

Development of Indian Railway Controlled Sanitary System

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Abstract— Indian Railways was being roundly criticized for creating an environment hazard by discharging toilet waste on tracks. IR coaches have toilet system that has hole on the floor through which human feces and urine is flushed directly on railway tracks. This project presents the methodology for design and fabrication of human waste disposal system for Indian railway with the related search. Mostly bad problem in train is discomfort of toilet. In train toilet there is not cleanliness as well as in train human waste from toilet is directly fall on the rail track. This condition is same at the railway station where trains are stop. When the train is stop on the station due to toilet outlets are already open, when any person use the toilet then all human wastage is falling on the rail track. Therefore surrounding atmosphere at the station is get polluted as well as there are increase bad smell. Due to this, passengers face the many problems. Considering the problem of toilet waste in Indian Railway in which we can keep the Railway station and the nearby place much cleaner than at present condition for this purpose we are developing a system which would help the station and nearby area clean. This system is based on automatic control and highly reliable and less expensive to implement without any modification in present coaches this system can be implemented. In our project we are trying to eliminate the problem of falling down of human wastage. When train stop on the station whenever passengers used toilets then instead of falling down the human wastage on a railway track, it store in the drum installed at bottom. When train is start to moving after speed reaches about 40km/hr. Then outlet of drum gets open slowly and all human wastage through the drum falls down away from station. Due to this the station be a clean and solve the all problems at station.

Key words: Sensor, Overflow, Tank & Square Type Tank Outlet, Environment Safety

I. INTRODUCTION

Indian Railways uses more than 40,000 coaches regularly for passenger service. Keeping this population of the coaches in view, IR has to operate approximately 1, 60,000 toilets, round the clock, on coaches moving at a speed of 100kmph plus. The toilets on Indian Railways are of open flush type in which faecal matter excreted by passenger is discharged directly on the tracks. Human feces and urine contains a large number of harmful germs. These germs not only pollutes the surrounding environment but also responsible for causing parasitic infections (tapeworm, pinworm, roundworm and hookworm are spread mainly through human solid waste), hepatitis, diarrhea, waterborne diseases, typhoid, cholera and other various types of diseases.

Indian Railways has completed more than 150 glorious years developing in many aspects but neglecting one major area, disposal of human faecal matter in large amount on tracks by toilets installed on coaches of Indian railways. This area has neglected by every responsible authority during these 150 years, which is now a great cause of concern.

A. Importance of Project

- This project is totally innovative.
- It support to the “SWACHA BHARAT ABHIYAN”.
- This help to keep always clean the railway track at the station.
- It helps to eliminate pollution and bad smell at the railway station.
- It helps to Clean, odor-less, hygienic and aesthetically pleasing the station.
- It eliminates problems of travelers about toilet at railway station.

B. Scope of Works

- It provides comfort to passengers, track mans, staff member etc.
- Easily install in conventional toilet system with minimum changes in their design aspect.
- Required Maintenance for this system is neglected.
- At the railway station, we see that the people facing to the dirty pollution and bad smell.
- Hence I think about the reason of this problem and I found that overall problems because of only human wastage falling on the rail track at the station.
- Then I think deeply about solution of this problem and we get idea of this project, i.e. “DEVELOPMENT OF INDIAN RAILWAY CONTROLLED SANITARY SYSTEM”.

C. Methodology

- In our project, we used methodology of storing the human wastage in the drum for several time.
- Toilet tank is installed at the bottom of railway drum and toilet tank has one outlet.
- The human wastage stored only for the time when train stop at the station.
- The opening and closing of outlet of drum is automatically controlled by using sensor, controller, motor and actuator.

II. EXPERIMENTAL SET- UP

A. Railway at Stop Condition

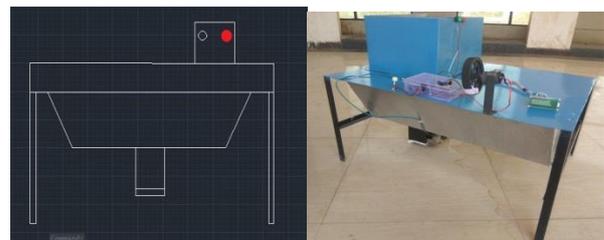


Fig. 1: Layout & Photo of Condition When Railway Stops.

1) IR Sensor

The function of the sensor is to sense the movement or speed and this information is foreword to the next device. In this project Sensor since the speed of the wheel which at below

the 40 kmph and send this information to the controller in the program language.

2) Ordinio Dio Controller

The controller work as the taking information from the sensor and work implement as of that information. This controller is installed at the Dashboard of the railway. An Arduinio Uno controller receives the information from the sensor and controls the rotation of DC motor for closing the outlet of storage tank.

3) Regulator

The function of regulator is to adjust the speed or voltage by increase or decrease the voltage with rotating in clockwise and anticlockwise direction. Regulator help to decrease the speed of the railway wheel below the 40 kmph.

B. Servo Motor

The servomotor can rotate the wheel with regarding voltage impute I one direction. The speed is controlled by regulator. In this project there are servo motor rotate the wheel below or above the 40kmph as their requirement of speed.

C. Liquid Crystal Display (JHD162A)

Liquid crystal display is like notification display which gives the present information of the process and speed. Liquid crystal display is display the speed of wheel below or above 40kmph in digital language and also indicate the letter that 'DOOR IS CLOSED' or 'DOOR IS OPEN'.

D. DC Motor

The DC motor is used to rotate in the angular motion for particular angle. This angular motion is used for open and closes the toilet tank outlet for particular time. Dc motor is receive signal from controller and if speed is below 40kmph then squire type section rotate to close the tank opening.

E. Setup Procedure

- Firstly check that all connections and components are connected to each other and then start the voltage input button.
- When start the button then wheel start to rotate. The speed of the DC motor is vary below the 40kmph the by using potentiometer.
- At that time IR sensor measure the speed which is below 40kmph and collect the information and foreword to the controller.
- Controller take the information of the speed is below 40kmph from sensor and the give the command to the Servo motor to rotate in 120 to 0 degree in the way that the outlet of the tank is going to be closed gradually and tank outlet cover is get closed.
- Also the controller controls the LED light above the toilet door that the RED LED indicator is ON.
- Green signal shows that the passengers can use the toilet.
- Then there is liquid crystal display which how the speed of wheel is below 40kmph and there is display that 'outlet is closed'.
- In this way we can use toilet anywhere.

F. Railway at Running Condition

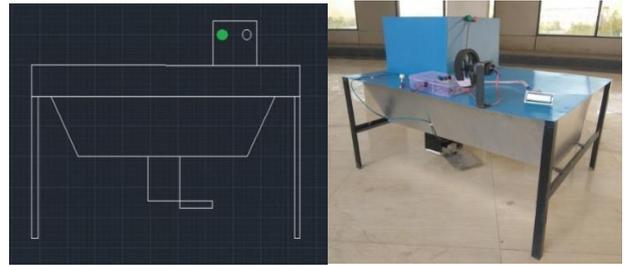


Fig. 2: Layout & Photo of Condition When Railway Running

G. Setup Procedure

- 1) Firstly check that all connections and components are connected to each other and then start the voltage input button.
- 2) When start the button then wheel start to rotate. The speed of the DC motor is vary above the 40kmph the by using potentiometer.
- 3) At that time IR sensor measure the speed which is above 40kmph and collect the information and foreword to the controller.
- 4) Controller take the information of the speed is above 40kmph from sensor and the give the command to the Servo motor to rotate in 0 to 120 degree in the way that the outlet of the tank is going to be open gradually and tank outlet cover is get closed.
- 5) Also the controller controls the LED light above the toilet door that the green LED indicator is ON.
- 6) Green signal shows that the passengers can use the toilet.
- 7) Then there is liquid crystal display which how the speed of wheel is above 40kmph and there is display that 'outlet is open'.
- 8) In this way we can use toilet anywhere.

III. WORKING CONCEPT

A. Railway at Running Condition

- When railway started then wheel start to rotate. The speed of the dc motor is vary above the 40kmph the by using potentiometer.
- At that time IR sensor measure the speed which is above 40kmph and collect the information and foreword to the controller.
- controller take the information of the speed is above 40kmph from sensor and the give the command to the servo motor to rotate in 0 to 120 degree in the way that the outlet of the tank is going to be open gradually and tank outlet cover is get closed.
- Also the controller controls the LED light above the toilet door that the green led indicator is on.
- Green signal shows that the passengers can use the toilet.
- Then there is liquid crystal display which how the speed of wheel is above 40kmph and there is display that 'outlet is open'.
- In this way we can use toilet anywhere.

B. Railway at Stop Condition

- When railway is started then wheel start to rotate. The speed of the DC motor is vary below the 40kmph the by using potentiometer.

- At that time IR sensor measure the speed which is below 40kmph and collect the information and forward to the controller.
 - Controller take the information of the speed is below 40kmph from sensor and the give the command to the Servo motor to rotate in 120 to 0 degree in the way that the outlet of the tank is going to be closed gradually and tank outlet cover is get closed.
 - Also the controller controls the LED light above the toilet door that the RED LED indicator is ON.
 - Green signal shows that the passengers can use the toilet.
 - Then there is liquid crystal display which how the speed of wheel is below 40kmph and there is display that 'outlet is closed'.
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IV. CONCLUSION

Sanitation in Indian Railways had become a need of time and an important aspect for Indian Railway's complete success. Responsible authorities are also putting efforts in this direction by carrying out outfield trials and putting notice board in toilets such as requesting passenger not to use toilet when train is stationary at platform. Our proposed model will not put any restriction on its user. Passengers can use toilet when they want, even if the train is standing on the platform. The Main Conclusion Will Be Drawn Find Out Whether It Is Possible To Automate A Human Waste Disposal Process Which Would Avoid Passengers Inconvenience And Uncleanliness And Unhygienic Condition Of Railway Stations.

Thus this project work might be useful in all fields. For practical application this system is very easy and eliminate the all problem and provide the comfort to the passensers. It's height, weight, length and other mechanical design construction and all connections of all components are made as suitable for easy operation without come any problems.

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