Design of Shaped Magnetic Resonance based Contact Less Power Transfer Systems

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Abstract— **Power is an important concern for working the electric vehicles. In which transferring the power through wired medium is associated with some drawbacks such as it provides limited options for recharging and it required long hour charging time. In Order to overcome this problem wireless power transfer system has been proposed. This system uses the Magnetic coil to transfer the power wirelessly between Road and electric-vehicles. By using wireless power transfer system for charging the electric vehicles is a safe and convenient method as compared to plugging in the vehicles into an external power outlet. At the same time a system allows only an authorized vehicle to charge their batteries with the help of Radio-Frequency-Identification Tags and also the Environmental condition are classified with the help of Random Forest Algorithm.**

Keywords: Magnetic coil, Light Dependent Resistance (LDR), RFID tag.

I. INTRODUCTION

Now a day, a demand for electric vehicles are increased rapidly in the vehicle Environment. In a electrical vehicle, transferring of power plays a vital role to charge the batteries present in a vehicle But in an Earlier days wired based power transfer system [1] are used to charge the batteries, hence it required long time to charge the batteries. And also in our present wired based electrical system, large amount of powers are losses. When a powers are transmitted from a power grid to consumer. One of the alternative methods to overcome this problem by wireless power transfer system [2].In these system magnetic coils are used to transfer a power wirelessly between roads and electric vehicles

Where a super magnetic conductor plates are used to protect the coils from damage. In our method power supplies are given to coil with the help of road side power grids and a magnetic flux are produced. And these fluxes are absorbed by electric vehicles to charge their batteries. Whereas this system allows only an authorized vehicle to charge their batteries with a help of Radio Frequency Identification tags which it's checked by RFID reader to avoid the Un-authorized vehicles. At the same time a particular location conditions are classified with a help of Random Forest Algorithm. By using of this algorithm particular environmental information can be intimate to a user when he/she enters into a particular location. Where a Random forest algorithms are used for classification and Regressive purpose .In which an accurate environmental condition are classified than the Support Vector Machine Algorithm [3].In a SVM method marginal hyper plane lines are used to classify the tested and Trained data's. But in a

Random Forest Algorithm a tree's are grown with a leaf node. And it satisfies the condition only when a tested data are matched with trained data. Then immediately growths of trees are terminated. In this paper we describe the design and implementation of a wireless power transfer system for vehicles. In section II we explain the basic proposed system operations. In section III we explains the hardware requirements details .In section IV we describes the simulation result and the conclusions are provided in section V.

II. PROPOSED SYSTEM

A. Overall Block diagram

Fig 1 shows a transmitter section diagram. Here power supply is given to the magnetic coil present in the Road Section Due to the power supply a magnetic flux is produced and it's absorbed by a Receiver coil placed at a car section. At a same time, this system allows only an Authorized vehicle to charge their batteries present in the vehicles. In which Separate RFID tags are given to all the Authorized Person. When an Authorized vehicles are arrived then immediately RFID reader present in the Road section are check this Tags. If the Tags are matched with RFID reader .then a power supplies are given to the Magnetic coil present in a Road condition with the help of PIC microcontroller
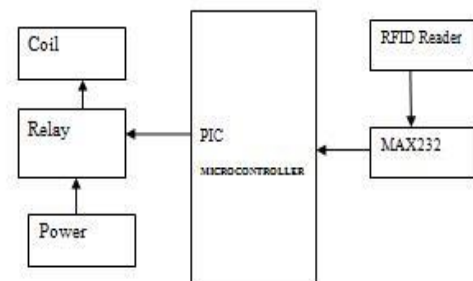

Fig. 1 Transmitter Section

Fig. 2 shows the car section diagram. In which Environmental condition are intimated to an user before he/she enter into the Particular Environmental Location .If there is any abnormal conditions are found in the Environmental. Then a Buzzer has been activated with the

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help of microcontroller. Otherwise the normal conditions are intimated to user with the help of LCD display.
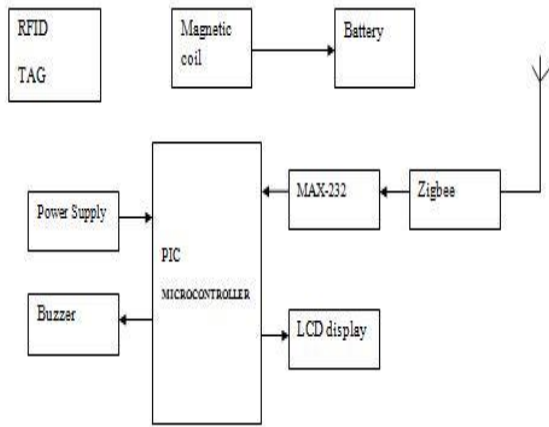

Fig. 2 Receiver Section

Fig. 3 shows the particular Environmental condition. In which environmental condition are classified with the help of LDR sensor and Humidity sensor .this values are sends to user with the help of Zigbee transmitter. In these system environmental conditions are classified with the help of Random forest Algorithm
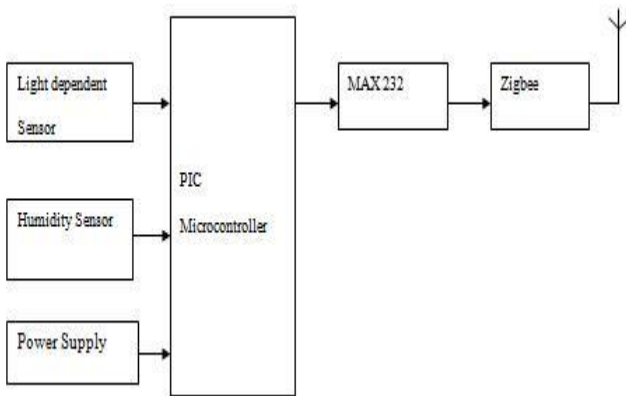

Fig. 3 Environmental condition classification

B. Random Forest Algorithm

Random Forest is an ensemble method used for classification purpose. And it is used to construct many decision trees. By using this random forest algorithm a required output is obtained. Ensemble Method is used to learn the Multiple Algorithm to obtain the better predictive performance. Since Decision tree is used to obtain a target output variable from a several inputs.

1). Algorithm:

The Random Forest algorithm is as follows:

1. Draw n_{tree} for the Tested data

2. From each Testing samples, an Un-pruned classification or regression tree, is grows. With a leaf nodes. When a Tested node is matches with the Training Database node. Then a growth of the tree is terminated.

3. Otherwise a tree is grows for M_{try} samples to obtain the required output.

2). Mathematical Expression:

The give algorithm is also expressed in a mathematical Equation to calculate the Accuracy value

For the given Training data

$$D_n = \{X_i, Y_i\}_{i=1} \quad \text{-------------------} \quad \text{Eqn. 1}$$

To calculate the Neighborhood node

$$Y = \sum_{i=1}^{n} W_i(X) Y_i \quad \text{--------------} \quad \text{Eqn. 2}$$

Then an Accurate Output is obtained by:

$$F(x) = \sum_{i=1}^{n} (i/m \sum_{m=1} W_i m(X)) Y(i) \quad \text{---Eqn. 3}$$

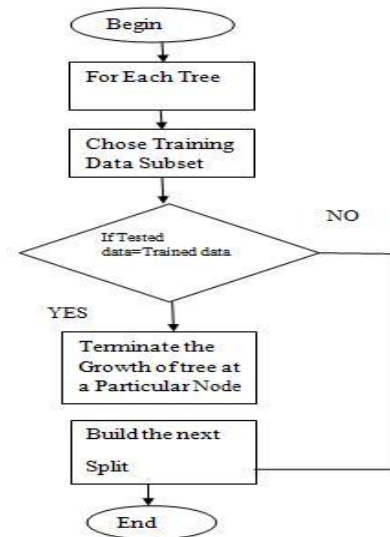Fig. 4 shows a flowchart diagram for Random Forest

Fig. 4 Flowchart for Random Forest Algorithm

Here tested data is taken from the Humidity and Light Dependent Resistance sensor from these tested values the Tree has been constructed with the Neighborhood nodes. If the tested values are matched with the Data

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base value then required output is classified. If once output is obtained then algorithm starts to terminate the growth of Tree. Otherwise it builds the next split to obtain the Required Classified output. Random forest algorithms' are used for Classification and Regression purpose. In addition to this classification is used to categories the variable and Regression is used for continuous the variable.

III HARDWARE REQUIREMENTS

A. *PIC 16f8779*

PIC16F877A is an 8-bit microcontroller based on CMOS FLASH and has 44-pins. It has 256 bytes of EEPROM, 368 bytes of RAM, 8 channel 10-bitAnalog-to-Digital converters, two capture/compare/PWM, Serial Peripheral Interface SPI, I2C, two 8-bit timers, two Comparators, single 16-bit timer and a Universal Asynchronous Receiver Transmitter (USART). The operating voltage ranges from 3v to 5.5v.

B. *Light Dependent Resistance*

LDR is a component that has a resistance that changes with the light intensity that falls upon it. A LDR is a resistor whose resistance decreases with increasing incident light intensity's photo resistor is made of a high resistance semiconductor.

C. *Humidity Sensor*

Humidity sensor is used to determine amount of water vapour present in an atmosphere. It's more important to sense the humidity factors present in Industries. The most common units of humidity sensors are Relative Humidity and Absolute Humidity. Where Relative Humidity is a ratio of Partial pressure of water vapour present in a gas and Absolute humidity is a ratio of the mass of water vapour in air to the Volume of Air.

D. *RFID*

Radio Frequency Identification is a wireless Non-Contact use of Radio Frequency Electromagnetic fields to transfer data, for identification purpose RFID contains a tags which its attached to the object. It's classified into two types they are Active Tags and Passive Tags. In Active Tag has an on-Board Battery to store an ID –signals. But in Passive tag is cheap because it does not contain battery to periodically receive the ID –signals

$$\alpha + \beta = \chi. \qquad (1) \qquad (1)$$

E. *Magnetic coil*

An Electromagnetic coil is an Electrical conductor such as a wire in the shape of a coil, spiral or helical. In the magnetic coil a magnetic field is produced at the center of the loop of a coil. When the current is passed through the magnetic coil an induced EMF is produced at a interior design of a coil.

F. *Zigbee IEEE 802.15.4*

Zigbee is a communication protocol which is used to create Personal Area Network. It consumes low power and transmission ranges between 10-100 meters Line Of Sight (LOS). It has data rate of 256 Kbps, long battery life time, secure networking and widely used in low data rate applications. Zigbee chip has integrated microcontroller, radio and flash memory (256 KB). It operates in 2.4 GHz band. XBEE-PRO S2 is an widely used Zigbee device. It is a RF modem which has integrated chip antenna. It has 22 pins and 132 GPIO (General Purpose Input and Output).

G. *LCD:*

Liquid Crystal Display is the type of super thin display used in digital watches and many portable computers. This image on an LCD screen is created by sandwiching an electrically reactive substance between two electrodes. It is having Low Power Consumption than LED. It is powered with +5v. Display colour is gray for LM016L and New-gray for LM016XMBL. Display area size is 61(Width) x 15.8(Height) mm and character size is 2.96(Width) x 4.86(Height) mm.

H. *MAX232*

Max232 is an IC, which converts signals from an RS232 serial port into TTL compatible digital logic circuits. Where TTL signals are only used by PIC microcontrollers transmit and receive the signal. Max232 is dual driver/Receiver and typically converts the RX, TX, CTS and RTS signals.

IV SIMULATION

In Phase -1 result Environmental condition has been intimated to user before he/she enters into the particular location. In which the environmental condition has been classified by two sensors they are Humidity sensor and Light dependent resistance (LDR) sensor. Humidity sensors are used to measure the moisture condition.

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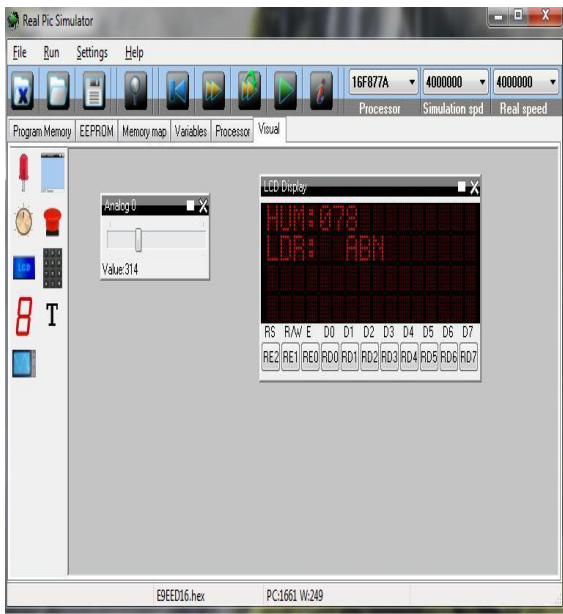
III.   USING THE TEMPLATE

Fig. 5 Required Outputs for Humidity Sensor

In Which Humidity sensor sends a sensed value to user with the help of LCD display. In this RE0-RE2 port are act as an output .and sensed analog values are converted into Digital value in which UART is act as a wireless medium Zigbee. It's used to transmit the required output to User. And also LDR sensor are used to classify the environmental conditions shown in Fig.6

Fig. 6 Required Outputs for LDR Sensor

Fig.6 shows environmental conditions are intimated to user with the help of LDR sensor. In this RD0-RD7 act as output port. In this, Button is used in the case of LDR sensor When any obstruct has been introduced, then LDR sensor observes this signals and it sends to user with the help of LCD display shown in Fig 7.
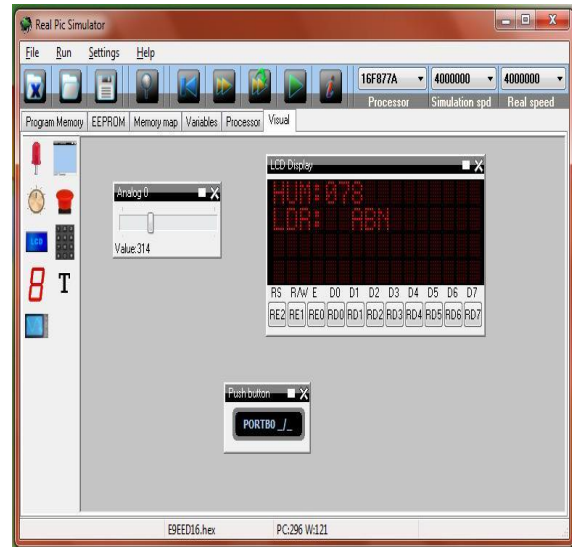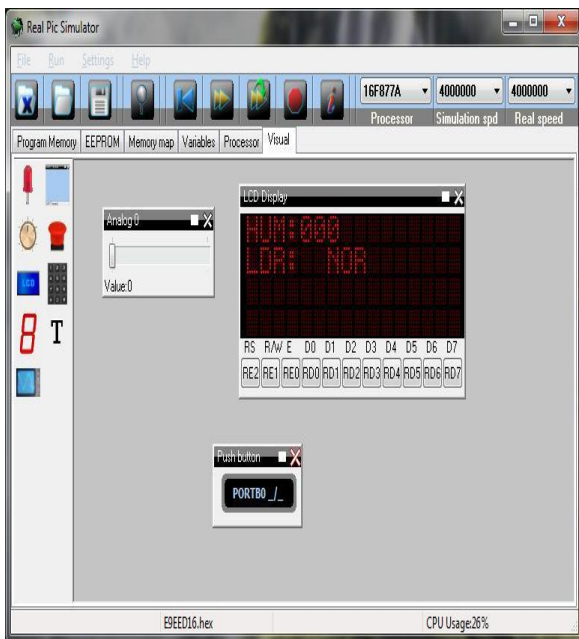

Fig 7 Required outputs for LDR sensor

V.CONCLUSION

Thus, the life time of the batteries are increased with the help of Charging the batteries under the principle of Wireless power transfer system .and also the Environmental condition is Monitored with the help of Random Forest Algorithm Whereas, Road condition is monitored before the Users enter into the Particular location and at the same time Authorized person only can Charge their Batteries with the help of Wireless power transfer System.

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