Navigation using iBeacon

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Abstract:
GPS provides specially coded satellite signals that can be processed in a GPS receiver, enabling the receiver to compute position, velocity and time. Four GPS satellite signals are used to compute positions in three dimensions and the time offset in the receiver clock. GPS is being installed in vehicles with the primary objective of providing accurate monitoring of location. To provide better customer service in the competitive Cab business, fast and efficient dispatching is a critical factor. Most cab dispatching systems rely on good staff and teamwork, but misunderstandings occur when bookings are transmitted by voice. This project will initiate a new application using GPS, a smart satellite-based system for tracking and dispatching Cabs to commuters. With the new system, the nearest Cab is located with the help of GPS and then bookings and routings are transmitted to the Cab drivers display unit in digital form. Through the use of this computerized satellite-based Cab dispatching and data network system, operational errors and costs are expected to be reduced.

Key Words: coded satellite signals, monitoring of location, Compass module, establish secure navigation.

I. INTRODUCTION

The system computerized dispatching links both commuters and Cab drivers by computer and lets the operators know, by satellites, where their Cabs are located. Every Cab has its location updated periodically. The system can find the nearest vacant Cab, and the Cab’s display panel can tell the driver passenger’s location. Once a job is acknowledged by the driver, the system can automatically contact the customer telling him or the Car’s license plate number through a synthesized text message. In order to make the whole system fully autonomous, the project is also implemented on an autonomous robot equipped with GPS and Compass module which has the ability to navigate between a series of way points to reach its destined coordinates.

Existing system

In the existing system, presently private company launched the cabs for the passenger carrying from one place to another place like pickup and drop. And lot of the criminal activity are happened during travel by the driver are other. So this the major issues in the present system.

1.2 Proposed System

In the proposed system, beacon based navigation system is implemented for unmanned vehicle for passenger carrying. When the passenger requests the webpage it searing the nearby vehicle and sends the passenger location to the cab. And the vehicle automatically moves from the location to the passenger location based upon beacon signal. So the beacon is placed in public place for navigation purpose. So the vehicle detected the signal. It will traps the signal and the vehicle reaches to the passenger.

II. BLOCK DIAGRAM

2.1 Master Node

![Diagram](image1)

2.2 Slave Node

![Diagram](image2)

2.3 Block Diagram Description

In this project, beacon based unmanned automatic vehicle navigation system is implemented. Here the ARM microcontroller is used for controlling the entire section ARM controller is power by the battery power supply. The operating voltage of ARM controller is 3.3V.
The entire section is placed in the robotic vehicle, so the beacon can’t start the searing process. When the command received from the GPRS module the vehicle starts the trap the signal nearby. And the GPRS sends the command to the vehicle like passenger location. Here the relay is used for changing the direction of the vehicle and Display is used for showing the processed result, when the user sends the request to the server. The server checks the passenger location and sends to the nearby vehicle. And the server plots the map from the source to destination. The vehicle automatically starts, and start the scanning process so the each places place the beacon module, if the beacon module ID is matched it’ll automatically move

III. TECHNOLOGY IMPLEMENTED IN OUR PROTOCOL

Beacons allow applications to understand their location on a hyper-local scale, and sends signals to users based on the location. The uses of beacons in the real world are extremely diverse and endless. They essentially bridge the online and offline world while gathering invaluable data.

Beacons and proximity are most commonly used for:
- indoor navigation
- asset tracking
- employee tracking
- keyless access
- proximity marketing

IV. FLOW CHART

Figure 3. flow chart

START

Search for Beacon module

Obtain the MAC address

Initialization of motor & ultrasonic sensor

Yes

Any obstacle

No

Slowdown & change the route

Execute as per the programming route

END

V. CIRCUIT DIAGRAM

Figure 4. circuit diagram

5.1 MAX 232

The MAX232 from Maxim was the first IC which in one package contains the necessary drivers (two) and receivers (also two), to adapt the RS-232 signal voltage levels to TTL logic.

Figure 5. MAX 232

5.2 IC 7805 (Voltage Regulator IC)

7805 is a voltage regulator integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The voltage regulator IC maintains the
output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending upon the respective voltage levels.

![Figure. 6. The voltage regulator](image)

**Table 1. Pin Description:**

<table>
<thead>
<tr>
<th>Pin No</th>
<th>Function</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Input voltage (5V-18V)</td>
<td>Input</td>
</tr>
<tr>
<td>2</td>
<td>Ground (0V)</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>Regulated output; 5V(4.8V-5.2V)</td>
<td>Output</td>
</tr>
</tbody>
</table>

5.3 Crystal Oscillator

Electronics oscillators are used in frequency control applications finding their usage in almost every industry ranging from small chips to aerospace. A quartz crystal is the heart of such type of resonators. Their characteristics like high quality factor (Q), stability, small size and low cost make them superior over other resonators like LC circuit, tuning forks, ceramic resonator etc. The basic phenomenon behind working of a quartz crystal oscillator is the inverse piezo electric effect i.e., when electric field is applied across certain materials they start producing mechanical deformation. These mechanical deformation/movements are dependent on the elementary structure of the quartz crystal.

5.4 GSM/GPRS Module

GSM/GPRS module is used to establish communication between a computer and a GSM-GPRS system. Global System for Mobile Communication (GSM) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rates. GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and communication interfaces (like RS-232, USB, etc) for computer. The MODEM is the soul of such modules.

![Figure.7. GSM/GPRS Module](image)

5.5 LCD Display

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. The data is the ASCII value of the character to be displayed on the LCD.

![Figure.8. LCD displayed](image)

5.6 Control signals

- RS- Register Select
- There are 2 very important registers in LCD
- Command Code register
- Data Register
- If RS=0 → Instruction command Code register is selected, allowing user to send command
- If RS=1 → Data register is selected allowing to send data that has to be displayed.

5.7 R/W- ReadWrite

- R/W input allows the user to write information to LCD or read information from it. How do we read data from LCD? The data that is being currently displayed will be stored in a buffer memory DDRAM. This data could be read if necessary.
  - If R/W=0 → Reading
  - R/W=1 → Writing

5.8 Interfacing with Arm Processor

The LPC2141/2/4/6/8 consists of an ARM7TDMI-S CPU with emulation support, the ARM7 Local Bus for interface to on-chip memory controllers, the AMBA Advanced High-performance Bus (AHB) for interface to the interrupt controller, and the VLSI Peripheral Bus (VPB, a compatible superset of ARM’s AMBA Advanced Peripheral Bus) for connection to on-chip peripheral functions. The LPC2141/24/6/8 configures the ARM7TDMI-S processor in little-endian byte order. AHB peripherals are allocated a 2 megabyte range of addresses at the very top of the 4 gigabyte ARM memory space. Each AHB peripheral is allocated a 16 kB address space within the AHB address space. LPC2141/24/6/8 peripheral functions (other than the interrupt controller) are connected to the VPB bus. The AHB to VPB Bridge interfaces the VPB bus to the AHB bus. VPB peripherals are also allocated a 2 megabyte range of addresses, beginning at the 3.5 gigabyte address point. This must be configured by software to fit specific application requirements for the use of peripheral functions and pins. The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanisms are much simpler than those of micro programmed Complex Instruction Set Computers. This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems cope with information at a very high rate.
can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory.

![Figure 9. interfacing with ARM processor](image)

**VI. SIMULATION**

The micro-controller simulation in simulation works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables it’s used in a broad spectrum of project prototyping in areas such as motor control, temperature control and user interface design. It also finds use in the general hobbyist community and, since no hardware is required, is convenient

![Figure 10. micro-controller](image)

To use as a training or teaching tool. Support is available for co-simulation of:

- Microchip Technologies PIC10, PIC12, PIC16, PIC18, PIC24, dsPIC33 Microcontrollers.
- Atmel AVR (and Arduino), 8051 and ARM Cortex-M3 Microcontrollers.
- NXP 8051, ARM7, ARM Cortex-M0 and ARM Cortex-M3 Microcontrollers.
- Texas Instruments MSP430, PICCOLO DSP and ARM Cortex-M3 Microcontrollers.
- Parallax Basic Stamp, Freescale HC11, 8086 Microcontrollers.

**VII. CONCLUSIONS**

Thus, automatic control of vehicle for more efficient transportation and also to reduce anonymous theft behavior is effectively implemented by using ibeacon technology. It also acts as essential source of transportation for business and other commercial use. In order to make the whole system fully autonomous, the project is also implemented on an autonomous robot equipped with GPS and Compass module which has the ability to navigate between a series of way points to reach its destined coordinates.

**VIII. REFERENCES**


