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POSITION TRACKING SYSTEM OF EVERYDAY OBJECTS FOR ALZHEIMER PATIENTS AND OLD AGE HOMES

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***Abstract*— The position tracking of everyday objects for Alzheimer patients & old age homes is a system which will track the lost objects of Alzheimer patients and elderly people. This system uses RFID technology for the detection of their lost objects. All the object sensors and object indicators are interfaced to Peripheral interface control (PIC) Microcontroller to which RFID Scanner is also connected. Microcontroller is used to control all the blocks of this system.**

All the hardware system is connected to an Android (OS) mobile phone with the help of Bluetooth module. This system is able to display exact location of the lost object on a display device (Here we're using Android device).

***Keywords:* RFID, RF transceiver, Bluetooth module**

I. INTRODUCTION

GPS seems to be the best solution to develop outdoor location systems, but performance of these systems is not good enough to locate entities within indoor environments, mainly if accuracy and precision are required. The development of outdoor location systems seems to be solved using GPS systems. However, regarding indoor environments, the accuracy and precision of GPS is not enough to satisfy the necessity of indoor location [2].

Daily life support work in a care house for Alzheimer patients and elderly persons is a promising application of indicator for every object. Although it may be a simple and well-ordered environment for human beings, it is too complex to recognize changes for a conventional self-contained autonomous robot equipped with as many sensors as possible within its limited body. We will not be able to expect a capable robot to execute various tasks in the everyday environment in the near future.

To overcome these limitations new system "Position Tracking of Everyday Objects for Alzheimer Patients and Old Age Homes" is developed.

In this system user (which will be patients and elder persons in this case) will be able to find their lost object on a display device.

Inside many application of advanced service robotics, elderly care is one of the most promising ones. Elder people tend to forget the things where they have kept. One of the most demanding tasks by the user will be to find the objects and go and fetch the objects as their need. In case of people with special memory loss problems such as Alzheimer patients, the special task is retrieval of commodities; the people forget the location of the object at some point in time. Finding these forgotten objects is a challenging task for such people. This system will sort out this type of problem and can provide information about the possible positions of the object [2].

II. LITERATURE SURVEY

Andreas Scalera et al. presented *"Enhancing WSN-based Indoor Positioning and Tracking through RFID Technology"* In this system numbers 0 to19 indicate the IDs of the objects. In that experiment they moved objects from one to another. The ratio of colors in each bar graph indicates the probability that an object is related to each position in the environment. Each position has its own color. The color corresponding to the person is white. In this system the uncertainty is high for objects OBJ0 to OBJ3. The robot checks the ID of the object located at P3 [1]. This paper discussed performance of a hybrid wireless system for tracking people and objects in indoor scenarios. In this wireless systems used have very less range and networks costs goes very high [1].

Oscar Martinez et al. presented *"Tracing commodities in indoor environments"* .In this system the device being tracked is connected three access points and a central monitoring system. PC's with Bluetooth radio adaptors which run multithreaded java based desktop application are used to implement the access points and central monitoring system [2]. The disadvantage of this is that the components used in this system are not available in Indian market for educational use.

III. SYSTEM ARCHITECTURE

This project mainly consists of two units viz. Handheld unit and Central unit whose block diagram are as shown in the fig 3.1.1 and fig 3.1.2 respectively.

3.1.1 Handheld unit

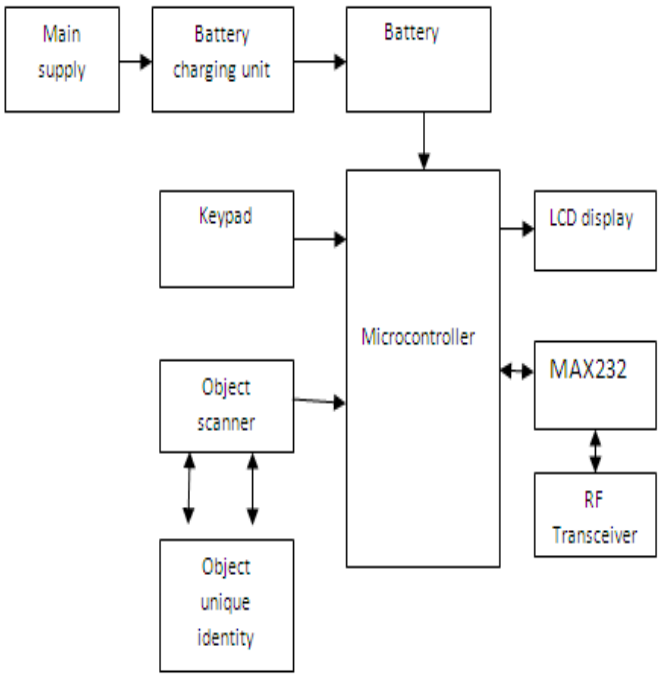

Fig 3.1.1 Block diagram of handheld unit

3.1.2 Central unit

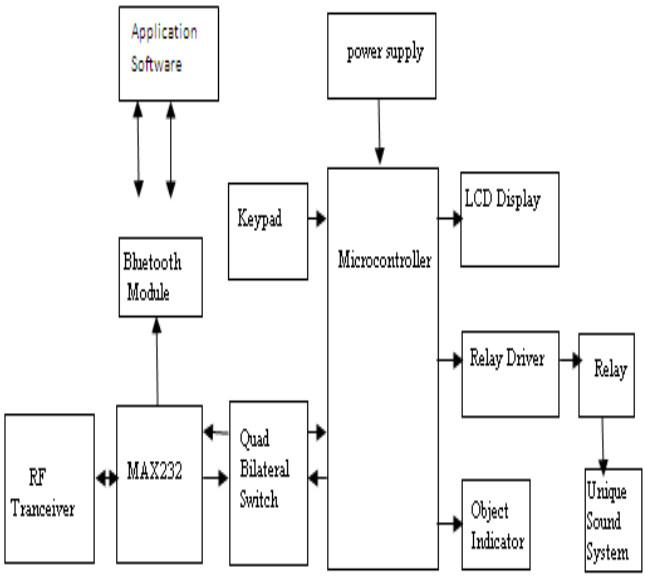

Fig 3.1.2 Block diagram of Central unit

A. BLOCK DIAGRAM DESCRIPTION:

a) HANDHELD UNIT

The hand held unit consists of following blocks:

1. **Battery Charging Circuit**: As the hand held unit is a remote part of this system, it must be connected to the rechargeable battery system. Battery charging system is used to charge the battery of this unit.
2. **Battery**: it used to give power to all the devices on the unit.
3. **Keypad**: To enter the no. or code of object to be searched.
4. **Object scanner**: It will scan for the object as per the identity given by the microcontroller.
5. **Object unique identity**: It gives a separate unique identity for all the different objects.
6. **Quad bilateral switch**: It is a type of switch which can be switched from both the sides and current can be blocked or passed from both sides. This switch works on logic 0 and logic 1.
7. **MAX232**: MAX232 IC is used for serial communication.MAX232 is compatible with RS-232 standard, and consists of dual transceiver. Each receiver converts TIA/EIA-232-E C levels into 5V TTL/CMOS levels. Each driver converts TTL/COMS levels into TIA/EIA-232-E levels.

8. **LCD display**: To show the status about the object in searching process.
9. **Bluetooth**: This module connects hand held unit to the display device.
10. **RF transceiver**: It connects handheld unit and central unit in order to exchange information.
11. **Application software**: This will be installed in the display device. Display device used in this project is smartphone and the application software will be Android based application for display purpose.
12. **Microcontroller**: Microcontroller will handle all the commands received from the wireless module and generate the control signals for different modules.

b) CENTRAL UNIT*:*

The central unit shown in the fig 3.1.2 consists of following blocks:

1. **Power supply**: To provide a dc power to whole unit. It will convert main supply voltage to the appropriate dc voltage required for unit.
2. **Keypad**: It is used for the database entry of all the objects in the main central unit.
3. **MAX232**: MAX232 IC is used for serial communication.MAX232 is compatible with RS-232 standard, and consists of dual transceiver. Each receiver converts TIA/EIA-232-E C levels into 5V TTL/CMOS levels. Each driver converts TTL/COMS levels into TIA/EIA-232-E levels.
4. **RF transceiver**: It connects Handheld unit and central unit in order to exchange information.
5. LCD Display: It will show the database entry of all objects.
6. **Relay Driver and Relay:**
   Relays are used as a switch in this system to switch the finder ON & OFF.
7. **Unique Sound System:** This will generate different sounds for different objects to make object recognition easy.
8. **Microcontroller**: Microcontroller will handle all the commands received from the wireless module and generate the control signals for different modules.

IV. SYSTEM IMPLEMENTATION

Micro-controller: PIC16F877

PIC16F877A

- Current: 25mA sink/source per I/O
- Operating voltage:2.0V to 5.5V
- Operating speed: DC – 20 MHz clock input
- DC – 200 ns instruction cycle
- Up to 8K x 14 words of Flash Program Memory,
- Up to 368 x 8 bytes of Data Memory (RAM),

- Up to 256 x 8 bytes of EEPROM Data Memory
- Pin out compatible to other 28-pin or 40/44-pinPIC16CXXX and PIC16FXXX microcontrollers.
- 256 Bytes EEPROM data memory
- Self Programming

RFID tag:

An electronic identification device that is made up of a chip and antenna. For reusable applications, it is typically embedded in a plastic housing, and for tracking shipments, it is usually part of a "smart" packaging label. Valuable assets can be tracked if the identity of the attached tag is known.

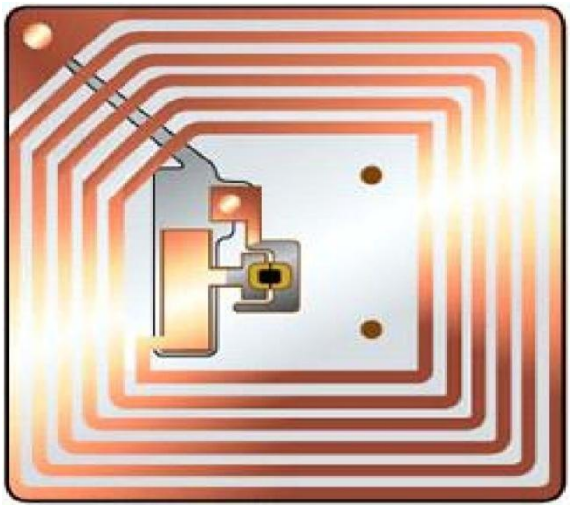

Fig 3.2 RFID Tag

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.

RFID reader:

Radio Frequency Identification (RFID) Card Readers provide a low-cost solution to read passive RFID transponder tags up to 2 inches away. 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.

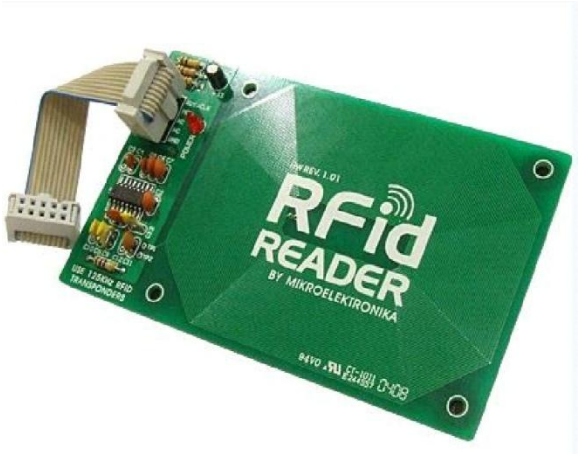

Fig 3.3 RFID Reader

Basic transistor relay driver, actuated on HIGH input (NPN):

This circuit will drive a relay coil from a low power output, usually from an IC like 89s51. It is used to switch high loads or a load that needs AC current to operate. The relay will be actuated when the input of the circuit goes high. The protection

diode Dp is used to protect the transistor from the reverse current generated from the coil of the relay during the switch off time. The values for Rb and Qs vary accordingly.

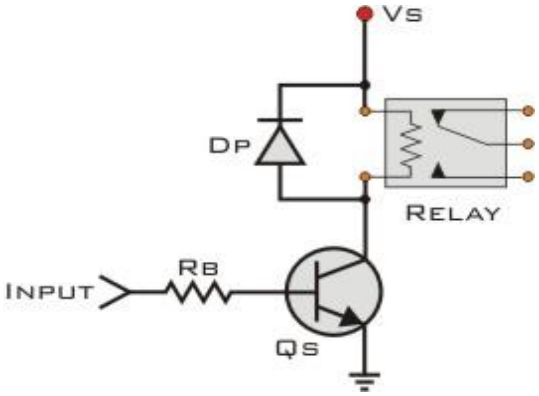

Fig 3.4 Relay driver circuit

RF Module:

RF refers to **radio frequency**, the mode of communication for wireless technologies of all kinds, including cordless phones, radar, ham radio, GPS, and radio and television broadcasts. In our project, we have successfully implemented rf technology for data transmission as well as reception.

RF waves are electromagnetic waves which propagate at the speed of light, or 186,000 miles per second (300,000 km/s). The *frequencies* of RF waves, however, are slower than those of visible light, making RF waves invisible to the human eye. The frequency of a wave is determined by its oscillations or cycles per second. One cycle is one hertz (Hz); 1,000 cycles is 1 kilohertz (KHz); 1 million cycles is 1 megahertz (MHz); and 1 billion cycles is 1 gigahertz (GHz). A station on the AM dial at 980, for example, broadcasts using a signal that oscillates 980,000 times per second, or has a frequency of 980 KHz. A station a little further down the dial at 710 broadcasts using a signal that oscillates 710,000 times a second, or has a frequency of 710 KHz.

BLUETOOTH:

Bluetooth Smart technology is a wireless communications system intended to replace the cables connecting many types of devices, from mobile phones and headsets to hear monitors and medical equipment. Wireless technology for short-range voice and data communication

Fig 3.5 Bluetooth Module

Features:

- Low-cost and low-power
- Provides a communication platform between a wide range of "smart" devices
- Not limited to "line of sight" communication

RF transceiver:

- Frequency: 433MHz
- Operating voltage:5VDc
- Range:100mtrs
- Keypad: 4x4 matrix

V. WORKING PROCEDURE

1) Start

2) Enter the object to be searched.

3) Scan the lost object with handheld unit.

4) Buzzer starts to ring when the object is found.

5) Located object will be displayed on Smartphone.

VI. DISCUSSION

In this paper, we have presented how RFID technology can be used in position tracking system of everyday objects for Alzheimer patients and old age homes.

VII. REFERENCES

[1]. Andrea Scalera, Francesco Sottile, *"Enhancing WSN-based Indoor Positioning andTracking through RFID Technology"*,Fourth International EURASIP workshop on RFID technology, page 107 – 114,2012

[2]. Oscar Martinez, Francuis Chollet, Kauji Marukami, *"Tracing commodities in indoor environments",* Japan society for promotion of science, 2009

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