

MAPPING AND SURVEILLANCE OF SAND MINING USING SENSOR TECHNOLOGY

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ABSTRACT

Sand mining is a practice that is used to extract sand in an open pit which is used for manufacturing concrete. Sand mafia is making millions through illegal and legal exports of minerals. The indiscriminate mining leads to insufficient ground water and hence the agriculture is yet to decline. The unregulated sand mining is in process now a days. To avoid this the government has implemented vehicle tracking system along with the trip sheet in the carrier. This system fails to check the load of the sand taken. Thus, large amount of sand is excavated in a single truck. To overcome this above discrepancy, The National Green Tribunal (NGT) 2010 environmental protection act was introduced to provide effective disposal of cases related to sand mafia. As an extension of this surveillance IR level, weight and humidity sensors are used. The IR level sensors are used to map the ground and excavation done below the permitted level is alerted or alarmed. Similarly, weight and humidity sensors are used to observe the weight and humidity level. The above information gathered is monitored by the deciding authority or to the NGT. This project circles around the rescuing of river beds from sand mafia under the NGT2010 environmental protection act using sensor technology. In addition, RF transmitter and receiver helps in vehicle identification and detection.

Keywords:-ndiscrimination,Excavation,Discrepancy.

1. INTRODUCTION

Sand mining is the extraction of sand, mainly through an open pit but sometimes mined from beaches and inland dunes or dredged from ocean and river beds. Sand is often used in manufacturing, for example as an abrasive or in concrete. It is also used on icy and snowy roads, usually mixed with salt, to lower the melting point temperature on the road surface. Sand can replace eroded coastline. Sand mining presents opportunity to extract rutile, ilmenite and zircon, which contain the industrially useful elements titanium and zirconium. These minerals typically occur combined with ordinary sand, then are separated in water by virtue of their different densities, before the sand is redeposited. Sand mining is a direct cause of erosion, and impacts the local wildlife. Various animals depend on sandy beaches for nesting clutches, and mining has led to the near extinction of gharials (a species of crocodile) in India. Disturbance of underwater and coastal sand causes turbidity in the water, which is harmful for organisms like coral that need sunlight. It can also destroy fisheries, financially harming their operators. Removal of physical coastal barriers, such as dunes, sometimes leads to flooding of beachside communities, and the destruction of picturesque beaches causes tourism to dissipate. Sand mining is regulated by law in many places, but is often done illegally. Globally, it is a \$70 billion industry, with sand selling at up to \$90 per cubic yard.

1.1 OVERVIEW

A system provided for the purpose of mapping and surveillance of sand mafia with the help of Sensor technology. The sensors used are Weight sensor, Temperature sensor, Humidity sensor, Infrared sensor. These sensors are used to detect their respective parameters. It is given to the PIC Controller. In this System when the Truck is nearing the area, the module alerts the Control unit by a message. This activity is monitored by the guard in Mining Area.

1.2 OBJECTIVE

The aim of this project is to detect the exact load of the sand excavated from the river bed. The load is monitored by the weight sensor. An Infrared level sensor is used to map the ground and also to indicate the penetration of excavation (i.e.) depth. The humidity sensor is used to check the moisture content of the sand. The internet of things can also be used to provide a continuous information about the sand mining which is capable of exhibiting the virtual representation of the event occurred.

2. PROPOSED DESIGN AND ARCHITECTURE

2.1 INTRODUCTION

The Sensor enabled solution provider, sought to bring in district level administration of sand ecosystem. The organization's solution envisages partnership with the government bodies for sustainable mining for operational excellence, transparency, accountability and efficiency. Although the government had enacted the necessary laws to curb illegal sand mining, their implementation was an up-hill task for the following reasons:

- Manual system to issue and validate permits
- No control on the amount of sand being extracted
- Illegal inter-state transportation.

The Sand Mining Administration Regulation Transport (SMART) system, addressed the above issues by bringing in transparency in issuing permits, checking the movement of vehicles, and monitoring the sand reserves at each source. The new type of data acquiring system consists of one computer, PIC micro controller and necessary with sensors and transducers. The sensor module consists of temperature, humidity and much more. Concern sensor output will be connected to proper signal conditioners and perfect filter like low pass and harmonic filter. The state of art Embedded micro controller PIC 16F877A will be employed in our project to reduce electronics complicity. PIC 16F877A is a versatile embedded chip prepared by Microchip Corporation. Output of the embedded controller will be fed to a RS232 connector chip, RS232 output will be connected to a computer. Set points, graphics, animation, annunciation output and database, control output to other important logic algorithm will be performed by computer using visual basic language.

2.2 PROPOSED SYSTEM

RFID tags are mounted on vehicles and fixed RFID infrastructure is placed at strategic locations such as entry/ exit gates, weigh-bridges, parking lots and equipment. This allows completely automated wireless identification of vehicles without impacting on existing vehicle processes.

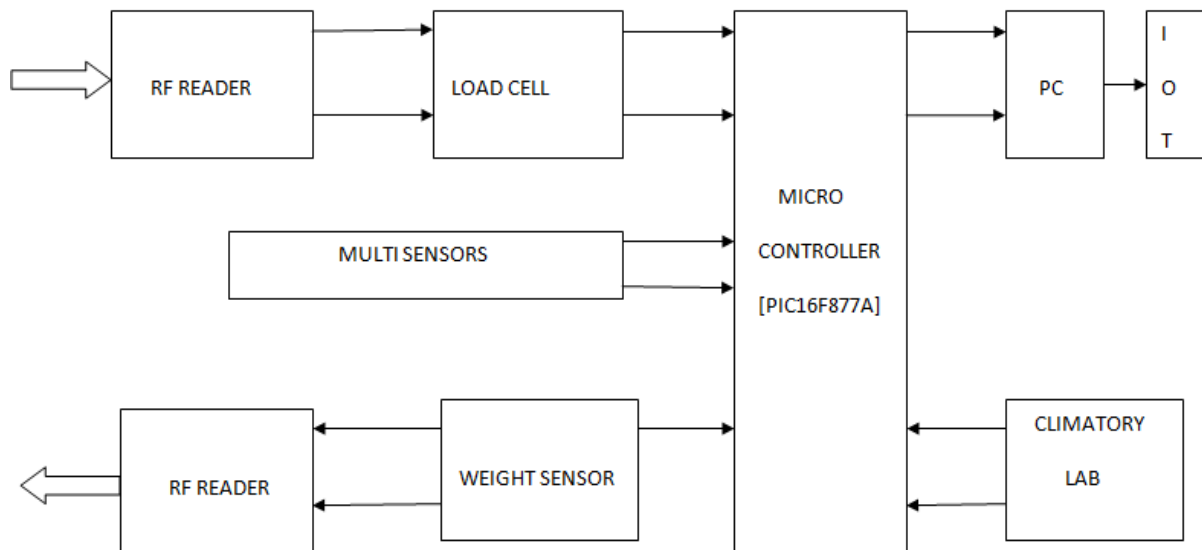


Fig 2.1 Block Diagram of Surveillance System

2.2.1 Access Control

The ability to allow or deny access based on a vehicle having a specific RFID tag is a valuable way to provide a building or parking lot an enhanced level of security as denoted in Figure 3.14. These systems keep out unauthorized vehicles that would otherwise take up space and deters individuals from entering a secure building or lot. Thousands of RFID vehicle access control applications are operative in apartment/housing complexes, secure parking lots, construction yards, etc.

2.2.2 Vehicle Identification

The ability to identify a vehicle and access information about it by reading its RFID tag is a beneficial for companies. With the addition of software, these companies can pull up records by just reading the vehicle's unique RFID tag

2.2.3 Vehicle Tracking

Tracking a vehicle while it is traveling hundreds or thousands of miles is not a capability of UHF RFID; but, if checkpoints are set up along the route, the location of the vehicle can be estimated based on when it passes each one. This is being done throughout the nation at large truck weigh stations along major interstates. When 18-wheelers are weighed, their RFID tags are read to pinpoint location and can also be used to document the journey. For companies or persons interested in tracking vehicles in real-time and without setting up expensive infrastructure, vehicle GPS tags are a better solution.

2.2.4 Weighing Under Loaded and Unloaded Condition

The system has two weigh platform that the trucks drive on to so this is used when loading and unloading the trucks. Unload scale is measured at entry and load scale is measured at exit. The system alerts if overload is taken

2.2.5 Depth Measurement

The mining area can be separated as four divisions with a pair of IR emitter and detector per division. The Device is placed above the area upside down. The emitted IR rays gets reflected and reaches the detector which is converted into electric signals. These electric signals provide the corresponding depth from which the level of

area mined can be given in percentage .Along with it,Temperature and Humidity can be measured using Temperature sensor and Thermistor.If humidity is high,mining of sand is prohibited.

3.RESULT AND DISCUSSIONS

The Sand Mining Administration Regulation Transport (SMART) system checking the movement of vehicles, and monitoring the sand reserves at each source.The new type of data acquiring system consists of one computer, PIC micro controller and necessary with sensors and transducers.

The sensor module consists of temperature, humidity and much more. Concern sensor output will be connected to proper signal conditioners and perfect filter like low pass and harmonic filter.

The Receiver is connected to the PIC controller. The transmitter is placed in the truck. It has transmitter module and transmitting antenna .The receiver receives the signal from transmitting antenna, and then decodes it. In the receiver side, the modulation signal is separated from the carrier signal and it is given to the PIC Controller.

Once the Vehicle approaches,the RFID transmitter signals the receiver due to which the vehicle's entry is registered in the system then after which the Weight is calculated using Load cell.The signal is transmitted in wireless with carrier frequency of range upto 433Mhz

Based on Humidity and Temperature of sand,Mining of areas can be permitted or prohibited.If the truck carries overload,it can be sensed and detected and the information can be transmitted to the system.By implementation of IOT,message can be transmitted to higher officials under unmanned conditions.

3.1 MINING DATA SYSTEM

3.1.1 Output for Mining Area Measurement





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VEHICLE IN  Reg No: <input type="text" value="TN10 BA4321"/> Unload <input type="text" value="0"/>  <input type="button" value="HOLD"/> <input type="text" value="49"/>		PHYSICAL TEMP <input type="text" value="34"/> °C RH % <input type="text" value="88"/> NORTH <input type="text" value="10"/> FT SOUTH <input type="text" value="10"/> FT EAST <input type="text" value="9"/> FT WEST <input type="text" value="9"/> FT AREA ALOTTED <input type="text" value="100"/> % AREA MINIED <input type="text" value="5"/> % <div> <input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> </div>		VEHICLE OUT  Reg No: <input type="text"/> loaded <input type="text" value="0"/> Click here for actual <input type="text" value="119"/> 	

Figure 4.1 System Output for Mining Area Measurement

The Percentage of area mined as shown in Figure 4.1 can be calculated by Squaring section area and finding average,which can be divided with Total square area to obtain percentage.

3.1.2 Output for Vehicle Identification





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VEHICLE IN  Reg No: <input type="text" value="TN10 AA1234"/> Unload <input type="text" value="0"/>  <input type="button" value="HOLD"/> <input type="text" value="42"/>		PHYSICAL TEMP <input type="text" value="33"/> °C RH % <input type="text" value="91"/> NORTH <input type="text" value="10"/> FT SOUTH <input type="text" value="10"/> FT EAST <input type="text" value="10"/> FT WEST <input type="text" value="9"/> FT AREA ALOTTED <input type="text" value="100"/> % AREA MINIED <input type="text" value="2"/> % <input checked="" type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>		VEHICLE OUT  Reg No: <input type="text" value="TN10 AA12"/> loaded <input type="text" value="0"/> Click here for actual <input type="text" value="91"/> 	

Figure 4.2 System Output for Truck Identification

The unloaded weight is deducted from the loaded value in order to find the Actual load value, with all parameters for the respective truck ID. The respective details of the truck can be displayed and monitored as shown in Figure 4.2. The Climatory Lab Circiut present in the Hardware Configuration as shown in Figure 4.3 consists of components to measure Area mined, Temperature and Humidity.

4. CONCLUSION

The guidelines also call for site-specific survey of all existing and proposed mine leases to calculate the exact amount of extractible sand and other aggregates from an area. These surveys should be carried out by district administrations with the help of the geology and mining department, public works department, forest department at the district level, aided by groundwater boards and government-controlled remote sensing centres. Due to automation and IOT, this system considerably reduces the Manual support system and the error occurred due to it. This system leads a key to environment protection as well as controls soil erosion

5. REFERENCES

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