SOLAR VAYU ELECTRIC CRUISER

#AnAeroHertz

CBSE Science Exhibition 2023-24

SOLAR VAYU
ELECTRIC CRUISER
AN AERO HERTZ

CATEGORY Transport and Communication

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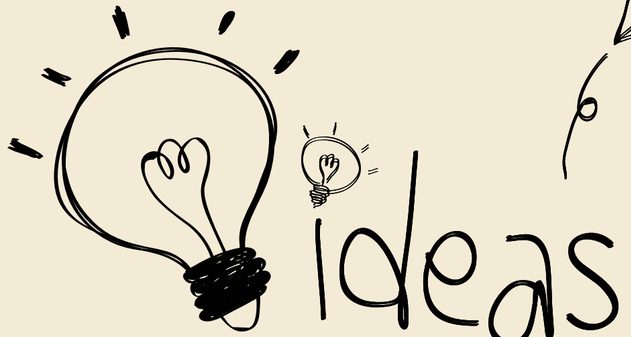
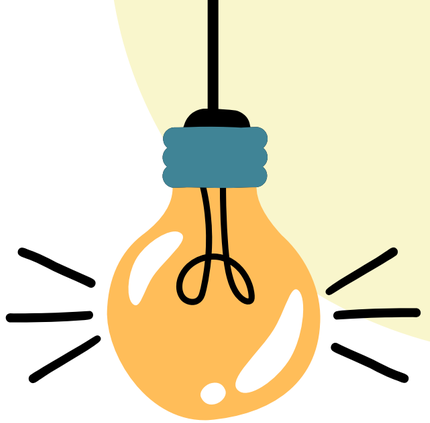


Brief Overview

- Integrates a sun tracking mechanism for solar panels
- The solar panels are engineered to streamline their shape while in motion, effectively reducing drag.
- When the vehicle brakes, the solar panels are strategically positioned perpendicular to the vehicles direction, facilitating the deceleration process.



An Aero Hertz

Why we came up with this Idea?

The idea was conceived to address two major challenges facing the automotive industry:

- the need for cleaner and more sustainable transportation, and
- the demand for more efficient and cost-effective vehicles.

Aerodynamic Solar Electric cars gaining popularity

01. ✓

Produce zero emissions

02. ✓

Lower operating costs

03. ✓

Innovative and technologically advanced

04. ✓

Performance and convenience

Materials Used

01. Arduino Uno
02. BO Motor
03. Servo Motor
04. L298N
05. LDR
06. Solar Panels
07. Male to Male wires
08. Female to Female wires
09. Male to Female wires
10. Wheels
11. Wood Plastic
12. Metal Axle
13. DC-Motor
14. Jumper Wire

Details about the Solar Panel

01. Located on the roof of the car, where they can receive maximum sunlight exposure.

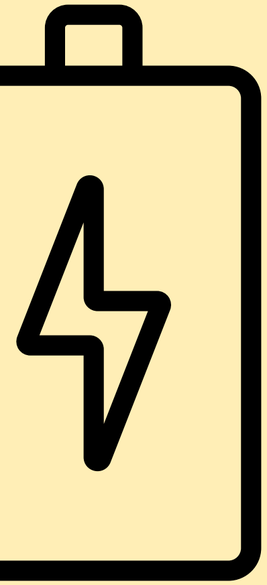
02. Made using advanced materials such as monocrystalline or polycrystalline silicon, which offer high efficiency and durability

03. The angle and orientation of the solar panels are carefully calculated to maximize efficiency. The panels are angled at an optimal angle to capture as much sunlight as possible

04. connected to a battery pack, which stores the energy generated by the panels

05. The Solar energy absorbed is used for not only running the car but also for charging the battery for use at night.

Battery Mechanism



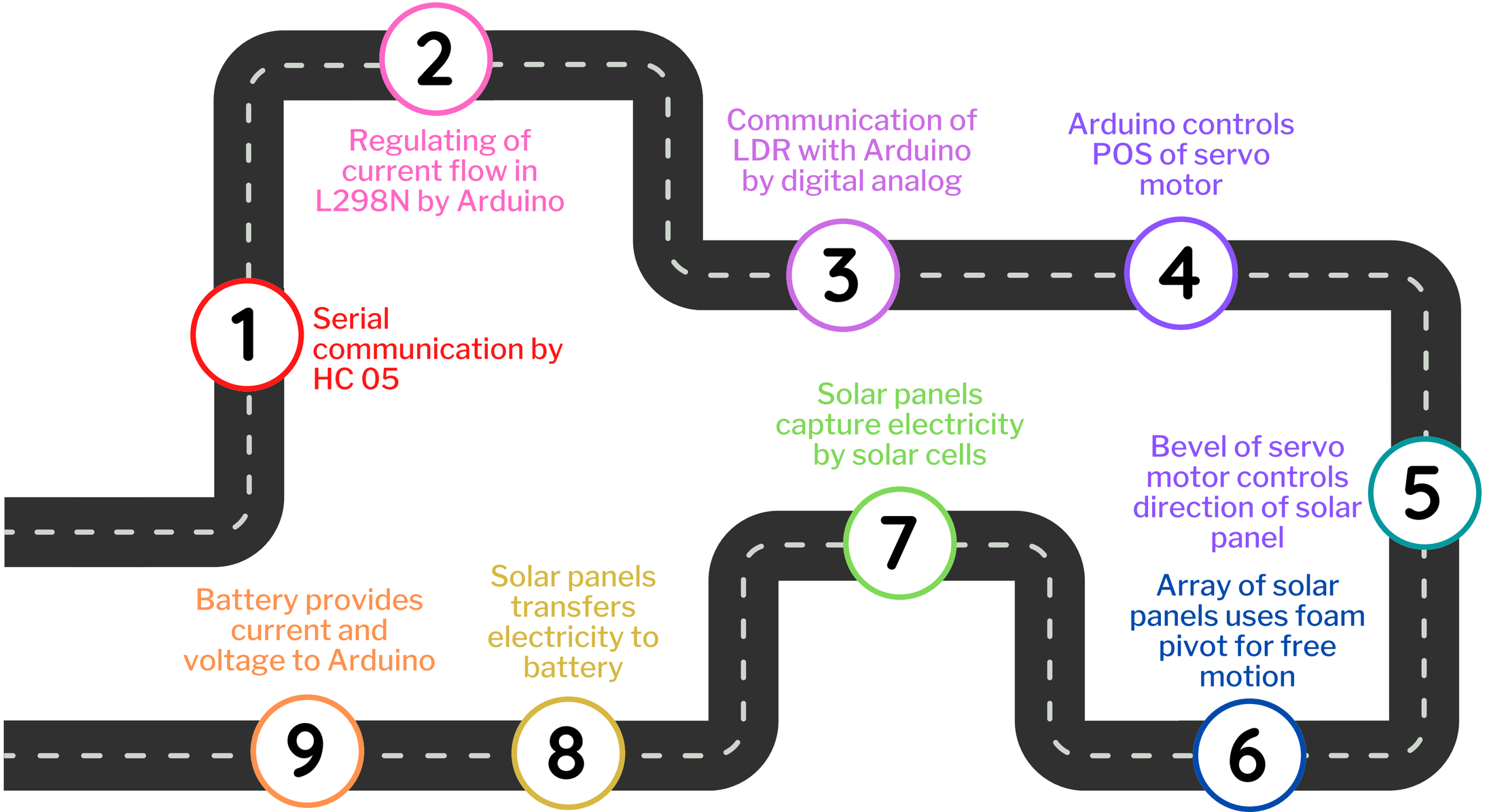
01. The battery pack in a solar electric car is typically made up of several individual cells, which are connected in series and parallel to create a larger battery pack. The cells offer high energy density, long cycle life, and low self-discharge rate.

02 The battery pack is charged using a combination of sources, including the solar panels on the car's roof and sides, as well as external charging sources such as a public charging station. The charging process involves converting the electrical energy from these sources into chemical energy that can be stored in the battery cells.

03. To ensure optimal performance and longevity of the battery pack, it is managed by a sophisticated control system that monitors the voltage, temperature, and state of charge (SOC) of each individual cell. This system helps to prevent overcharging, overdischarging, and thermal runaway, which can damage the cells and reduce their overall lifespan.

04. When the car is in motion, the battery pack discharges electrical energy to power the electric motor that drives the wheels. The amount of energy discharged depends on several factors, including the car's speed, terrain, and driving style.

WORKING STEP BY STEP



Carbon Emmisions

The exact percentage of carbon emissions that can be reduced by using an aerodynamic solar electric car instead of a petrol-based car varies depending on several factors, such as the efficiency of the solar panels, the driving conditions, and the distance traveled. However, studies have shown that such cars have the potential to significantly reduce carbon emissions.

According to a study published in the journal Renewable and Sustainable Energy Reviews in 2019, an aerodynamic solar electric car could reduce carbon emissions by up to 80% compared to a conventional petrol-based car. The study analyzed the performance of a prototype solar electric car called the Sion, which was developed by the German company Sono Motors. The authors of the study found that the Sion could achieve a range of up to 250 kilometers (155 miles) on a single charge, with an additional 34 kilometers (21 miles) provided by solar power

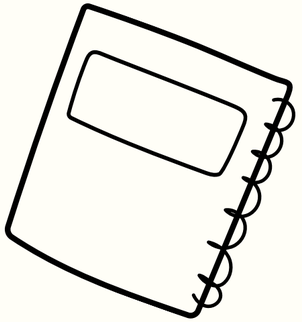
Carbon Emmisions

.Another study published in the journal Transportation Research Part D: Transport and Environment in 2018 found that a solar electric car could reduce carbon emissions by up to 90% compared to a conventional petrol-based car, depending on the driving conditions. The study analyzed the performance of a prototype solar electric car called the Lightyear One, which was developed by the Dutch company Lightyear. The authors of the study found that the Lightyear One could achieve a range of up to 725 kilometers (450 miles) on a single charge, with an additional 32 kilometers (20 miles) provided by solar power.

References:- "Performance analysis of Sion: Aerodynamic Solar Electric Car" by Ajay Kumar et al., Renewable and Sustainable Energy Reviews (2019)- "Life cycle assessment of Lightyear One: A high-efficiency long-range electric vehicle" by Guillaume Moulin et al., Transportation Research Part D: Transport and Environment (2018)

BENEFITS OF SOLAR VAYU ELECTRIC CRUISER

REDUCED DRAG



Aerodynamic design reduces air resistance, making the car more efficient and requiring less energy to travel at high speeds.

IMPROVED DRIVING SAFETY

vehicle dynamics caused by variations in road surface friction across different locations around the world. Surface area aerodynamic solar electric cars can provide greater driving safety overall compared to traditional

IMPROVED STABILITY

Aerodynamic cars have a lower center of gravity, which improves stability and handling, making them safer to drive.

REDUCED FUEL CONSUMPTION

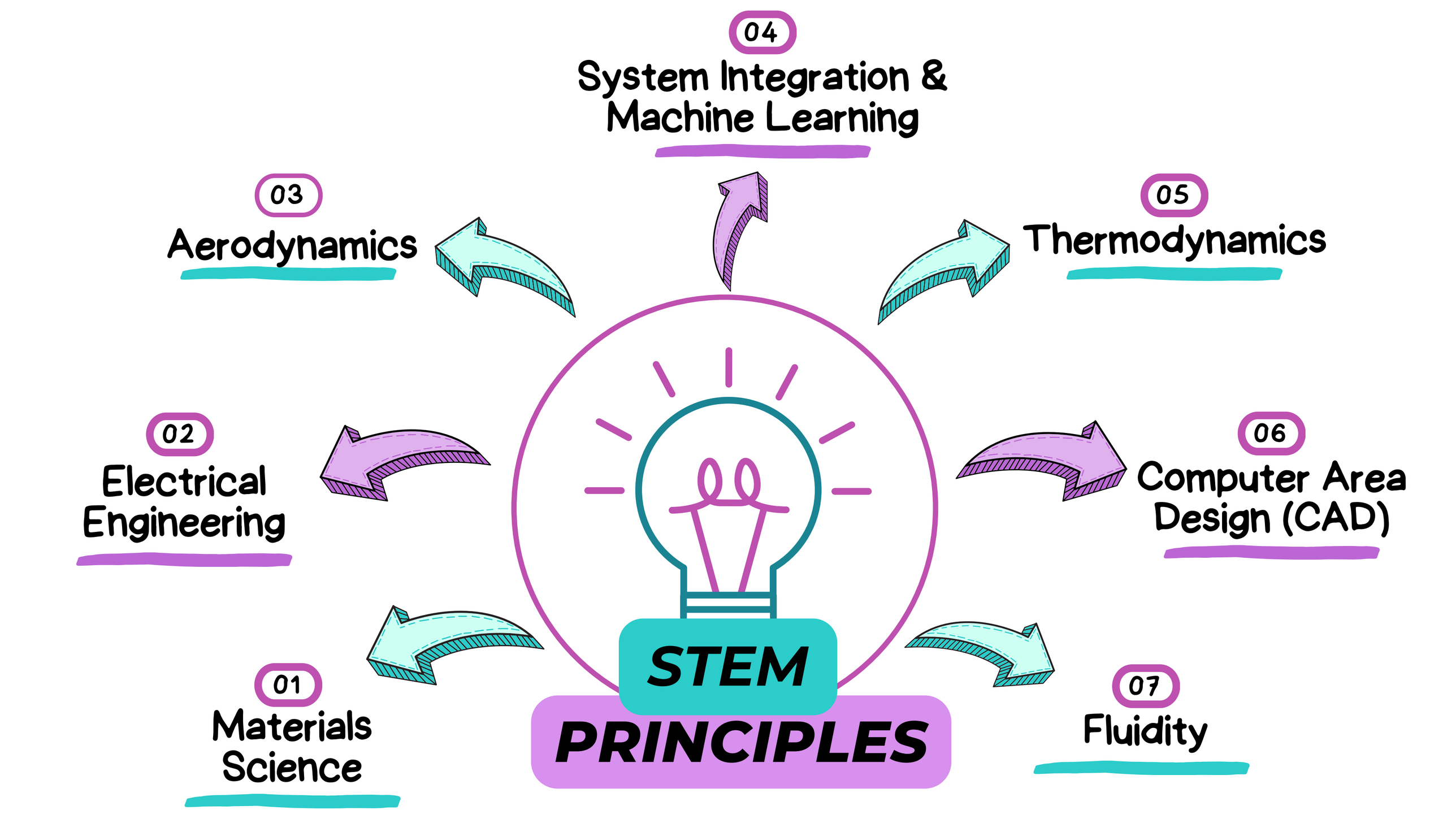
In stop-and-go traffic conditions where fuel consumption is highest due to frequent acceleration and deceleration cycles, aerodynamic solar electric cars can help reduce fuel consumption

QUIETER OPERATION

The electric motor and reduced wind noise make aerodynamic cars quieter than traditional cars, making them more pleasant to drive.

REDUCED CARBON FOOTPRINT:

By using renewable energy sources like solar power to charge the batteries of aerodynamic solar electric cars, these vehicles have an even lower carbon footprint than traditional electric cars.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System Integration &
Machine Learning
03
Aerodynamics
05
Thermodynamics
02
Electrical
Engineering
06
Computer Area
Design (CAD)
STEM
PRINCIPLES
01
Materials
Science
07
Fluidity


Towards a Brighter and Sustainable Future