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Improving Deep Speech Denoising By Noisy 2 Noisy Signal Mapping

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ABSTRACT
The Solar-Wind Hybrid Electric Vehicle (S-WHEV) is a forward-thinking innovation in sustainable transportation that combines solar and wind energy harvesting systems with electric vehicle (EV) technology to improve energy efficiency, extend operational range, and reduce environmental impact. By integrating two renewable energy sources, the S- WHEV addresses key limitations of traditional EVs, such as limited range and dependence on external charging infrastructure. The design features high-efficiency photovoltaic panels mounted on the roof, hood, and other surfaces to maximize sunlight capture, converting solar energy into electricity that is stored in an onboard battery system. At the same time, a lightweight wind turbine is strategically positioned to harness airflow during vehicle motion, generating additional power and supplementing the energy provided by the solar panels. This dual energy collection system allows the vehicle to generate power both while in motion and when stationary, ensuring continuous energy accumulation and minimizing the need for frequent recharging from external power sources. The onboard battery, typically a lithium-ion or solid-state system, stores the harvested energy and powers the electric motor, while a smart power management system optimizes the distribution of energy between the motor, battery, and auxiliary systems, enhancing overall performance and efficiency. The combination of solar and wind energy significantly reduces the vehicle's carbon footprint by eliminating greenhouse gas emissions, contributing to cleaner air and supporting global efforts to combat climate change. The S- WHEV's simple yet effective design also promotes energy independence by reducing reliance on fossil fuels and electricity grids, aligning with the broader shift toward renewable energy adoption and sustainable development. While challenges such as limited surface area for solar panels, weather dependency, and the need for further advancements in photovoltaic efficiency and battery storage remain, ongoing technological progress is steadily addressing these obstacles.

1-INTRODUCTION

The Solar-Wind Hybrid Electric Vehicle (S-WHEV) represents a significant leap forward in the pursuit of sustainable and eco-friendly transportation. As the global community grapples with the dual challenges of energy security and environmental degradation, the integration of renewable energy sources into the automotive industry has become a focal point of innovation. The S-WHEV is a pioneering concept that combines solar and wind energy harvesting systems with electric vehicle (EV) technology to create a more efficient, self-sustaining mode of transport. This approach not only reduces reliance on fossil fuels but also contributes to the reduction of greenhouse gas emissions, aligning with global efforts to combat climate change and promote greener mobility solutions.

At the heart of the S-WHEV's design are high-efficiency photovoltaic panels and a compact wind turbine, strategically integrated to maximize energy capture. The solar panels, mounted on the vehicle's roof and hood, convert sunlight into electrical energy, which is stored in an onboard battery system. Simultaneously, the wind turbine harnesses airflow during vehicle motion, generating additional power to further enhance the vehicle's energy efficiency. This dual energy system ensures that power generation occurs both while the vehicle is stationary and in motion, thereby extending the operational range and minimizing the need for frequent external charging.

The primary objective of the S-WHEV project is to demonstrate the feasibility of utilizing renewable energy to power electric vehicles, thereby reducing the consumption of fossil fuels and decreasing carbon emissions. By leveraging readily available solar and wind energy, the

project aims to provide a cost-effective, environmentally friendly alternative to traditional gasoline-powered vehicles. The S-WHEV not only lowers operational costs by utilizing free energy from natural sources but also addresses the growing demand for energy independence and sustainable transportation solutions.

Despite its numerous advantages, the development of S-WHEV technology is not without challenges. Limitations in surface area for solar panels, dependency on weather conditions, and the current state of battery storage technology pose significant hurdles. However, ongoing advancements in photovoltaic efficiency, battery capacity, and lightweight materials are gradually addressing these limitations, enhancing the practicality and scalability of the S- WHEV concept.

In conclusion, the Solar-Wind Hybrid Electric Vehicle stands as a testament to the potential of renewable energy integration in the automotive sector. This project not only contributes to the reduction of environmental pollution but also paves the way for a future where transportation is driven by clean, sustainable energy. As technology continues to evolve, the S-WHEV is poised to become a cornerstone in the shift towards a greener, more resilient transportation ecosystem.

2-LITERATURE SURVEY

Electric vehicle are seen as a means of reducing carbon emissions for transport operations. The first mass produced fully electric vehicle was the Nissan leaf. The number of leafs sold passed 50,000 on the 14th feb, 2013 and the total mileage covered by leafs has exceeded 161millions miles.

The sales of battery electric vehicles such as the leaf are exceeding those of the Toyota prius, the first mass produced hybrid vehicle, at an equivalent stage of its market life. e-ISSN: 2582- 5208 International Research Journal of Modernization in Engineering Technology and Science Vehicle to grid technology, allowing electric vehicles to act as a power sources, is seen as major selling point for electric vehicle technology. The use of vehicle batteries in this way means that

overnight charging the vehicles can be used as localized buffers to smooth the load on the

power supply grid. This project not only contributes to the reduction of environmental pollution but also paves the way for a future where transportation is driven by clean, sustainable energy.

The US Department of defense is investing $20million to demonstrate the concept using a fleet of electric vehicles and it is believed that the use of the vehicles in this way will offset the increased purchase costs of the electric vehicles.

A further advantage offered by battery electric vehicles is the removal of emissions from the point of operations, offering improved air quality in congested cities.

Despite the sales achieved, EV uptake has so far fallen short of expectations. The main reasons are related to perceptions of poor performance and range along with cost.

Most of the vehicles are running on the gasoline fuels. These vehicles exhaust hazards gases. This increases the environmental pollution in the world. In recent years to reduce the pollution researchers have given the solution of EV's or hybrid vehicles and many countries adopted this as one of the best solutions to reduce pollution. The popularity is due to battery and silent operations. The present challenge is the optimization of best battery and charging. This project not only contributes to the reduction of environmental pollution but also paves the way for a future where transportation is driven by clean, sustainable energy

3-INTRODUCTION TO EMBEDDED SYSTEM

Each day, our lives become more dependent on 'embedded systems', digital information technology that is embedded in our environment. More than 98% of processors applied today are in embedded systems, and are no longer visible to the customer as 'computers' in the ordinary sense. An Embedded System is a special-purpose system in which the computer is completely encapsulated by or dedicated to the device or system it controls. Unlike a generalpurpose computer, such as a personal computer, an embedded system performs one or a few pre-defined tasks, usually with very specific requirements. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. Embedded systems are often mass-produced, benefiting from economies of scale. The increasing use of PC hardware is one of the most important developments in high-end embedded systems in recent years. Hardware costs of high-end systems have dropped dramatically as a result of this trend, making feasible some projects which previously would not have been done because of the high cost of non-PC-based embedded hardware. But software choices for the embedded PC platform are not nearly as attractive as the hardware.

Typically, an embedded system is housed on a single microprocessor board with the programs stored in ROM. Virtually all appliances that have a digital interface -- watches, microwaves, VCRs, cars -- utilize embedded systems. Some embedded systems include an operating system, but many are so specialized that the entire logic can be implemented as a single program.

Physically, Embedded Systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants.

4-SOLAR AND WIND POWER-BASED ELECTRIC VEHICLES

In this chapter we will discuss about Existing/Proposed System, block diagram and methodology for Solar and Wind Power-Based Electric Vehicles.

Existing System

One prominent alternative is Battery Electric Vehicles (BEVs), which operate solely on electricity stored in batteries. These vehicles are charged from the grid or renewable energy sources, making them a clean option with zero tailpipe emissions. Recent advancements in battery technology have significantly improved the range and efficiency of BEVs, making them increasingly viable for everyday use. As the infrastructure for charging stations

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expands, BEVs are becoming more accessible to consumers, contributing to a shift towards greener transportation.

Another noteworthy option is Plug-in Hybrid Electric Vehicles (PHEVs). These vehicles combine a conventional internal combustion engine with an electric motor and a rechargeable battery. PHEVs can be charged from the grid, allowing for electric-only driving over shorter distances while still having the flexibility to use gasoline or diesel for longer trips. This dual capability addresses range anxiety, making PHEVs an attractive choice for drivers who may not have consistent access to charging facilities.

Hydrogen Fuel Cell Vehicles (FCVs) represent another innovative approach. These vehicles utilize hydrogen gas to generate electricity through a fuel cell, producing only water vapor as a byproduct. FCVs offer the advantage of quick refueling times and longer ranges compared to Another noteworthy option is Plug-in Hybrid Electric Vehicles (PHEVs). These vehicles combine a conventional internal combustion engine with an electric motor and a rechargeable battery. These vehicles are charged from the grid or renewable energy.

However, the infrastructure for hydrogen refueling is still developing, which presents challenges for widespread adoption.

Compressed Natural Gas (CNG) vehicles provide a different alternative by using compressed natural gas instead of traditional gasoline or diesel. CNG vehicles emit fewer pollutants than their gasoline counterparts and often benefit from lower fuel costs. While they do not eliminate emissions entirely, they represent a step towards cleaner transportation.

Biofuel vehicles also play a significant role in the sustainable transportation landscape. These vehicles run on biofuels derived from organic materials, such as ethanol and biodiesel. By utilizing renewable sources like plant materials and animal waste, biofuel vehicles reduce greenhouse gas emissions and decrease reliance on fossil fuels. The integration of biofuels into existing infrastructure can provide an immediate solution while transitioning to more advanced technologies.

Additionally, some vehicles are equipped with solar panels that harness sunlight to generate electricity directly. These solar electric vehicles can reduce the need for grid charging, especially in sunny regions, and extend the driving range through solar energy capture. This innovative approach aligns well with the goals of sustainability and energy independence.

Lastly, regenerative braking systems are an essential feature in many electric and hybrid vehicles. These systems capture energy that would typically be lost during braking and convert it back into usable power for the vehicle. By increasing overall energy efficiency, regenerative braking extends the driving range and enhances the performance of electric vehicles.

PHEVs can be charged from the grid, allowing for electric-only driving over shorter distances while still having the flexibility to use gasoline or diesel for longer trips. This dual capability addresses range anxiety, making PHEVs an attractive choice for drivers who may not have consistent access to charging facilities.

In conclusion, the landscape of sustainable transportation is diverse, with various systems available beyond Solar-Wind Hybrid Electric Vehicles. Each alternative offers unique advantages and challenges, and the choice of system often depends on specific use

infrastructure availability, and regional energy policies. As technology continues to evolve and the push for greener solutions intensifies, these alternatives will play a crucial role in shaping the future of transportation.

Proposed System

The proposed system aims to develop a hybrid electric vehicle powered by both solar and wind energy, providing an innovative solution to reduce the harmful environmental impacts caused by fossil fuel-based transportation. The central concept revolves around utilizing freely available and renewable energy sources solar radiation and wind flow to generate electricity on the go. A high-efficiency solar panel is mounted on the vehicle to capture sunlight and convert it into electrical energy, while a compact wind turbine is strategically placed to harness wind energy generated by the vehicle's motion or natural airflow. The combined power from these sources is regulated through a smart charge controller and stored in a rechargeable battery pack, which supplies energy to a lightweight brushless DC motor integrated into the wheel mechanism. This motor delivers smooth and efficient propulsion, enabling the vehicle to move without emitting any pollutants. The system may also include a monitoring module to display real-time data such as battery voltage, power input from solar and wind sources, and motor status. The primary aim of this project is to build a functional hardware model of a hybrid electric vehicle that demonstrates the potential of renewable energy integration in transportation. By focusing on sustainability, innovation, and energy efficiency, the project aspires to contribute toward reducing carbon emissions and promoting a greener future through clean mobility solutions.

The proposed system not only addresses environmental concerns but also emphasizes practicality and adaptability. The hybrid approach ensures a continuous power supply even in less favorable weather conditions—solar energy during sunny periods and wind energy during vehicle motion or breezy conditions. This dual-source energy model improves the vehicle's reliability and range compared to conventional solar-only systems. Additionally, the use of lightweight materials and energy-efficient components helps in reducing the overall energy consumption, making the vehicle more viable for real-world applications.

integrating renewable energy harvesting with intelligent energy management, the system is expected to pave the way for future developments in off-grid, sustainable transportation, especially in remote or rural areas where conventional charging infrastructure may not be readily available.

5-HARDWARE DESCRIPTION

Arduino

The Arduino Uno R3 is a microcontroller board based on the ATmega328(datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16

MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

Revision 3 of the board has the following new features:

- 1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin that is reserved for future purposes.

- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

Memory

The ATmega328 has 32 KB (with 0.5 KB used for the boot loader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

Power

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a

2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts. The power pins are as follows:

- VIN-The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- 5V-The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.
- 3V3- A 3.3-volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- GND- Ground pins.

6-RESULT

Solar and Wind Power-Based Electrical Vehicles, successfully integrates renewable energy sources—solar panels and wind turbines—to power an electric vehicle. The 140 Wp solar panel generates up to 25V DC during optimal sunlight hours, while the wind turbine complements this by harnessing airflow during motion. Energy is efficiently stored in a battery system, protected from overcharging and deep discharge by a charge controller.

The Arduino microcontroller manages energy flow and system components, while an LCD display provides real-time monitoring. This setup powers a DC motor for eco-friendly vehicle

operation, showcasing reduced reliance on fossil fuels and a significant step towards sustainable transportation.

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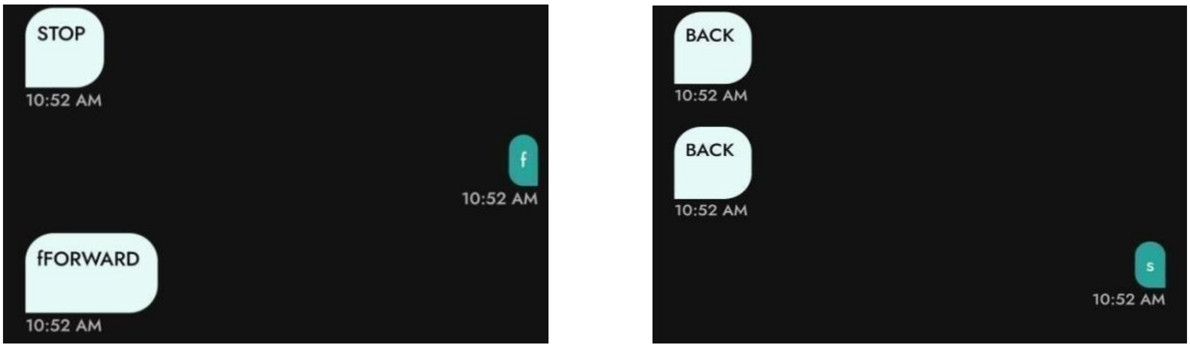

Figure 8.1: Command window

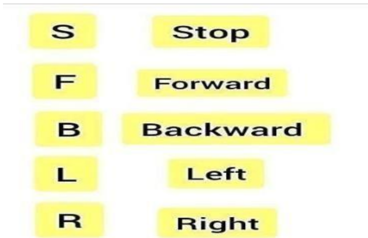

Figure 8.2: Commands

Figure 8.3: Front view of SEV

Figure 8.4: Side view of SEV

7-Conclusion and Future Scope

Conclusion:

Our overall goal of this paper is to research, design, build and test working prototype of solar and wind-powered electric bus. A solar-powered bus will have zero emission levels, as they don't utilize non-renewable resources & burn fuel. The electric motors generate electricity that doesn't emit greenhouse gases or other pollutants. The process of this project will be concentrated primarily on design, construction, and alternative energy sources. the integration of solar and wind energy systems to power electric vehicles, reducing dependency on fossil fuels. The hybrid setup optimizes energy efficiency and ensures consistent vehicle operation. It offers an eco-friendly and cost-effective solution to address the challenges posed by traditional fuel-based vehicles, highlighting the potential of renewable energy in transportation.

The development of a solar and wind-powered electric bus not only demonstrates innovation in sustainable transportation but also serves as a practical model for future public transit systems. By harnessing clean energy sources, the hybrid system significantly lowers operational costs over time and reduces maintenance requirements compared to internal combustion engine vehicles. The incorporation of regenerative braking systems and advanced battery management further enhances the efficiency and longevity of the energy storage units. This initiative aligns with global efforts to combat climate change and supports the transition to smarter, greener cities. Moreover, the project aims to raise awareness about the feasibility and benefits of renewable energy applications in large-scale mobility solutions, setting a precedent for wider adoption of green technologies in the transportation sector.

The implementation of this solar and wind-powered electric bus prototype also emphasizes the importance of energy resilience and independence. By generating its own power, the vehicle reduces reliance on external charging infrastructure, making it ideal for remote or underdeveloped regions where power supply is inconsistent. Additionally, integrating real- time monitoring systems allows for efficient energy management, fault detection, and system optimization, enhancing both safety and performance. This project not only supports environmental sustainability but also promotes technological innovation in renewable energy integration, paving the way for future developments in clean, self-sustaining public transportation solutions.

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