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Eco Friendly Bus Transportation System

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ABSTRACT: Nowadays conventional buses which run on fuel results in release of the harmful gases such as CO2 which leads to increase in environmental pollution, global warming, this also affect the health of human. In order to control the situation, we are proposing a method in which instead of using a fuel in buses we are developing electric bus. Electric vehicles offer superior energy efficiency while offering an enormous Potential for reducing CO2 emissions if the electricity is supplied from a renewable or nuclear source. This system aims at extending the wireless power transfer to the charging of moving electric vehicles. Inductive charging, also known as wireless charging, has found much successes and is now receiving increasing attention by virtue of its simplicity and efficiency. The most important structural difference between contactless transformers and conventional transformers is that the two “coils” in the former are separated by a large air gap. Recent improvements in semiconductor technology provide an opportunity to almost gratuitously improve on the system efficiency, because a higher operating frequency, in general, benefits the inductive energy transfer.

I.INTRODUCTION

We can charge the battery using two methods they are wired and wireless. Inductive charging, also known as wireless charging, has found much successes and is now receiving increasing attention by virtue of its simplicity and efficiency. The most important distinctive structural difference between contactless transformers and conventional transformers is that the two „coils‟ in the former are separated by a large air gap. Compared with plug and socket (i.e., conductive) charging, the primary advantage of the inductive charging approach is that the system can work with no exposed conductors, no interlocks and no connectors, allowing the system to work with far lower risk of electric shock hazards. As the charging system is often fully enclosed, wireless charging can be realized in waterproof packages and as such, wireless charging is rechargeable devices need to be frequently used near or even under water as well as in humid conditions. Broad application of wireless inductive-coupled contactless energy transfer systems is stymied by their fast-declining efficiency performance as a function of wireless relative energy transfer distance. This relative measure is defined as the actual energy transfer distance divided by the radius of the wireless inductive energy transfer system. However, recent improvements in semiconductor technology provide an opportunity to almost gratuitously improve on the system efficiency, because a higher operating frequency, in general, benefits the inductive energy transfer. Applications, e.g., wireless charging of electrical vehicles by means of a magnetic coil in the road surface, thus become feasible and slowly become ready for a market introduction. The success of this program may prove to be a very significant step forward towards the possibility of unlimited range electric mobility. By extending the range of electric vehicles, this project will contribute to overcoming a critical limitation of existing electrical vehicles, by offering range at competitive costs. Physical separation between the primary and secondary windings incurs proximity-effect winding losses.

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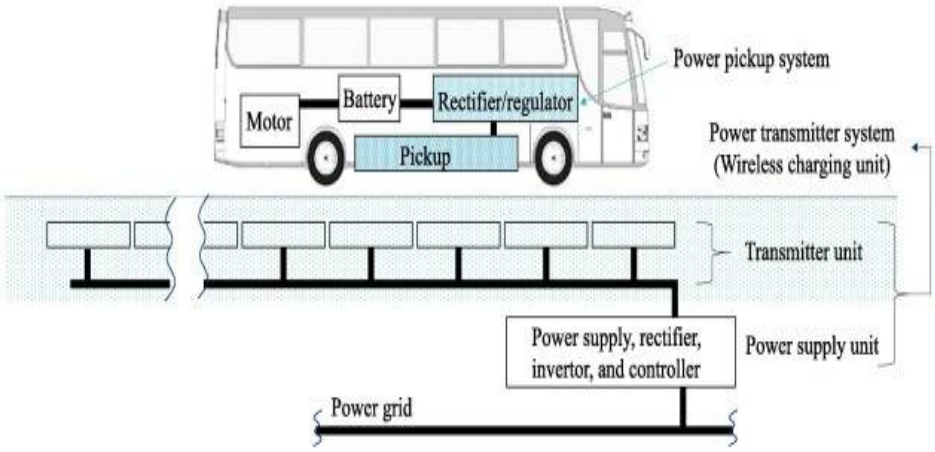

Poor coupling can result in poor transmission performance and low efficiency. Due to the large air gap between the primary and secondary windings, contactless transformers have large leakage inductances, small mutual inductance and low efficiency. Compared to direct contact charging, inductive charging efficiency is lower and resistive heating is.

II. LITERATURE SURVEY

The buses which are in market operate on petrol or diesel. This bus generates pollution as well as gases which are harmful for human health. Solution for this china developed a BYD electric bus in which operate on battery for fully charged battery we require 6 amp for 5 hours. The BYD electric bus or BYD Ebus called K9 in China, is an all-electric bus model manufactured by BYD powered with its self-developed Iron-phosphate battery, allegedly featuring the longest drive range of 250 km (155 miles) on one single charge under urban road conditions. BYD electric bus rolled off line on September 30, 2010 in Changsha city of Hunan province. This pure electric bus is another renewable energy vehicle by BYD following its models like F3DM, F6DM and e6.
The K9 has following specification:

1) Electric power consumption: less than 100kWh/60mins
2) Acceleration: 0–50 km/h in 20s
3) Top speed: 96 km/h
4) Normal charge: 6h for full charge
5) Fast charge: 3h for full charge
6) Overnight charging: 60 kW Max. power to fully charge the bus within 5h
7) Range: 155 miles (249 km) (186 miles (299 km) according to some reports)
8) Length*Width*Height:

   12,000mm*2,550mm*3,200mm
9) Standard seats: 31+1 (31 for passengers and 1 for driver)
10) Weight: 18,000 kg [3]

There are several open questions related to electric bus systems as a whole, charging vehicles, and on the vehicle level feasibility of various electric bus technologies, their overall performance and economic impacts. The Ebus public

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private partnership was started in the fall of 2011 to answer part of these questions by testing several electric bus models and gaining practical experiences.

III. PROPOSED SYSTEM WITH WORKING PRINCIPLE

The block diagram is divided into two parts: -
1. Bus Stop Unit
2. Bus Unit

At bus stop unit, the bus verification unit identifies the bus by sending the bus info to controller. Then the controller switches ON the relay through relay driver circuit.

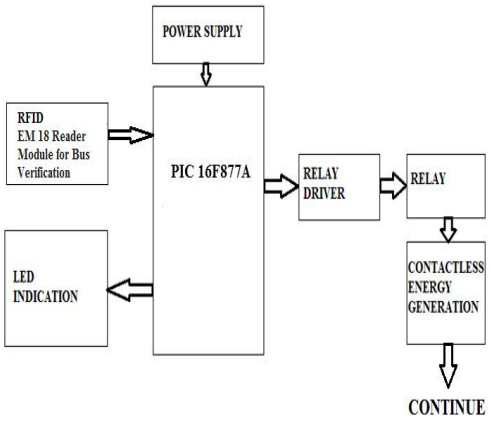

Fig2. Bus stop unit

Then the relay activates "contactless power generation circuit" through inductive coupling where the battery gets charged. The current status of the battery is displayed on LCD. In bus unit, it consists of wireless zone receiving circuit, through which charging of the battery is done. At first the moderator unlocks the system by entering the password. Then the RFID tag is identified by the RFID reader and it is processed by the microcontroller. Here it also shows the status of the bus.

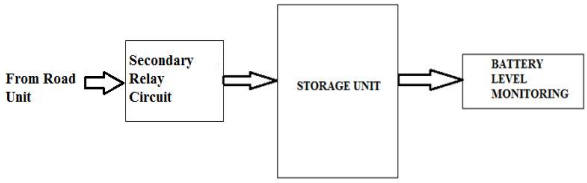

Fig3. Bus unit

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IV. SPECIFICATIONS OF HARDWARE

The following are the important elements in the block diagram:

1) Microcontroller:
The signals from EM Transponder are given to the Microcontroller. Microcontroller processes all these signals and gives data to LCD display.

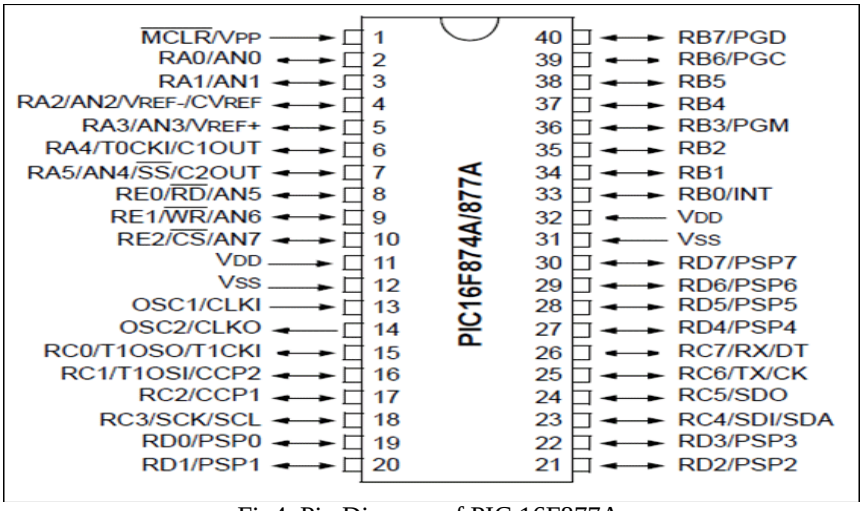

Fig4. Pin Diagram of PIC 16F877A

2) EM 18 reader:
When EM transponders come in the range of EM reader it will read the unique id number.

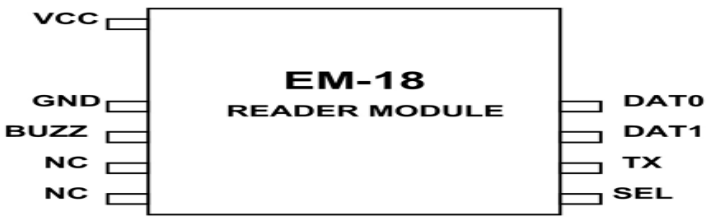

Fig5. EM 18 Reader module pin diagram

Features: -

1) Fully-integrated, low-cost method of reading passive RFID transponder tags.
2) Single-wire, 2400 baud Serial TTL interface to PC, BASIC Stamp and other processors.
3) Requires single +5VDC supply.
4) Bi-colour LED for visual indication of activity.

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There are two types of RFID tags:

i) Active RFID
Identification system in which tags have their own power source (usually a battery), enabling them to broadcast an identifying signal. This extends the range of the tags and the capability for communicating advanced information such as location.

ii) Passive RFID
Identification system, in which the tags are not powered, is relying on active signals from the location transmitters for their response. This limits the range of the tags to a few feet.

3) LCD display
It is used for the displaying the information.

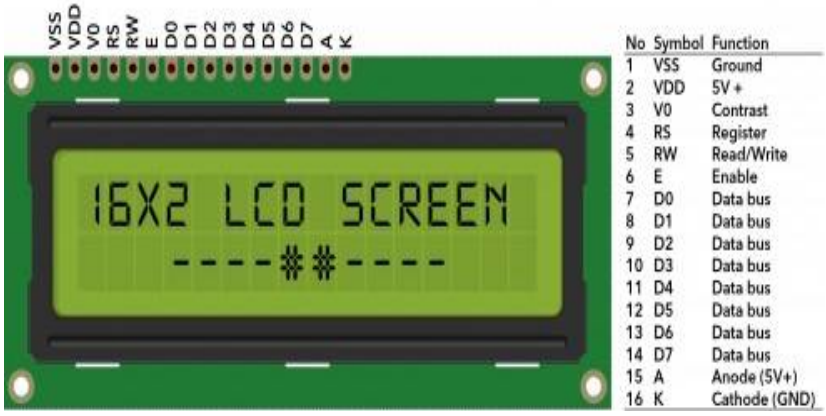

Fig6. LCD Display 16x2

4) Relay
It is used to drive AC/DC Load & also used for auto switching purpose.

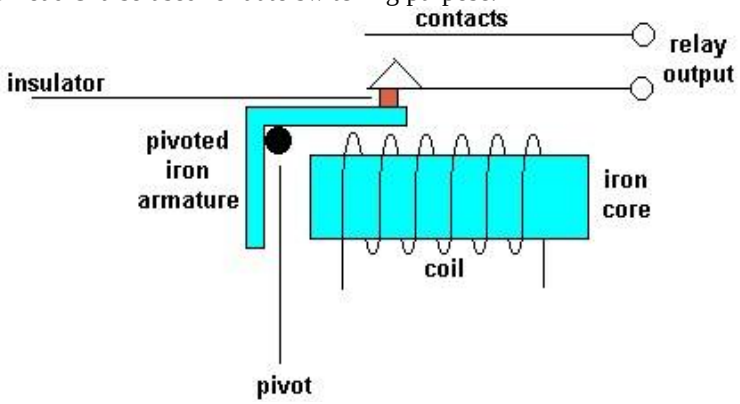

Fig7. Relay Circuit

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V. RESULT AND DISCUSSION

5) Battery

A battery is a device that converts chemical energy directly to electrical energy. There are two types of batteries: primary batteries (disposable batteries), which are designed to be used once and discarded, and secondary batteries (rechargeable batteries), which are designed to be recharged and used multiple times.

There are several types of batteries available in the market such as:

Lithium ion, Lead Acid, Nickel Metal Hydride, Fuel cell batteries, Zinc-air, Lithium Polymer, etc.

From above types of batteries lead acid battery is most efficient and maintenance less battery whichfalls into the category of rechargeable batteries.

Lead acid battery is most suitable battery for this project.

Features of lead acid battery: -

- It does not require any maintenance
- About 97% of lead can be recycled and reused in new batteries
- It offers slow self-discharge, which is lowest among rechargeable batteries
- It offers good performance at low and high temperature.
- It is best in terms of reliability and working capabilities
- It offers longest life cycle.
- Simple to manufacture, low cost per watt hour

Fig8. Rechargeable battery

6) Transformer:

A transformer is used to step down input AC supply of 230V to 12 V for Supplying to PIC Microcontroller via +5V DC voltage regulator in power supply.

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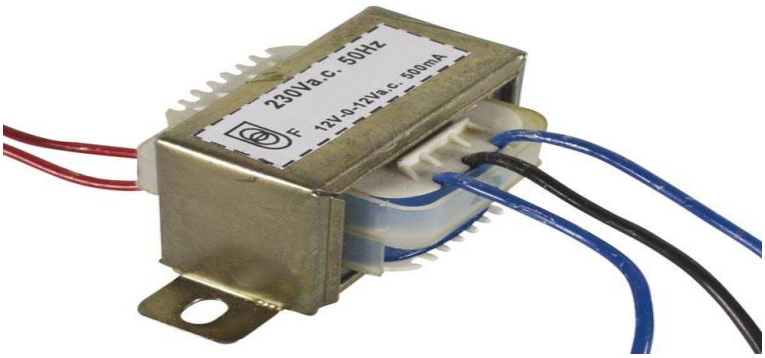

Fig9. Step Down Transformer 230/12V

Advantages: -

- Pollution free bus provides quiet and smooth operation. There is absolutely no noise like those cars who runs on gasoline or petrol.
- Pollution free bus has automatic transmission, which makes them very convenient for a city ride, which is mostly stop-and-go.
- Very less maintenance is required.
- Fast charging facility to ensure reliable operation

Disadvantages: -

- Power Supply is needed at the bus stop and depo sectors for charging.
- Cost of Capital investment is high.
- Safety provision is strictly required to ensure clean and safe operation of Ebus.
- During maintenance shutdown of power supply is required

VI. APPLICATIONS

1) Navi Mumbai Municipal Transport (NMMT) has placed an order with Volvo to procure 8400 Hybrid City Bus. Volvo has delivered 5 buses under this contract to NMMT.

2) Mumbai Metropolitan Region Development Authority (MMRDA) is procuring 25 Hybrid buses from Tata Motors. Tata Star bus Diesel Series Hybrid Electric Bus can run without the requirement of external charging infrastructures, due to integration of on- board charging, via a BSIV compliant engine & energy storage through advanced Lithium Ion Nano-Phosphate Batteries.

3)BEST Mumbai has received funding for the retro-fitment of 6 buses and procurement of 30-seater six electric busses with a range of 210 km. BEST has placed an order for retro-fitment with AV Motors and Impact Automotive Solutions Limited (a subsidiary of KPIT) with a grant of ₹ 100 million from the Brihanmumbai Municipal Corporation (BMC). Further, the corporation has placed an order with BYD-Goldstone and will be used the buses as feeder services to the train and metro stations

4) Himachal Road Transport Corporation has received sanction from DHI to produce 25 full electric 6-seater busses. The corporation has recently conducted 10 days trial of midi electric bus in Manali-Rohtang pass and is quite convinced with electric bus technology at such high altitude of 13,000ft. The state has also granted exemption from token tax, registration charges and value-added tax on all electric vehicles for five years to promote eco-friendly transport services in the state.

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5) Bangalore Metropolitan Transport Corporation's (BMTC) has also submitted proposal with DHI to procure 150 electric buses on PPP model. BMTC has proposed to set up an exclusive depot for the electric buses with the required infrastructure, which would include battery rechargeable points and well-equipped workshops.

6) Thane Municipal Transport (TMT) has approved the plan to introduce 100 electric buses on PPP model. The private operator will purchase and operate these buses for 10 year on selected routes. The operator will have the first right to select the routes. TMT banner and the ticket rates will be the same as approved by the Metropolitan Transport Authority.

VII. CONCLUSION

We are trying to develop wireless charging system which is having the RFID authentication for the moving vehicle using inductive coupling principle. This will reduce emissionof harmful gases such as CO2 or SO2 that are produced by the fuel vehicles.

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