# FABRICATION AND STUDY ON MAGLEV TRAIN INCORPORATED WITH TURBOJET ENGINE

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**Abstract-** *The project represents an innovative approach to increase the speed of trains. In recent past days, the Indian railway required high speed trains with new technology. Already an electrical and diesel trains were used for transportation, which would consume more electricity and fuel and also needed more time to reached their destinations. They also involve with some accidents. But currently an emerging technology in transportation known have been Aero maglev train a class of technologies used magnetic levitation principle to propel vehicles by magnetic levitation. We modify this system in connected with turbojet engine could enhance its speed with high paced. they were also more efficient and would generate high thrust, as a result the aero maglev had become the fastest train in the field of railways industry. This train requires less fuel and reaches a speed from 0 to 100 kmph in short span of time, which attains the speed up to 650+ kmph up to 1000kmph without risk of accidents. In this project the maglev model was have been prepared with variety of components and magnets to checked its efficiency, speed and structural ability by the influence of turbojet. The turbojet engine very safest engine and the engine problem is very less its produce maximum amount of trust and acceleration in the system. The aero maglev runs with both magnetic levitation and wheels. magnetic levitation on high speed and runs and on wheels at low speed. The train technology grown day by day this aero maglev train make a revolution* in the Indian railway system and world railway system.

**Key Words:** Turbojet, Magnetic levitation, Aero maglev train, propulsion, acceleration, system, Maglev train, Transportation, systems, Microcontroller, Electromagnets, Permanent magnets, Infrared sensor, Electrodynamic suspension

## 1. INTRODUCTION

The magnetic levitation (MAGLEV) train uses magnetic field to suspend, guide, and propel vehicle onto the track. The MAGLEV train provides a sustainable and cleaner solution for train transportation by significantly reducing the energy usage and greenhouse gas emissions as compared to traditional train transportation systems. In this paper, we propose an advanced control mechanism using an Arduino microcontroller that selectively energizes the electromagnets in a MAGLEV train system to provide dynamic stability and energy efficiency. We also design the prototype of an energy-efficient AERO MAGLEV train that leverages our proposed control mechanism. In our AERO MAGLEV train prototype, the levitation is achieved by Magnetic Levitation principle a repulsive magnetic field between the train and the track using magnets mounted on the top-side of the track and bottom side of the vehicle. The propulsion is performed by creating by Turbojet engine and the permanent magnets attached on the sides of the vehicle and electromagnets mounted at the centre of the track using electrodynamic suspension (EDS) and electromagnetic suspension (EMS). We use an infrared-based remote-control device for controlling the power, speed, and direction of the vehicle in both the forward and the backward direction.

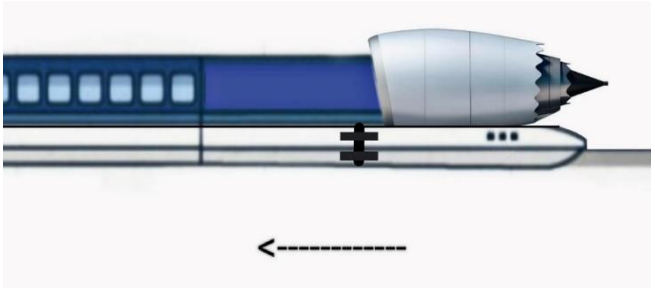


**Figure 1**: Maglev Train with Turbojet Engine

The proposed AERO MAGLEV train control mechanism is novel, and according to the best of our knowledge is the first study of its kind that uses an Arduino-based microcontroller system for control mechanism. Experimental results illustrate that the designed prototype consumes only of energy as compared to a conventionally design AERO ned MAGLEV train prototype that consumes fuel and electricity. Results reveal that our proposed control mechanism and prototype model can reduce the total power consumption by 8.3 × as compared to the traditional AERO MAGLEV train prototype, and can be applied to practical AERO MAGLEV trains with necessary modifications. We Modified the maglev train into aero maglev train by using of turbojet for propulsion and wheels for low speed. because normal maglev train too difficult to propulsion. basically, the maglev

train trains are propulsion by the change of magnetic poles in tracks. it consumes more energy and electricity so we modified maglev by using turbojet for the propulsion Thus, our proposed prototype and control mechanism serves and speed as a first step towards cleaner engineering of train transportation systems. approach to Increase the speed up to 500-1000km/hr by using magnetic levitation and turbojet.

## 2. LITERATURE REVIEW

The magnetic levitation technology in the industry Magnetic levitation technology also has many applications in industry. A large number of factories use magnetic levitation technology to increase efficiency and reduce energy consumption. In this part, the author conducts a simple analysis with the magnetic levitation blower. Magnetic levitation blowers can reduce the noise problems caused by traditional blowers in industrial production, while also improving operating quality and efficiency, and their frictionless nature also greatly reduces maintenance costs. Maglev Technology Expectations Maglev technology is still a hot topic today. The mainstream long-distance transportation urgently needs in-depth research on many projects:

1. How to effectively brake and guide ultra-high-speed maglev trains. This problem is directly related to the safety of passengers. If the problem of efficient braking and guidance at high speed is solved, the reliability of maglev trains can be increased, and the research and development of ultra-high-speed maglev trains can also be promoted.

Russia has a much larger territory than Japan, South Korea, Germany, and France, where the integration of high-speed lines into the transport complex has successfully completed its tasks. In Russia, the average distance between key socioeconomic canters is 190 km in the European part and 320 km beyond the Urals. In the above countries, the same is usually the length of the entire HSR line, on the basis of which we can conclude that the speeds that the HSR can provide (350 km/h) will have a significantly smaller consolidating effect in the conditions of socio-economic canters dispersed throughout Russia. This fact is confirmed by the experience of the People's Republic of China, where the high-speed railway can with great difficulty provide a comfortable trip duration. hours) between the main economic canters Beijing - Shanghai (1318 km - trip duration 4.48 hours) It is generally accepted that highspeed railway lines cannot ensure the transportation of goods. Therefore, the decision to build a high-speed highway is made solely on the basis of the parameters of existing and projected passenger flows in this direction. Today, the estimate of the profitable HSR passenger flow is from 7 to 14 million passengers per year. This leads to the a priori impossibility of constructing HSR lines in all directions in Russia, except Moscow-St. Petersburg. The main disadvantages of high-speed rail construction in Russia.

The line designs of most high-speed lines provide for the possibility of moving freight trains with a C8 load at normal speed, which will entail corresponding logistical difficulties in coordinating schedules. It is obvious that the search for solutions to improve transport accessibility and carrying capacity in Russia lies in the field of innovative solutions. Our colleagues have defined the concept of innovative highspeed ground transport systems as systems that meet the following criteria. Cost-effective transportation speed is 600 km/h, which makes it possible to compete with air transport in almost all directions of the continental part of Russia (transportation lengths up to 5000 km). A significant change in the current matrix of the transport industry with the introduction of HSGTS into the transport complex due to the dragging of passenger traffic and cargo traffic. To date, there are various HSGTS concepts (magnetic levitation transport)

## 3. METHODOLOGY

Maglev (derived from *magnetic levitation*) is a system of rail transport whose rolling stock is levitated by electromagnets rather than rolled on wheels, eliminating rolling resistance.

Compared to conventional railways, maglev trains can have higher top speeds, superior acceleration and deceleration, lower maintenance costs, improved gradient handling, and lower noise. However, they are more expensive to build, cannot use existing infrastructure, and use more energy at high speeds.

Maglev trains have set several speed records. The train speed record of 603 km/h (375 mph) was set by the experimental Japanese L0 Series maglev in 2015. From 2002 until 2021, the record for the highest operational speed of a passenger train of 431 kilometres per hour (268 mph) was held by the Shanghai maglev train, which uses German Trans rapid technology. The service connects Shanghai Pudong International Airport and the outskirts of central Pudong, Shanghai. At its historical top speed, it covered the distance of 30.5 kilometres (19 mi) in just over 8 minutes.

**Figure 2:** Maglev Train

Turbojet engine is a jet engine which produce all of its trust by ejecting a high energy gas stream from the engine exhaust nozzle. Turbofans are the most efficient engines in the range of speeds from 500 to 1200km / h * r (270 to 540 knots; 310 to 620 mph), the speed at which most commercial aircraft operate. its take-offs, a jetliners engine can move 1.25 tons of air per second, that enough power suck All the air out of the largest American football stadium in less than a minute! Here's basic look at incredible jet engine technology with the turbofan engine.

The high-speed train project involves the integration of aerospace and terrestrial rail transport technologies, with a designed speed of up to 1000km/h, thus aiming to surpass commercial aviation speeds.

**Figure 3:** Turbo Jet engine

So, we add Two system with each other as a result they form Aero Maglev Train.

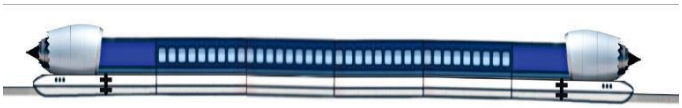

**Figure 4:** Prototype of Aero Maglev Train

**Making Process**

1. Take the cut into rectangular shape length 1.5 meter and breath 12 cm
2. Take roller fix to the plywood at first middle and last with help of screws
3. Take a fan remove the propellers fix the 2200kv brushless motor in the centre of cooler supporter fix with screw and attach the propellers to the motor
4. Take ESC connect to the motor and fix the system to the plywood with help of nut and bolt. On both sides.
5. Take a card word cut into rectangular shape and make like the turbofan case attach to the motor with help of gun glue on both side
6. Tale cardboard male like rectangular box fix centre of plywood
7. Take a xt60 and servo wire connect to the ESC on both side
8. Take a plastic scale make a hole and attach the steel wire between servo motor and scale fix on the passenger rectangular box on top both sides. Its use like spoilers of train to resist the speed.
9. Take magnetic strips fix in the bottom of the train. Its act as model and prototype of the maglev train
10. Connect xt60 wire to the Battery and servo wire to the Receiver
11. Turn on the transmitter and receiver check the all motors are running
12. Take card board make like triangular shape for turbojet door on the both sides attach the steel wire between servo motor and door and fix in the turbojet.
13. Connect the servo wires in channel 2,3,5&6
14. Channel 2 for spoilers
15. Channel 3 for opening and closing doors of turbojet
16. Channel 5 and 6 for both turbojet throttles
17. check the all system working or not and make it colourful
18. Finally check the speed of the train

**Figure 5:** Making process

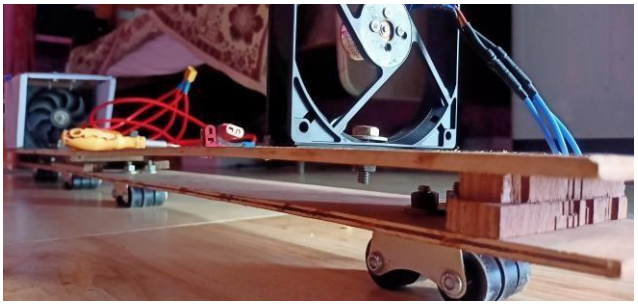

**Figure 6:** Joining the wheels and Turbojet

**Figure 7:** Turbojet Fans


**Figure 8:** Side View

## 5. RESULTS AND DISCUSSION

In future works, new technologies such as evacuated AERO MAGLEV transport technologies that incorporate AERO MAGLEV along with a full system to allow frictionless transport and permitting a speed of 1000 km/h can be adopted.

In future work, we plan to consider the air drag and weight limitations of AERO MAGLEV system to make the existing prototype robust. The magnetic levitation (AERO MAGLEV) train technology has emerged as a sustainable, robust, and cleaner solution for train transportation as it significantly reduces energy and greenhouse gas emissions as compared to traditional transportation systems. In this paper, we propose a novel control mechanism for switching of electromagnets of a AERO MAGLEV system that conserves energy and provide dynamic stability to the AERO MAGLEV train.

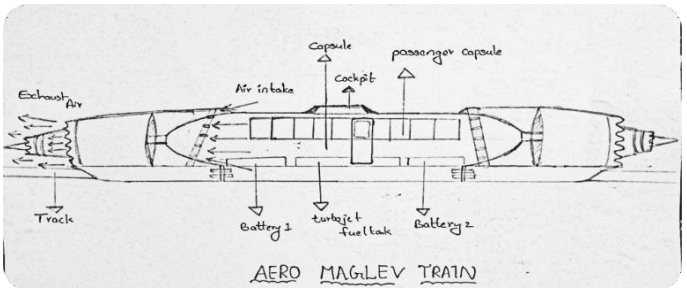


**Fig 9:** 2D View


**Figure 10:** Final prototype

We further design and prototype an energy-efficient AERO MAGLEV train system leveraging our proposed control mechanism. The electrodynamic suspension (EDS) technique is leveraged in the proposed design to provide a repulsive mechanism for levitating and propelling the vehicle in both the forward and reverse direction. In the proposed design, electronics components are embedded onto the printed circuit board (PCB) and an Arduino board is integrated with the relays to switch the electromagnets efficiently. The traditional transportation systems have certain limitations in terms of cost, feasibility, safety, air gap, performance parameters, effectiveness, efficacy and control strategies. In this paper, a novel control approach is incorporated to overcome these limitations by leveraging a hybrid system that uses permanent magnets for levitation purpose and electromagnets propulsion. The key features of the proposed system are that it is frictionless.

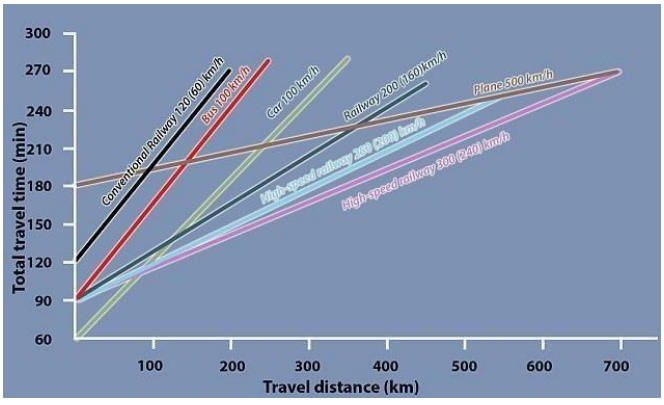


**Chart:** Graphs show speed of Aero Maglev train and plane at similar speed

## 6. CONCLUSIONS

Great progress was made on both the levitation and propulsion systems of the AERO MAGLEV TRAIN project. AERO MAGLEV train project comes a great future for the railways system. These trains consume very less electricity and high speed compared to other maglev trains. They Move a lot faster than normal trains because they are not affected by ground friction and turbojet engine. This train runs on wheels at low speed so it will run on both magnetic levitation and wheels. they would only have air resistance or drag resistance. They are incompatible with existing rail lines because they need a separate track to levitate, unlike the traditional high-speed trains. Initially the cost is very high but it may decrease in near future. This train become high speed train in future.

## 7. FUTURE SCOPE

1. In the aero maglev train have a safety, speed, comforts, less time to reach their destination, and low electricity require.
2. Aero maglev train are many times safer than any other means of transports and low operating cost.
3. Aero maglev train is luxurious mode of transport.
4. In this train has high speed, so it is time saving.
5. Accident between two maglev train is nearly impossible because the linear induction motor prevents.
6. Trains running in opposite directions.
7. Easy to maintain because no friction generates between track and train, longer lifetime.
8. Once trains moves and freely with constant speed no need to run the engine 5-10 kilo meters because of there is no friction between track & train and train.
9. The Aero maglev train is Very High speed compare to Japan and China maglev trains

## 8. REFERENCES

1. Alaneme, KK & Aluko, AO 2012, 'Production and age-hardening behaviour of borax premixed SiC reinforced Al-Mg-Si alloy composites developed by double stir-casting technique', West Indian J Eng., vol. 34, no. 1–2, pp. 80–5.
2. Alaneme, KK & Bodunrin, MO 2013, 'Mechanical behaviour of alumina reinforced Aa 6063 metal matrix composites developed by two-step – stir casting process', Acta Tech Corvininesis – Bull Eng., vol. 6, no. 3, pp. 105–10.
3. Bryan, JM et al. "Mechanism of the corrosion of aluminium", Chemistry & Industry, NACE-3, p. 135136.
4. Cannillo, V 2010, Surface modification of Al-Al2O3 composites by laser treatment. Journal of Optics and laser in engineering.
5. Casati, R & Vedani, M 2014, 'Metal matrix composites reinforced by nano-particles—a review', Metals, vol. 4, no. 1, pp. 65-83.
6. Hashemi, S et al. 'Foundations of materials science and engineering', 4thedition, McGraw Hill, ISBN 007 125690 3.
7. Hashim J 2001, 'The production of cast metal matrix composite by a modified stir casting method', J Teknol, vol. 35, pp. 9–20.
8. Hashmi J 2010, 'Metal matrix composites: production by the stir casting method', Journal of Materials Processing Technology, pp. 92- 93.
9. Hemanth Joel 2009, Quartz (SiO2P) reinforced chilled metal matrix composite (CMMC) for automobile applications Mater Des, vol. 30, pp.323–329.
10. Hirth, SM, Marshall, GJ, Court, SA & Lloyd, DJ 2001, 'Effects of Si on the aging behavior and formability of aluminium alloys based on AA6016', Original Research Article Materials Science and 52 Engineering: A, December, vol. 319-321, pp. 452
11. formability of aluminium alloys based on AA6016', Original Research Article Materials Science and Engineering: A, December, vol. 319-321, pp. 452–45
12. Luo Yafei. The speeding car that travels thousands of miles a day—the beginning and end of the maglev train. Innovation World Weekly, 2021, (02):94-99+7.
13. Deng Zigang, Liu Zongxin, Li Haitao, Zhang Weihua. The development status and prospect of maglev train. Journal of Southwest Jiaotong University, 2022,57(03):455-474+530.
14. Yang Shaoling. Improvement of Japanese maglev railway technology. Railway rolling stock workers, 2000(06):30-32.

## 9. ACKNOWLEDGEMENT

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