Wireless Chargeable Bus

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Abstract-*Today we are facing the problem of fuel crisis because conventional buses which runs on fuel, results in release of the harmful gases like co2 which leads to increase in environmental pollution such as global warming, also this affects the health of human being. This fuel which is used in buses is non-renewable source of energy and goes on decreasing day by day. For controlling the situation we are proposing a method in which instead of using fuel in buses we are developing an electric bus. This is eco-friendly bus and uses renewable source of energy. Electric vehicle offers higher efficiency than existing technology & also helps in reducing co2 emissions. This system aims at extending the wireless power transfer to charging of moving electric vehicles. We have also introduced BRT bus indication unit i.e. signaling system and verification system. For detection purpose of the bus, RFID technology is used.*

Keywords-Eco-friendly bus, moving electric vehicles verification system, RFID technology.

I. INTRODUCTION

The goal of this project is to develop a real time system to reduce pollution caused due to the fuel requirements in a bus. To reduce this problem we are using renewable source of energy utilizing the solar power using solar panel in our project.

This project aims at the possibility of charging the electric vehicles wirelessly. The success of this program may prove to be a very significant step forward towards the possibility of unlimited range electric mobility.

By expanding the range of electric vehicles, this project will contribute to overcoming a critical limitation of existing electrical vehicles, by offering range at competitive costs.

We can charge the battery using two methods they are wired and wireless. Inductive charging, is also called as wireless charging & it gives much successes and is now receiving increasing attention by virtue of its simplicity and efficiency.

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.

II. PROPOSED BLOCK DIAGRAM OF SYSTEM

In this system we have two different sections that is “bus stop unit” & “charging unit”. We used RFID technology to detect the bus. Once the Bus is detected we charge the bus using wireless inductive charging. When the bus moves it is automatically detected & charging stop.

2.1 Bus Stop Unit:

The block diagram of bus stop unit as well as charging unit is mentioned above .When bus comes at the BRT stop, at that time the RFID tag which is placed on the bus is automatically scan by RFID reader which placed at charging unit. The unique ID is fed to the reader by the tag. The reader identifies each tag only by its unique ID.

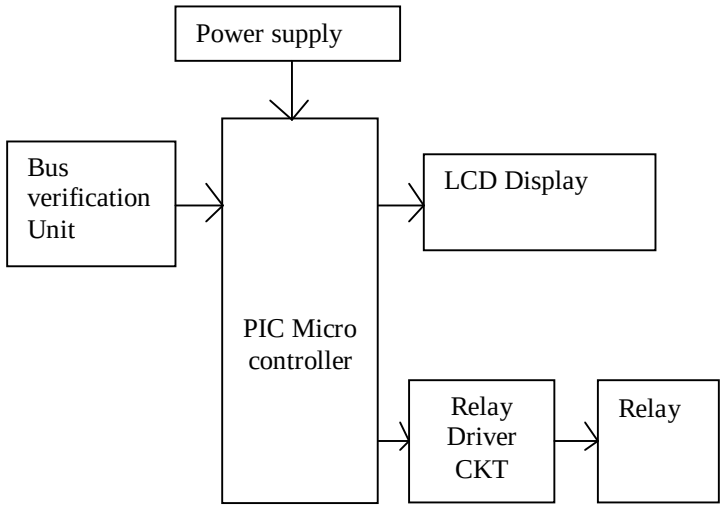

Fig 1: Block Diagram of Bus Stop Unit

This pair of RFID tag and reader makes the bus verification unit. Its sole purpose is to check the authenticity of the bus. When a bus is authenticated the verification unit sends a signal to the controller that the bus is verified and detected. We have used a PIC16F controller. Microcontroller then initiates the charging by operating a relay. The relay is controlled by a relay driver circuit. Relay acts as a switch to starts charging of bus unit. The LCD is used to display the status of bus as verified or not on the bus stop unit. The bus stop unit also has a keypad to manually verify a bus in case the system faces some problem.

2.2 Bus Unit:

The charging unit is mounted on bus. The charging unit has the following blocks Battery, charging level indicator, wireless zone detection circuit. The charging level indicator shows the current percentage of battery remaining. For use of solar power we can use solar panel which is also supported by this system.

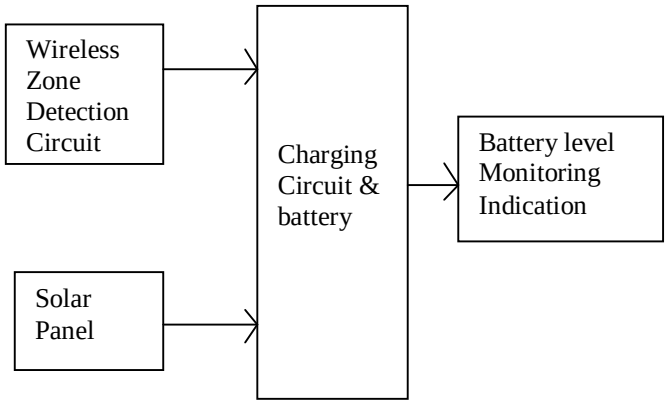

Fig 2: Block Diagram of Bus Unit

2.3 RFID Reader:

There are two RFID reader used , first is used for the scanning of BRT BUS at bus stop no.1 and second reader for bus stop no.2.

Radio Frequency Identification (RFID) Card Reader gives a low-cost method to read passive RFID transponder tags up to 2 inches distance. The RFID Card Readers can be used in a wide variety of hobbyist and commercial applications, including access control, automatic identification, robotics navigation, inventory tracking, payment systems, and car immobilization. The RFID card reader read the RFID tag in range and outputs unique identification code of the tag at baud rate of 9600. The data from RFID reader can be interfaced to be read by microcontroller or PC.

2.4 RFID Tag:

The BRT buses are tagged with the RFID tags. All the information related BRT bus are stored in cards. An electronic identification device that is made up of a chip and antenna. it is typically embedded in a plastic housing, and for tracking shipments, it is usually part of a "smart" packaging label.

There are two types of RFID:

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

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

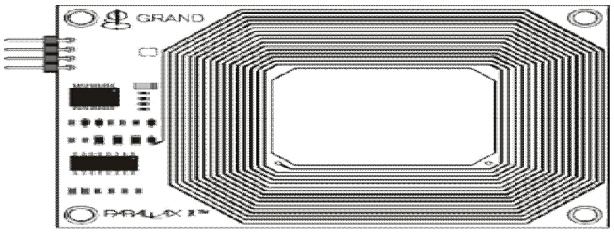

Fig 3: RFID Tag

III. FLOWCHART

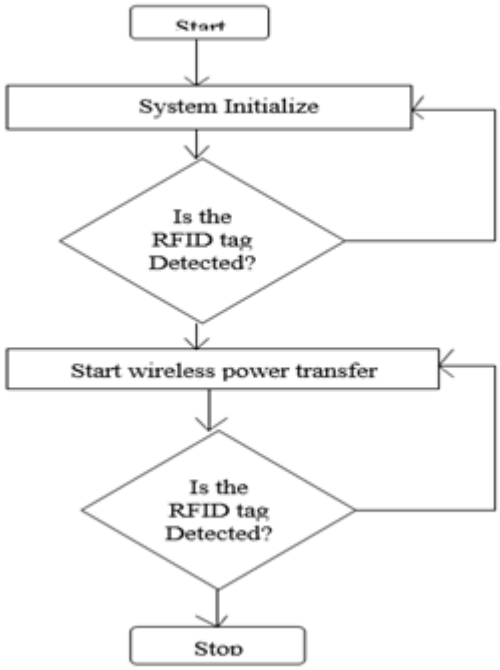

Fig 4: Flow Chart

IV. ADVANTAGES

- More convenient.
- No manual charging or recharging of batteries.
- Eliminate unsightly, unwieldy and costly power cords.
- More reliable.
- Never run out of battery power.

V. APPLICATIONS

- Automatic wireless charging for future hybrid and all electric passenger and commercial vehicles, at home, in parking garages, at feet depots and at remote kiosks.
- automatic wireless charging & Direct wireless power interconnections for medical devices (ventricular assist devices, pacemaker, defibrillator)
- Automatic wireless charging and for high tech military systems (battery powered mobile devices, convert, unmanned mobile robots and aircraft.)
- Direct wireless powering and automatic wireless charging of smart cards.

VI. RESULTS

First of all, when power supply is turned ON, the LCD shows the text 'Smart Bus'. Initially when bus is not on the bus stop unit, it is not starting the power transfer. When the RFID tag is detected by the RFID reader, instantly power transfer takes place from bus stop unit to the bus.

When power is received by the bus by using inductive coil, it is displaying the amount of voltage receiving by that coil by using the voltage divider circuit and Led's. The power transmission is continuous for 1 minute when the RFID tag is detected. After 1 minute power transmission is getting OFF automatically. But the power transfer from the bus depo unit is continuous always.

When the distance between the two inductive coil's i.e. primary winding coil and secondary winding coil is minimum, the power transmission is maximum. But when the distance is increased between the coils, the receiving power is decreased.

Fig.5: Actual pictures of the hardware

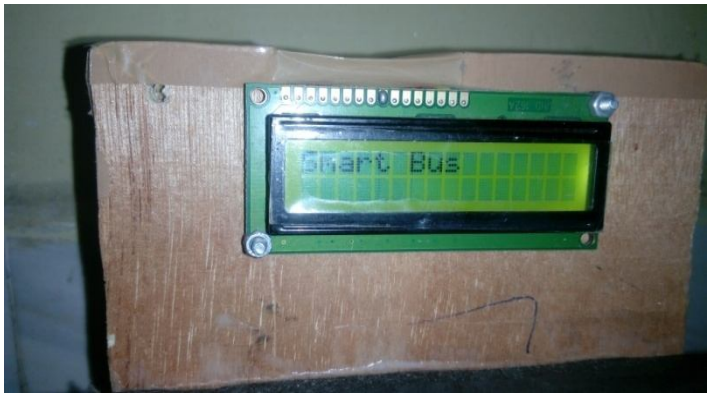

Fig 6: Actual Pictures of hardware parts

Fig 7: Actual Pictures of hardware part

VII. CONCLUSION

In this project we can conclude that we have developed an eco-friendly bus which will run on a renewable energy source solar energy, which would be environmental friendly. We design and build a system capable of charging eco-friendly bus without any contact media. When the receiving coil is having the more distance from the transmitting coil then the received power is less as compared to transmitted power. Power cannot be transmitted on 50/60 Hz. Frequency. Hence we require a very high frequency

transformer to transmit the wireless power. It is very reliable system because it requires very less power supply. It is a pollution free bus system.

REFERENCES

[1] N. Shinohara, "Wireless Power Transmission for Solar Power Satellite (SPS)" Space Solar Power Workshop, Georgia Institute of Technology, January 14 2012.

[2] Ken-ichiro Maki, Masashi Takahashi et al, "Microwave Characteristics of a Wireless Power Transmission Panel toward the Orbital Experiment of a Solar Power Satellite" IEEE MTT-S International Microwave Workshop Series, Kyoto, Japan, May 10-11, 2012.

[3] K. M. R. Sudeep Dogra, "Radio frequency identification (RFID) applications: A brief introduction, advanced engineering in-formatics." The IUP journal of Electrical and Electronics Engineering, 2011, p. 3.

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