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Integration of Electrical Vehicle Power with Grid, Home and Electrical Vehicle

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ABSTRACT: Now a day's electric vehicle plays vital role in transportation. In fact, the future of oil economy which is considered to be highly dependable by vehicle fleets in the world is not only unsustainable but also very limited. Besides, burning fossil fuels produces greenhouse gases (GHGS) which highly influence the world climate change. The electrification of transportation sector appears to be one of the feasible solutions to the challenges such as global climate change, energy security and geopolitical concerns on the availability of fossil fuels. This project investigates and discusses the wireless power transfer of electrical vehicle power to namely, the vehicle-to-home (V2H), vehicle-to-vehicle (V2V), and vehicle-to-grid (V2G) technologies. A PIC16f877a used for control the whole system. An electric vehicle is produce a DC power which is convert to a AC power that is transmit wirelessly, that power will be send to the home appliances and grid. Then the AC power convert into DC power it will send to dc battery vehicle. We can collect data from a device through IoT.

KEY WORDS: V2H, V2G, V2V, GHGS, Wireless, PIC 16f877a, IOT

I. INTRODUCTION

With ever increasing concerns on environmental issues and clean energy, electric vehicles (EVs) have attracted more and more attention of governments, industries, and customers. EVs are popularly regarded as one of the most effective strategies to reduce the oil dependence and gas emission, and increase the efficiency of energy conversion. Now, the car market is fermenting a revolution, and the trigger is all kinds of EVs. In the past years, the EV technologies focused on individual components or systems in EVs, such as electric machines, drive systems, batteries, fuel cells, onboard renewable energy, and so on . However, with the emerging concept of the smart grid, EVs will play a new role: energy exchange with the power grid. These EVs, called gridable EVs (GEVs), are capable of not only drawing the energy from the power grid with the plug-in function, but also delivering the energy back to the grid via the bidirectional charger.

Furthermore, the bidirectional charger has the direct current (dc) link capacitor which is inherently able to provide the reactive power support to the power grid. Traditional power plants with fossil fuel have a very low efficiency from sources to end users, approaching an overall efficiency of about 30%, whereas renewable energy sources have a high efficiency from generation to grid connection, approaching an overall value of about 70%. However, the intermittent nature of renewable energy sources (such as wind power and solar power) adversely affects the grid voltage, frequency, reactive power, and so on. Hence, the power grid needs to be compensated or regulated. In addition, this compensation becomes complicated in residential areas integrating with small-scale renewable energies.

A single GEV is a good candidate to play a role of power compensation in the home grid. Furthermore, a group of GEVs is also a good candidate to support the community-grid operation. Based on the charging/discharging capability of GEVs and the energy-efficient requirement of power grid, the vehicle-to-home (V2H), vehicle-to-vehicle (V2V), and vehicle-to-grid (V2G) concepts have become more and more attractive in recent years and probably will turn into reality in the near future. Actually, V2H, V2V, and V2G enable GEVs to not only serve as a transportation tool but also to act as controllable loads and distributed sources for the power grid. So, GEVs can play positive roles in the home grid, the community grid, and even the distribution grid during the charging and/or discharging period.

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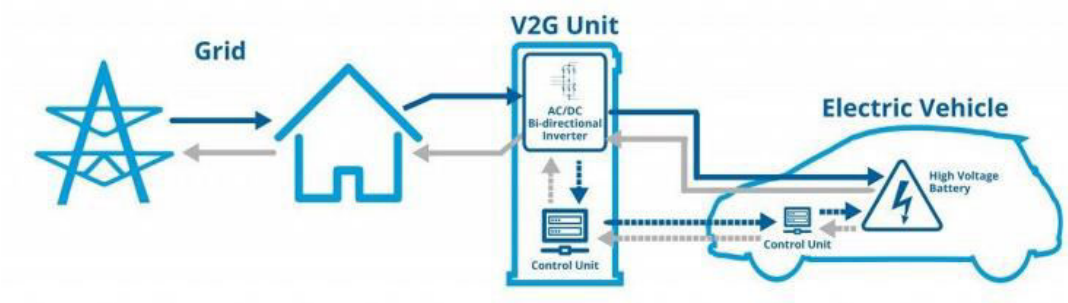
Meanwhile, the corresponding bidirectional charger can inject the reactive power into the grid with its capacitor. In the grid system, the reactive power support is so essential that the system can retrieve additional reactive power from the capacitive devices to support those inductive devices demanding high reactive power. All these characteristics form new technologies of V2H, V2V, and V2G. This proposed system investigates and discusses new technologies for GEVs connecting with the grid, namely, V2H, V2V, and V2G. The key is to present methodologies, approaches, and foresights of these emerging technologies, including frameworks, modeling, power electronics, battery technology, optimization strategies, and reactive power support, and information and communication technology. The rest of this paper is organized as follows. Section II will reveal the concepts of the V2H, V2V, and V2G technologies. This project investigates and discusses the wireless power transfer of electrical vehicle power to namely, the vehicle-to-home (V2H), vehicle-to-vehicle (V2V), and vehicle-to-grid (V2G) technologies.

II. EXISTING SYSTEM

A.VEHICLE-TO-GRID



The vehicle-to-grid (V2G) concept aims to optimise the way we transport, use and produce electricity by turning electric cars into ‘virtual power plants’. Under this relatively new concept, electric cars would store and dispatch electrical energy stored in networked vehicle batteries which together act as one collective battery fleet for ‘peak shaving’ (sending power back to the grid when demand is high) and ‘valley filling’ (charging at night when demand is low) .

V2G would allow consumers to charge electric vehicles and monitor their energy costs, using mobile devices. This information helps utilities to better manage grid loads during peak times. Pilot projects include applications for smartphones and a black box with cellular data modem collecting information on the car’s state of charge, the vehicle location and the type of power source it is connected to . Collected data is sent to the cloud where computers calculate, depending on the grid load, the optimal time to recharge .

When the electric utility would like to buy power from the V2G network, it holds an auction. The car owners or leasing companies would be able to define the parameters under which they will sell energy from their battery pack. This has led to the emergence of a new term ‘carbitrage’, a fusion of car and arbitrage, coined by the Rocky Mountain Institute in 2008 [10]. The roll out of a ‘fast recharge’ infrastructure is currently in nascent stages and would need to be extended further into nationwide systems to allow these projects to take off.

According to Peter Franken, head of the Energy Distribution department of EKZ in Switzerland, ‘electric vehicles can be used to buffer the irregular production of electricity from future renewable sources, which will contribute to the overall stability of the electrical network’

III. PROPSED SYSTEM

- ✓ V2H shows that the GEV can be connected to a home grid for charging and/or discharging by the onboard or off board bidirectional charger. Hence, the GEV is able to draw the energy from home or transfer its energy to home according to the control scheme.

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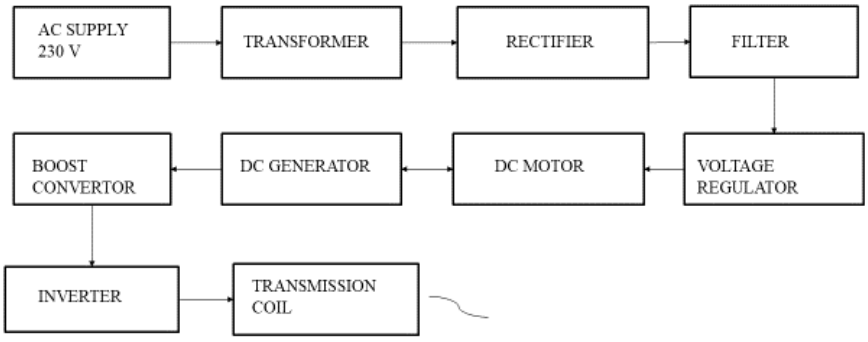
- ✓ V2V shows that GEVs can transfer their energy by bidirectional chargers through a local grid, and then distribute the energy among GEVs by a controller (generally called the aggregator). Classification of vehicles. responsible for collecting GEVs to make interaction among themselves, and also interacting with the grid for the energy request over V2V.

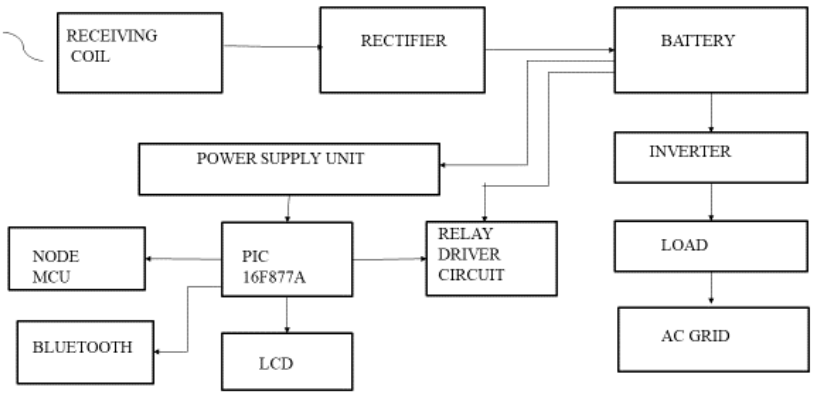
- ✓ V2G shows that GEVs can be connected to the power grid to obtain energy, as well as feed energy back to the grid. Since each GEV's energy is quite limited, the aggregator turns to the group GEVs for charging and/or discharging as well as for grid regulation.

IV.BLOCK DIAGRAM

A.TRANSMITTING UNIT



B.RECEIVING UNIT



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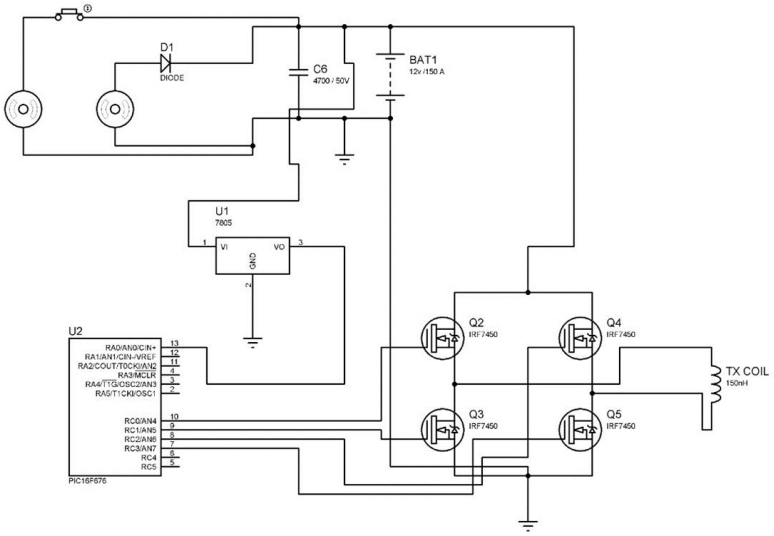
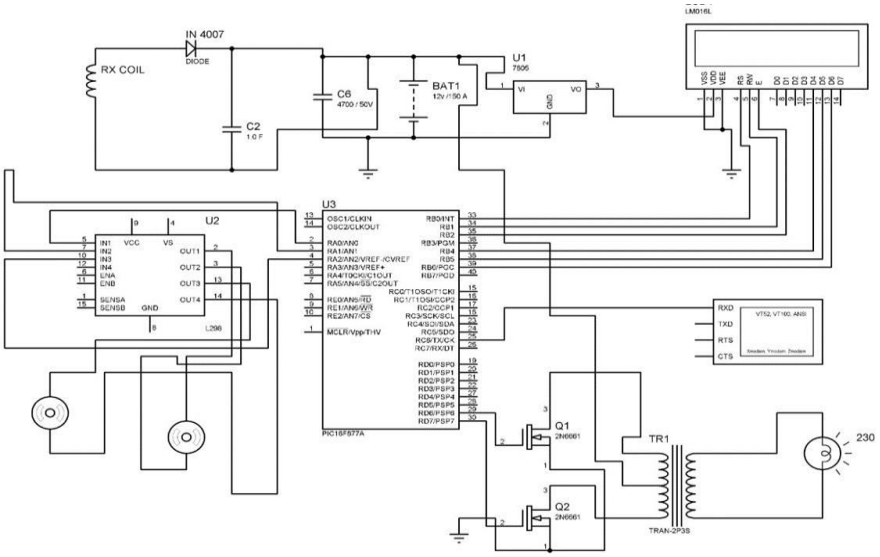
V. CIRCUIT DIAGRAM

A.TRANSMITTING UNIT



B.RECEIVING UNIT



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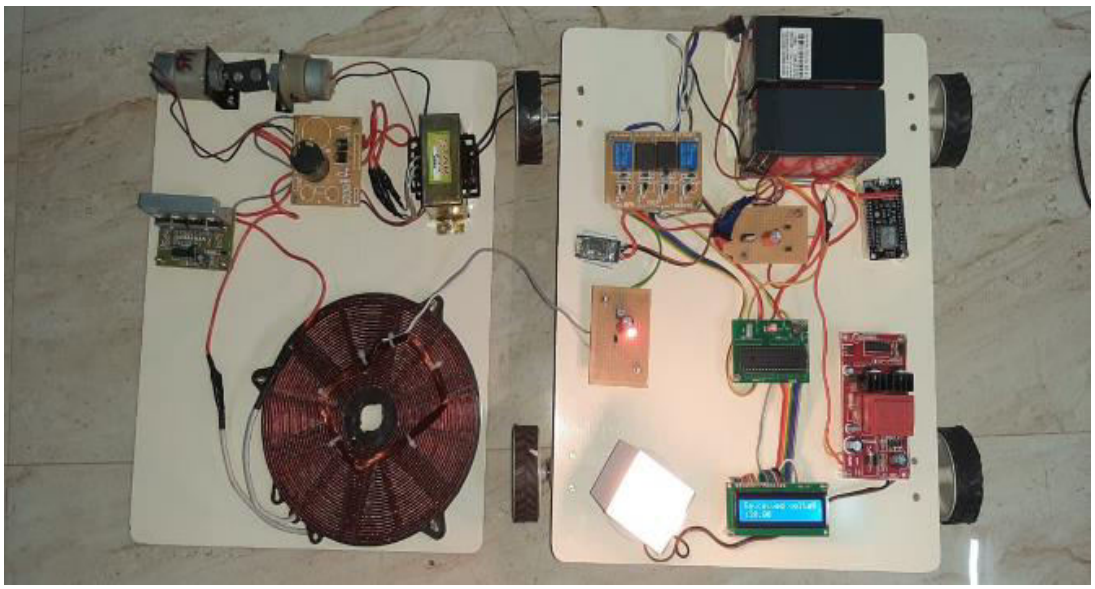
VI. ADVANTAGES

- ✓ Wireless transfer
- ✓ Electric vehicles are cheaper source of transportation for consumers as electricity price is lower than the fuel prices.
- ✓ It provides additional revenue to the owners of the vehicle
- ✓ Electric utility system also have advantages because it will get power from the vehicle during peak period times
- ✓ It reduces pollution by reducing the use of renewable sources
- ✓ The environment for V2G, V2H, and V2V can be houses, parking lots, employers working place and publicity available charging stations.
- ✓ Effective use of natural energy & self-sustainable living

VII. APPLICATIONS

- ✓ EV as an emergency power supply for home
- ✓ UPS Battery charger
- ✓ Dedicated GEV Charging
- ✓ Flexible power chargers within the the electric vehicles
- ✓ Provide the reactive power for the V2G grid system.

VIII. HARDWARE IMAGE



IX. CONCLUSION

The GEVs are one of the best ways to improve the environmental quality from fossil-fuel pollution. They also bring great challenges and opportunities to the power grid, which leads to the birth of V2H, V2V, and V2G. It has observed that, usage of V2G,V2H,V2V reduces the use of inefficient investment in conventional generation and promotes use of renewable sources.

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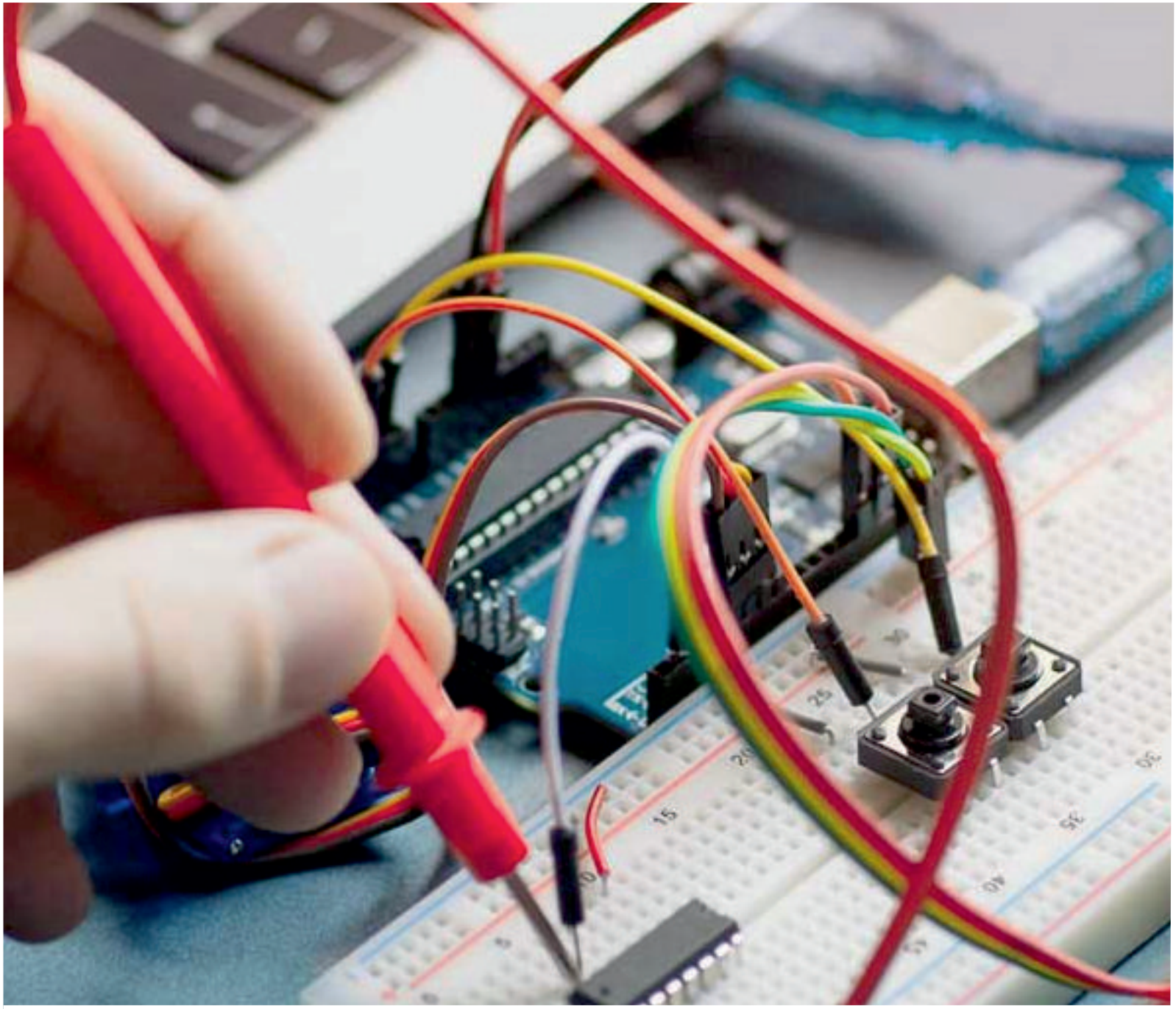

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