AUTOMATIC TOLL TAX COLLECTION SYSTEM

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Abstract:

Machine learning has been utilized in every possible field to leverage its astonishing puissance. The networking and distributed computing system is the key infrastructure which provides computational resources in efficient manner for machine learning. Networking itself can benefit from this promising technology. This article fixes on the application of MLN, which can not only avail solve the intractable old network questions but stimulate incipient network applications. In this article, we summarize the rudimentary workflow to explicate to apply machine learning technology in the network domain. This paper provides the latest representative advances with explications of their design principles and benefits. The advancement in machine learning is categorized into several network design objectives and the detailed information for the performance of machine learning work flow. This paper provides a wide research guideline on networking with machine learning to avail incentive researchers to develop innovative algorithms, standards and frameworks.

Keywords—Machine Learning, Quality of Service, Bayesian classifier, Radial base function, Clustering, Redundancy.

I. INTRODUCTION

India loses 86,000 crore rupees every year due to delay in toll collection. Manual toll collection leads to traffic congestion, fuel wastage and wastage of time. The study shows that the implementation will help save 60,000 litres of fuel daily and cut down on pollution. This system is capable of determining if the vehicle is registered or not, and then informing the authorities of toll payment violations, debits, and participating accounts. The most obvious advantage of this technology is the opportunity to eliminate congestion at tollbooths, especially during festive seasons when traffic tends to be heavier than normal. It is also a method by which we can curb complaints from motorists regarding the inconveniences involved in manually making payments at the tollbooths.

II. MANUAL COLLECTION SYSTEM

Until somewhat recently, the most common approach for collecting tolls was to have the driver stop and pay a toll collector sitting in a tollbooth. The toll collector determines the amount to be paid by each vehicle based upon its characteristics or classification.

Consider the manual toll collection system is efficient, then 1 vehicle takes 60 seconds to pass through the toll gate.

In month total time spent is 60*30=1800 seconds
In a year total time would be=1800*12=6.0 hours.

Thus on an average a vehicle spends 6 hours yearly to pass through the toll gate. If engine on start condition burns one litre of fuel every hour, it will burn six litre of fuel every year at toll plaza. Consider every year 10 million of vehicles pass through toll gates, which will result to 60 million litres of fuel wastage yearly. Thus we need an efficient system for toll collection that can minimize the wastage of fuel with improved security to save valuable resources for future use.
III. ADVANCED TOLL TAX COLLECTION SYSTEM

In Advanced toll tax collection system, Zigbee hardware is connected in vehicle and toll end. Vehicle details are registered in the main server along with the bank details as well as Vehicle ID which is Zigbee ID. In the user registration, two accounts are enrolled. First one is the main account which is called default account. If balance is insufficient in the first account then automatically amount is taken from the second account. When vehicle comes nearer to the toll, Zigbee from the vehicle communicates with the Zigbee attached in the toll automatically vehicle ID is communicated and amount is deducted from the bank of the concern user. The driver receives an SMS notification to his/her mobile about the payment details.

If the vehicle is not registered, the system alerts the authority at the toll and when the vehicle approaches the toll, the toll amount is collected manually with penalty. Penalty is forced so that it will register the vehicle in Toll Management System in future.

4. The specification is a packet-based radio protocol intended for low-cost, battery-operated devices.
5. The protocol allows devices to communicate in a variety of network topologies and can have battery life lasting several years.

ZigBee protocol features include:
1. Support for multiple network topologies such as point-to-point, point-to-multipoint and mesh networks
2. Low duty cycle – provides long battery life
3. Low latency
4. Direct Sequence Spread Spectrum (DSSS)
5. Up to 65,000 nodes per network
6. 128-bit AES encryption for secure data connections
7. Collision avoidance, retries and acknowledgements

B. PIC18F458 MICROCONTROLLER

It is used for converting analog signals captured by ZIGBEE to digital signals using ADC port pins by signal processing. It has signal processing interface, user interface, real time audio processing, and flash interface thus providing reliable connections among various components.

1. High-Performance RISC CPU:
   - Linear program memory addressing up to 2 Mbytes
   - Linear data memory addressing to 4 Kbytes
   - Up to 10 MIPS operation
   - DC – 40 MHz clock input
   - 4 MHz-10 MHz oscillator/clock input with PLL active
   - 16-bit wide instructions, 8-bit wide data path
   - Priority levels for interrupts
   - 8 x 8 Single-Cycle Hardware Multiplier
   - Complies with ISO CAN Conformance Test
   - Message bit rates up to 1 Mbps
   - Conforms to CAN 2.0B Active Spec with:
     - 29-bit Identifier Fields
     - 8-byte message length
     - 3 Transmit Message Buffers with prioritization
     - 2 Receive Message Buffers
     - 6 full, 29-bit Acceptance Filters
     - Prioritization of Acceptance Filters
     - Multiple Receive Buffers for High Priority Messages to prevent loss due to overflow
     - Advanced Error Management Features

2. Special Microcontroller Features:
   - Power-on Reset (POR), Power-up Timer (PWRT)
   - and Oscillator Start-up Timer (OST)
   - Programmable code protection
V. IMPLEMENTATION DETAILS

In the proposed system, Zigbee hardware is connected in vehicle and toll end. Vehicle details are registered in the main server along with the bank details as well as Vehicle ID which is Zigbee ID. In the user registration part two accounts.

- Power-saving Sleep mode
- Selectable oscillator options, including:
  - 4x Phase Lock Loop (PLL) of primary oscillator
  - Secondary Oscillator (32 kHz) clock input

VI. MODULES DEVELOPED

A. USER REGISTRATION AND ACCOUNT MAPPING

- In the server side, the administrator uses his/her login id and password.
- The admin adds the user details including the bank details.
- In both the cases, the id (zigbee id) which is generated automatically acts as the primary key.

B. ZIGBEE HARDWARE INTERFACE

- Zigbee hardware is the Wireless hardware which is connected in vehicle end as well as in the Toll gate end.
- The two Zigbee communicates among themselves, system will automatically identify that vehicle id.
- The PIC18F458 MICROCONTROLLER converts analog signal to digital signal.
- Amount is subtracted from the default bank number is which is specified as default account by the user.

C. DYNAMIC BANK ROUTING

- The user enrolls two accounts in user registration module, one as the primary account and another as the secondary account.
- If there is insufficient balance in the primary account the system automatically shifts to the secondary account as mentioned by the user.
- Each user account must have a minimum balance of rupees 500.

D. AUTOPAYMENT SYSTEM

- Registered Zigbee ID is identified by comparing the user details with central database.
- The amount is deducted according to the vehicle type mentioned at the time of registration.
- Only registered users are allowed to pass the toll gate without stopping.
- If user is not registered the system alerts the authority in the toll and toll tax is collected with penalty.
- Penalty is compulsory for future registration for unregistered users.

VII. ADVANTAGES

The following are the major advantages over current system...
1. Automatic collection of toll tax.
2. Reduces the man power.
3. No hard cash required.
4. Saves time and money.
5. Minimizes work stress.
6. Free flow of traffic
7. Record maintenance.

VIII. CONCLUSION
In this Paper, the concept of Automated toll collection using Zigbee. We have used an innovative approach where a traveler will be able to pay the toll while in motion using Zigbee communication technology. Through this process of toll collection will save time, effort, and man power. How many vehicles passing through the toll gate stored in a database. We can also find out a vehicle how many times passing through the toll gate in a day.

IX. REFERENCES