sea is recorded at 29 degrees celsius. Usually, it is recorded from 26 to 27 degrees celsius, said MG Manoj, a scientist at Advanced Centre for Atmospheric Radar Research (ACARR), CUSAT.

Cloudbursts are extreme amounts of precipitation, of about 10mm rain in an hour, resulting due to the cumulonimbus clouds. Kerala has no record of cloudbursts, but mini cloudbursts are being observed since 2019. Floods in 2018 were due to prolonged rain and the opening of dams, and the flood was gradual. But after 2019, mini cloudbursts have been increasing and causing flash floods and landslides. This phenomenon was also responsible for the 2019 landslides at Kavalappara and Puthumala.

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Due to this low-pressure system, heavy rains lashed throughout Kerala, and these rains are predictable by a range of 2–3 days. But within this rain pattern, some regions experience extreme rains in the form of cloudbursts, which is almost unpredictable. This gives no time for preparation.

Very heavy rainfall indicates 200 mm of rain in a day, that could be 200 mm in 24 hours, or sometimes 200 mm in just 1–2 hours. So, even ideally, the rate of draining of floodwater cannot match with the rate of rainfall, thus causing flash floods. And practically, all-natural drainage systems are deteriorated by poor land management and construction activities, thus increasing the destruction.

Kerala weather was uniform and predictable will 2018, the year in which nearly 500 people were killed in Kerala when it was ravaged by the worst floods to hit the state in almost a century. Also, Kerala was relatively safe from devastating cyclones. In 100 years from 1908 to 2008, the State was hit by just 18 coastal cyclones of low intensity.

The weather pattern over the Arabian sea and the Bay of Bengal have become very bizarre in recent years, with an increasing number of devastating cyclones. There has been a 52% rise in the frequency of cyclones in the Arabian Sea over two decades. 2019 saw the most intense cyclonic activity in more than 100 years in the Arabian sea. Five cyclones originated in the area. All these cyclonic activities and cloudbursts are linked to global warming and climate change.

For controlling above situation it is need to make **Smart Bridge – An Automatic High Lift Up While Flooding** is need of time.

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