

Smart Manhole Cover

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Abstract: *Smart Manhole Cover is made to reduce the water logging problem resulting into reduce flood situation during heavy rain.*

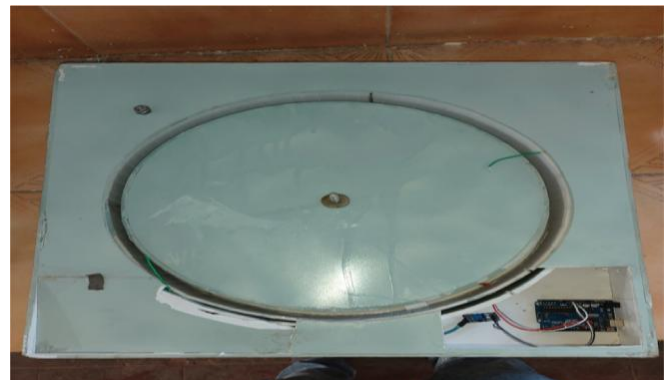
Keywords: Smart Manhole Cover, Project

1. Motive behind Making Project

In countries like India every year in rainy season flood situation arises not because of excess of rain but because of inefficient drainage system.



Top View of Cover



Bottom View of Cover



- The above figure demonstrates flood situation due to failure of drainage system.
- Sewer covers with holes are meant for preventing water accumulation on roads but they stay opened 365 days a year
- Due to this open sewer covers, stones, plastic bags, sand, dust everything gets deposited in drainage system (drainage pipes).

2. What is the Solution?

Open Manhole cover is responsible behind it.

What if a manhole cover is installed which opens only when water is collected and remaining all the time it stays closed, then water logging can be avoided.



Opening of Bottom Cover



Inner Part of Cover

3. Parts

1. Cover Frame
2. Cap (Top Portion of Cover)
3. Bottom Cover Cum Garbage Collector
4. Shutter
5. Programming System
6. Water Sensor
7. Servo Motor
8. GPS System
9. Piezo Electric Generator
10. Rechargeable Batteries

4. Working

This system works water sensor device. I have installed a water sensor which senses water presence and gives signal to servo motor to open or close the vents of the cover.

The bottom cover is designed in such a manner that during rain it only allows water to enter the drainage system other garbage (including small stones or plastic bags etc.) is accumulated in bottom cover.

For programming I have used Arduino Uno.

Here is the programming

Program

```
#include <Servo.h> //include servo library
Servo myservo; //define servo as servo
const int waterSens = A0; //set water sensor to A0
int pos = 0; //define servo position

void setup() {

  Serial.begin(9600);
  myservo.attach(9); //attach servo to pin 9

}

void loop() {
  int sensorValue = analogRead(waterSens); //read the water
  sensor value
```

```
sensorValue = map (sensorValue, 0, 1023, 0, 180);
if (sensorValue <= 50) {
  for (pos = 0; pos <= 180; pos += 1) { // goes from 0
    degrees to 180 degrees
    // in steps of 1 degree
    myservo.write(0);
  }
  if (sensorValue >= 50) {
    for (pos = 180; pos >= 0; pos -= 1) { // goes from 180
      degrees to 0 degrees
      myservo.write(180);
    }
  }
}
```

5. Description

Servo motor works according to above programming

When no water is detected by water sensor servo closes the vents of the cover.

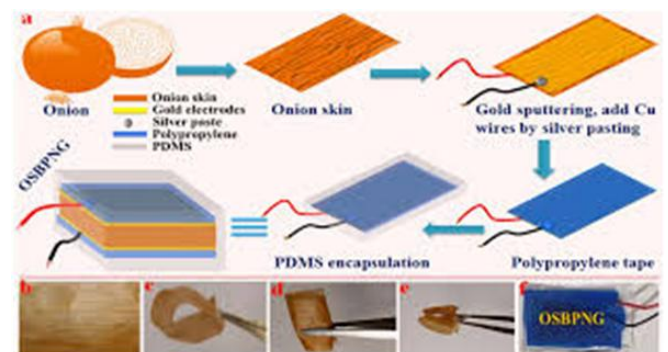
No chance of garbage entering drainage system.

When water is sensed by water sensor it gives signal to servo motor, servo opens the vents.

During flow of water if any plastic bag or stone enters in drainage system it is collected in bottom collector, which can be easily removed afterward.

Power Supply for the System

Tribo nano or piezo electric generators can be installed in the cover so that it can generate sufficient electricity from on road going vehicles pass from the cover.



Alert System

GPS and another water sensor can be added to bottom of the cover and software can be edited accordingly so that if any water logging is there a signal is sent to municipal office/ maintenance department to remove the logging.

6. Costing

I have made this model in just 1500 RS (approx.).

It can cost up to 10K to 15K Rs for making actual working system.

7. Link

Kindly go through the link given below to see working of the project, <https://youtu.be/AFIsfK0mup8>

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