Sand Mining Detection - Using IOT

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Abstract — In recent times sand mining is becoming major issue in India. Though there are severe actions taken from government sectors still we couldn't discover a solution for soil mafia. Unlawful sand mining in India is something of a loosely held bit of information however it has been brought under the scanner as of late after a government worker named Durga Shakti Nagpal was suspended from her post. Ms. Nagpal had picked up consideration from the Indian media for her endeavors to clasp down on the act of sand mafia. Inside 50 kilometers range (around 30 miles) of any building site in India, there is probably sand mining going on along waterway banks and beach front territories. Hence our idea is to propose a short message service to detect the soil mining using internet of things in and around land, rivers. With this SMS we can track the location where the soil mining is abruptly going on and an alert is sent to the nearest police station , Government offices and to the higher officials in the particular area.

Keywords— Ultrasonic sensor, Alarm buzzer, DC-DC Stepdown converter, GPS, GSM, Arduino-Uno.

I. INTRODUCTION

Usage of natural resources in improper way leads to natural disaster. This disaster could spoil the day to day life and maytake the life of many. Likewise illegal sand mining is one the major problem in the society which maylead todisaster like land slides, soil erosion etc. To overcome this problem, a short message service to detect the soil mining using internet of things in and around land, rivers is being proposed. With this SMS we can track the location where the soil mining is abruptly going on and an alert is sent to the nearest police station, Government offices and to the higher officials in the particular area. Ultrasonic sensor is utilized to detect the degree of sand. There are two signals transmitter and receiver, which sends and receive the signal. These signals indicate the level of sand for every 24/7. Alarm buzzer is placed along with the ultrasonic sensor, when it crosses the limit of mining it starts to send alert by producing sound, which is the signal for the people around them to know that the illegal sand mining is taking place. The GPS tracker is also placed, which is used to track the location, this gives the status of live location where abruptly illegal sand mining is going on. This setup is placed at the roof of the post lamp, so that it can monitor in all direction. RFID tag is placed at the entrance. when the tag in particular vehicle is detected and matched with number plate then it opens the gate. If the tag and number plate is mismatched it will not allow the vehicle to pass through the gate. Using this project illegal sand mining can be detected and message is sent to authorities and government officials and this helps to save the wealth of the soil.

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II. LITERATURE SURVEY

Ayshwarya. etal, In this paper the vehicle's subtleties are assembled utilizing a functioning RFID label appended to each vehicle going through that zone. When the vehicle carry beyond the limit it senses and indicate that illegal sand is taken using that vehicle and so the vehicle can be trapped. When more vehicle use same RFID tag it is difficult to control the theft.

Niveditha etal, In this paper when the captured image of IR camera varies from the recently captured image, which is stored in database , then it will send the alert and alarm to nearby people and police station. It will store the image of sand in database and map with the image and detect sand mining, if it is mined beyond the limit, then it authenticate to government officials. When the image captured is without interruption during the climate change it will send the alert to nearby people and police station.

Akash Deep Singh etal, Here the sand identification calculation utilizes shading based division, since sand can have different hues under various climate and lighting conditions. Using this technic, when vehicle carries more sand beyond the limit it will sense and provide alert. If correct amount of sand is taken by the person, due to changes in weather condition it shows that the container is carrying the sand beyond the limit.

III. PROPOSED SYSTEM

Ultrasonic sensor is placed on the top of the cliff of the lamp post. The GPS tracker is placed along with the sensors. When instrument touch the surface at the feet of 3.1 and above, the ultrasonic sensor senses it and provide alert using the alarm buzzer, which produces sound so that the nearby people could stop the illegal mining.The sensors sense the activities and indicate the authenticated user that the illegal sand mining activity is taking place at specified location and show the location using GPS Tracker via sand mining application. Using this location the authority can reach the location to take proper action on them and could stop the illegal mining. So the near- by police station and government officials (authenticated user) get alert message that illegal sand mining is going on that specific location.

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RFID tag is placed in the entrance, when the tag in particular vehicle is detected and matched with number plate then it opens the gate. If the tag and number plate is mismatched it will not allow the vehicle to pass through the gate.The vehicle details are stored in the database which is used to identify the particular person who mined illegally at that particular time.

IV. METHODOLOGY

A. Overview

The proposed system is divided into three phases:

1. Sensing Phase
2. Indication Phase
3. Message Transmission Phase

1. Sensing Phase

The sand level is sensed using the ultrasonic sensor. Ultrasonic sensor transmits and receives the signal upto the level. It is designed in a way to provide indication when mining goes beyond the limit.

2. Indication Phase

The level of mining has been fixed. Limit is set to distance of 29cm for demo, when it reaches the distance it starts to indicate.

3. Message Transmission Phase

An alert message is sent to the authorities with a indication message as level of mining is crossed at that particular location.

B. Arduino Uno

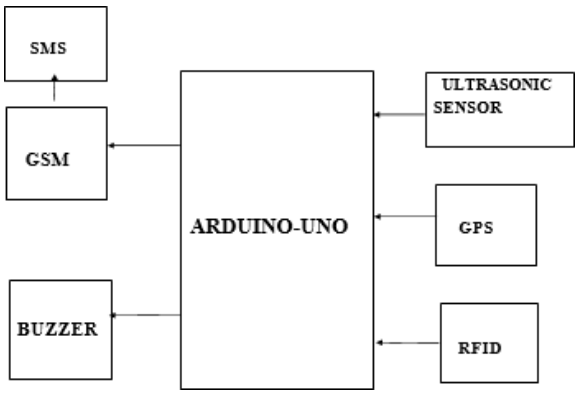

Fig.1 System architecture

The arduino uno is structured with 14 computerized input/yield pins and 6 simple information pins. This kit in this system is used as a microcontroller for controlling all the activities of all the modules involved in the process. The sensors are connected to this arduino board. This kit is embedded inside the sand mining detector device during the manufacturing process.

Fig.2. ArduinoUno

C. Ultrasonic sensor

Ultrasonic sensor is an instrument that quantifies the separation to an article utilizing ultrasonic sound waves. An ultrasonic sensor utilizes a transducer to send and getultrasonic waves that transfer back data about an item's nearness.Ultrasonic sensor monitor the mining and when mining of sand crosses the limit it will send indication.

Fig:3 Ultrasonic sensor

D. Buzzer

Alarm buzzer is used to indicate that illegal sand mining is going in that location, which help the nearby people to react and stop mining. If there is a police booth nearby they could stop the illegal mining.

Fig:4 Buzzer

E. RFID Tag Reader

RFID tag reader is placed at the entrance, which act as a toll gate that allows the user only when the tag is verified. If illegal mining is goes on using this tag information about that person can be identified.

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Fig:5 RFID Tag Reader

F. GSM Module and the SMS

It is utilized to portray the conventions for second-age (2G) computerized cell systems utilized by cell phones, for example, cell phones and tablets. Alert message are sent through GSM Module. All other details can also be viewed in the mobile as SMS. The illegal sand mining is detected and the information is received to authorities with GSM facility.Arduino- uno, GPS, GSM Module, Buzzer, RFID Tag.

Fig: 6 GSM Module and the SMS

V. EXPERIMENTAL RESULTS

The sand mining detector consist of Ultrasonic sensor, Arduino- uno, GPS, GSM Module, Buzzer, RFID Tag.

A. Hardware design:

The sand mining detector is made with the Arduino Uno board and sensor.

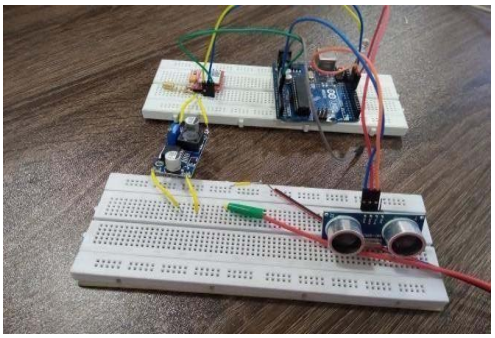

Fig:7 Hardware Design

B. Short Message Service(SMS):

The SMS service is provided to all the authorities to monitor in their location. This sms service indicates when illegal mining takes place in nearby area with the location to the authority.

Fig:8 Short Message Service

C. Arduino Output:

Fig:9 Arduino Output

D.Alert Message:

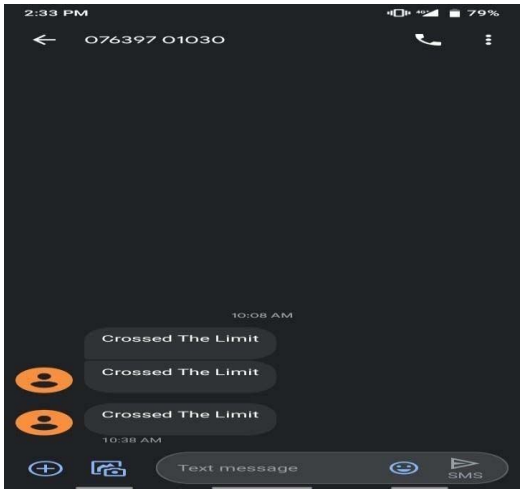

Fig:10 Alert message send to authority

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E. Advantages of Proposed System

- Sense and send the information aboutillegal mining to the Officials.
- Easy to track the location
- All the information about illegal mining will be available in mobile application.

VI. CONCLUSION

Mining of sand is the significant issues in our society. Due to illegal sand mining the wealth of the soil is reduced and it leads to natural disaster like soil erosion etc. To protect wealth of the soil, the concept of"Sand mining detection using IOT " is introduced. Using this idea illegal sand mining around the river areas can be prevented. The SMS provide exact location where illegal mining takes place.

REFERENCES

[1] M. Naveen Saviour. (2012). "Environmental impact of soil and sand mining: A review,"International Journal of Science, Environment and Technology. [Online]. 1(3), pp.125134.Availablehttp://www.ijset.net/journal/27.pdf [April. 29, 2015].

[2] J. Wu, X. Zhang, and J. Zhou, "Vehicle detection in static road images with PCA and wavelet-based classifier," in Proc. IEEE Intelligent Transportation Systems Conf., Oakland,CA, Aug. 25–29, 2001, pp. 740–744.

[3] Z. Sun, G. Bebis, and R. Miller, "On-road vehicle detection using Gabor filters and support vector machines," presented at the IEEE Int. Conf. Digital Signal Processing, Santorini,Greece, Jul. 2002.

[4] A. Broggi, P. Cerri, and P. C. Antonello, "Multi- resolution vehicle detection using artificial vision," in Proc. IEEE Intelligent Vehicles Symp., Jun. 2004, pp. 310–314.

[5] Liu Fengjiao,YangJiayan, Su Kai, Wang Yaoxi, et.al.(2017) "Research on Optimizing Visual Soil Resistivity Test Method Based on Theoretical Algorithm,"IEEE Trans.

[6] Massimo Mitolo; et.al(2016) "Recommended Practice for Eqiupment Grounding and Bonding in IndustrialandCommercialPowersystems,"IEEETrans.Ind ustrial, vol. 52,pp.1221-1225Ojos Negros Research Group. "Sand MiningImpacts"USENET:http://threeissues.sdsu.edu/ three_issues_sandminingfacts01.html. [April. 29, 2015].

[7] Mitchell Guthrie, Donald W.Zipse,et.al.(2007) "NFPA 780 Standard for theInstallation Lightening Production Systems 2007,"IEEE Trans.Industrial, pp.1-4.

[8] [9]Q.Louw;P.Bokoro,et.al(2017)"Soilresisitivity:Fiel dTestsandEstimationofZeroSequenceCurrents,"IEEE Trans, pp.1061-1064. XiyuangPan,RongZeng;JinliangHe,YanquingGao

[9] ,WeiminSun,et.al.(2000)"Multi-layer SoilStructure Analysis for Substation and PowerGenerating Station Sites," IEEE Trans.Power System Technology,vol. 3, pp. 1481-1486.International Journal of Pure and Applied Mathematics Special Issue1622

[10] zhe hu ; linlin ge ; xiaojing li ; kui zhang ; li zhang, an underground-mining detection system based on dinsar. Ieee transactions on geoscience and remote sensing (volume: 51, issue: 1, jan. 2013)

[11] Liu Jia, Zhang Qia,Xu Fen, Jiang Lijun, Obstacle detection method for underwater mine emergency rescue AUV. Frontiers of Sensors Technology

[12] Stefan Windman, Oliver Niggeman, Holg Ruwe, Friedrich Becker, Design of a Passive Multi-Tag RFID Hospital Entry/Exit Detection System based on Data Mining Method. Sensing, Diagnostics, Prognotics and Control(SDPC), 2017 International Conference on 18 Aug.

[13] Zhe Hu, Linlin Ge, Xiaojing Li, Kui Zhang., A Novel Self-Configuration Method for RFID Systems in Industrial Production Environments. Emerging Technologies and Factory Automation(ETFA),2017 22nd IEEE Interrnational Conference on15 Sep 2017.

[14] Sheng Huang, Oon Peen Gan, Sethu jose, Mo Li., Localization for Industrial WareHouse Storage Rack Using passive UHF RFID System.Emerging Technologies and Factory Automation(ETFA),2017 22nd IEEE Interrnational Conference on15 Sep 2017.

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