International Journal of Research
Available at https://edupediapublications.org/journals
p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 03 Issue 14
October2016

Smart Toll Collection using RASPBERRY PI 2

Sanniti Ramakrishna[1] & K Kameswar Reddy[2]

[1]M-Tech Dept of ECE, Geethanjali Engineering College NANNUR-V, KURNOOL-DIST
Mail Id :- manasajoshnaarthi@gmail.com

[2]Associate ProfessorDept ECE, Geethanjali Engineering College NANNUR-V, KURNOOL-DIST

Abstract: - The automated toll collection system using passive Radio Frequency Identification (RASPBERRY PI 2) tag emerges as aconvincing solution to the manual toll collection method employed at tollgates. Time and efficiency are a matter ofpriority of present day. In order to overcome the major issues of vehicle congestion and time consumption RASPBERRY PI 2technology is used. RASPBERRY PI 2 reader fixed at tollgate frame reads the tag attached to windshield of vehicle. The objectdetection sensor in the reader detects the approach of the incoming vehicle's tag and toll deduction takes placethrough a prepaid card assigned to the concerned RASPBERRY PI 2 tag that belongs to the owners' account. This makes tollgate transaction more convenient for the public use.

Keywords— Smart Toll Collection, (RASPBERRY PI 2)

1. INTRODUCTION

In our day to day life, we pay certain amount of tax through toll plaza to the government. The toll gates are mostlyfound on national highways and bridges etc., and we pay standing over a queue in the form of cash, although, themobility of vehicles gets interrupted by this method which takes longer travel time, more consumption of fuel and alsopollution level get increased in that region, instead of that the method commonly used by industries and in advancedcountries is the Electronic Toll Collection System.Electronic toll collection system is the technology that enables the automatic electronic toll collection from theprepaid account registered on the name of vehicle owner, determining whether the vehicle is registered or not andinforms the toll authorities avoiding toll violations. Over last decades, electronic toll collection system have been

Implemented in United States and many other countries with a new improvement in

it.By thiswe don't have to carry a handsome amount of cash with us relates to security as well. This system does notrequire any manual operation of toll barriers and collection of toll amounts, it is completely automated toll collectionsystem. The vehicle owners are registered with their vehicles proper information and their account is created, wherethey can recharge their account with required amount. When the vehicle passes through the toll gate, the information isshared between RASPBERRY PI 2 tag and RASPBERRY PI 2 reader and the amount is deducted from the owners account. This method reducesthe traffic congestion problems, also reduces the travel time and reduces the fuel consumption.

2. IMPLEMENTATION

Software

The raspbian os is used in the raspberry pi board. It is a free operating system that is based on Debian which is particularly optimized for the Raspberry Pi hardware. It comes with over 35,000 packages and pre-compiled software bundled in a simple format for easy installation in the Raspberry Pi. The coding for all the sensors and the robot movement are done using the python coding. Python is preferred since it is a simple and a minimalistic language. It is also free and open source software. This can be used in many platforms such as Linux, VxWorks, and PocketPC etc. Also, it supports procedure-oriented programming as well as OOPS. The web browser is created by using HTML. The static IP address should be configured in the raspberry pi for the Wi-Fi dongle. This assigned static ip address is for connecting with the Wi-Fi of the mobile phone for the live video transmission. Since a normal usb camera is used it must be initially installed in the raspberry pi 2 board using the linux commands.

Raspberry pi

The Raspberry Pi hardware has evolved through several versions that feature variations in memory capacity and peripheral-device support. Raspberrypi block function v01.svg This block diagram depicts Models A, B, A+, and B+. Model A, A+ and the Pi Zero lack the Ethernet and USB hub components. The Ethernet adapter is internally connected to an additional USB port. In Model A, A+, and the PI Zero, the USB port is connected directly to the system on a chip (SoC). On the Pi 1 Model B+ and

later models the USB/Ethernet chip contains a five-point USB hub, of which four ports are available, while the Pi 1 Model B only provides two. On the Pi Zero, the USB port is also connected directly to the SoC, but it uses a micro USB (OTG) port. The Broadcom BCM2835 SoC used in the first generation Raspberry Pi is somewhat equivalent to the chip used in first generation smartphones (its CPU is an older ARMv6 architecture),which includes a 700 MHz ARM1176JZF-S processor, Video Core IV graphics processing unit (GPU), and RAM. It has a level 1 (L1) cache of 16 KB and a level 2 (L2) caches of 128 KB. The level 2 cache is used primarily by the GPU. The SoC is stacked underneath the glued to RAM chip, so only its edge is visible. The Raspberry Pi 2 uses a Broadcom BCM2836 SoC with a 900 MHz 32-bit quad-core ARM Cortex-A7 processor (as do many current smartphones), with 256 KB shared L2 cache. The Raspberry Pi 3 uses a Broadcom BCM2837 SoC with a 1.2 GHz 64-bit quad-core ARM Cortex-A53 processor, with 512 KB shared L2 cache.

Power Supply

It supplies various voltages as per requirement to each unit. This portion consist of transformer, rectifier, regulatorand capacitors for filter. The rectifier is used as a bridge rectifier which converts 230V to desired 5V/12V DC.

Stepper Motor

It is for opening and closing of a barrier on the toll gate. It is done when the customer successfully performs thebilling operation through RASPBERRY PI 2 with sufficient balance.

Buzzer

Buzzer will ring when there will be insufficient balance in customer account.

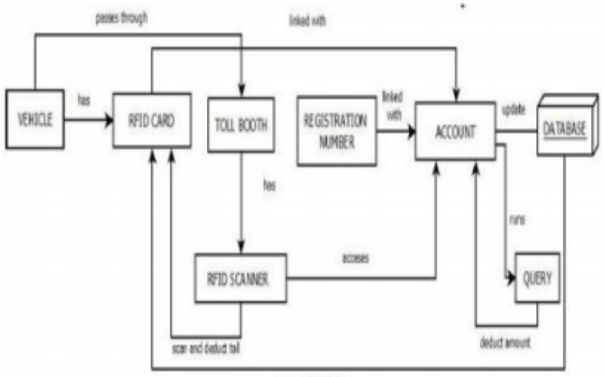

Fig:-1 Flow of the Project

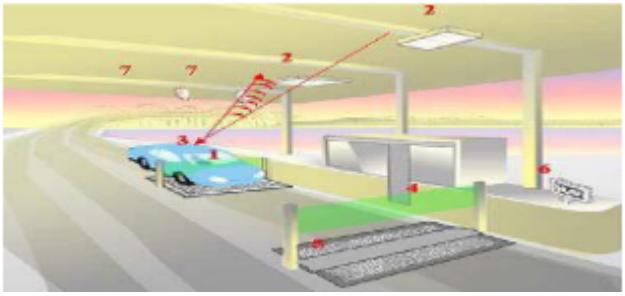

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Fig:-2 Live Project

3. EXPERIMENTAL RESULTS

Fig:-3 Home Screen on Web Results

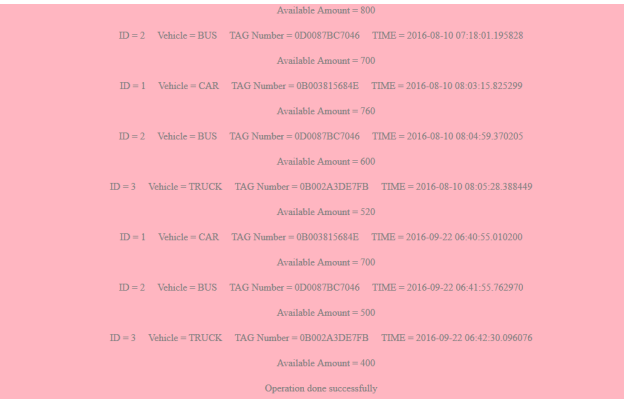

Fig:-4 Payment for Buses

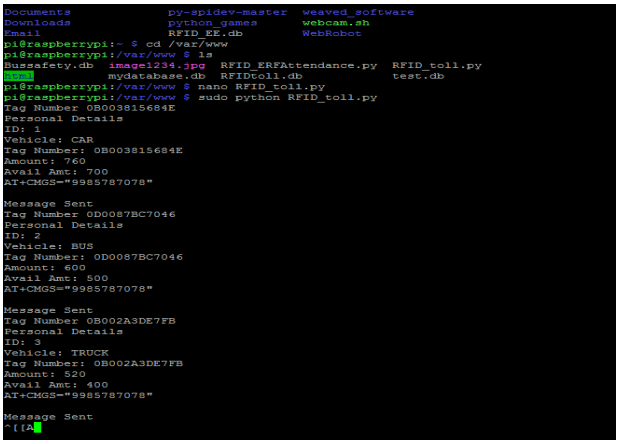

Fig:-5 Results

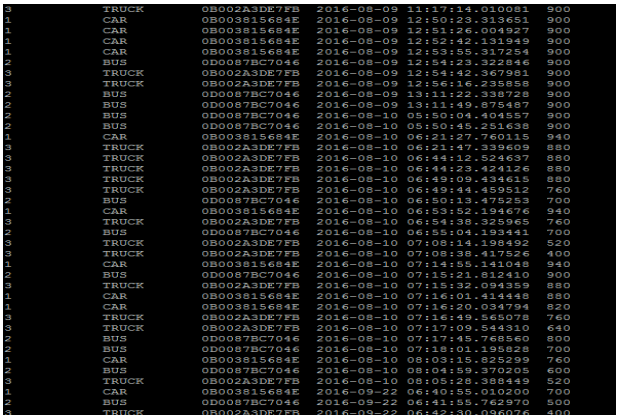

Fig:-6 Results

4. CONCLUSION

The Smart toll collection system in expressway based on RASPBERRY PI 2, a design scheme was put forward. It has characteristics of low cost, high security, far communication distance and high efficiency, etc. It improves technology level of charge and also improves passage ability of expressway. Smart toll collection system is an effective measure to reduce management

costs and fees, at the same time, greatly reduce noise and pollutant emission of toll station. In the Smart Toll Collection system, real time toll collection system has been designed. This reduces the manual labor and delays that often occur on roads. This system of collecting tolls is eco-friendly and also results in increased toll lane capacity.One of the most important impacts of technology is the development of sustainable technologiesthat reduce the traffic conjunction and that need of future generation, save energy and time.Our project mainly impact full in these aspects, by saving the time on the toll, and alsofor to save fuel and by regulating the pollution and usage of vehicle at toll gates; as shown itmakes the toll collection payment easy by using automatic toll cash collection process.

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