Project proposal for DST &Texas Instruments Inc. India Innovation Challenge Design Contest 2016 Anchored by IIM Bangalore

PARKIT

Indian Institute of Technology (Indian School of Mines), Dhanbad

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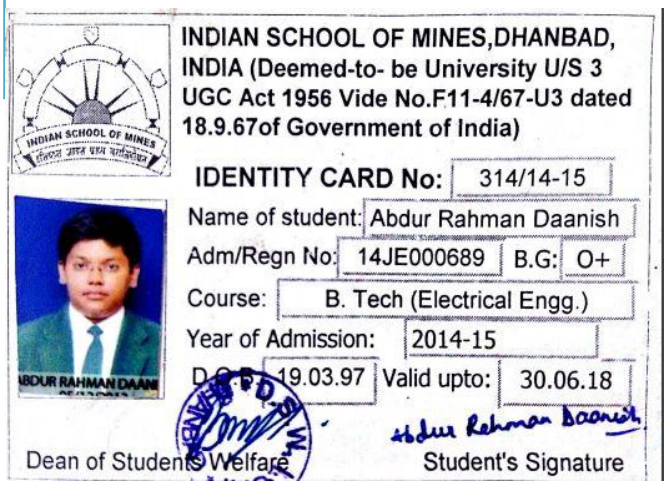
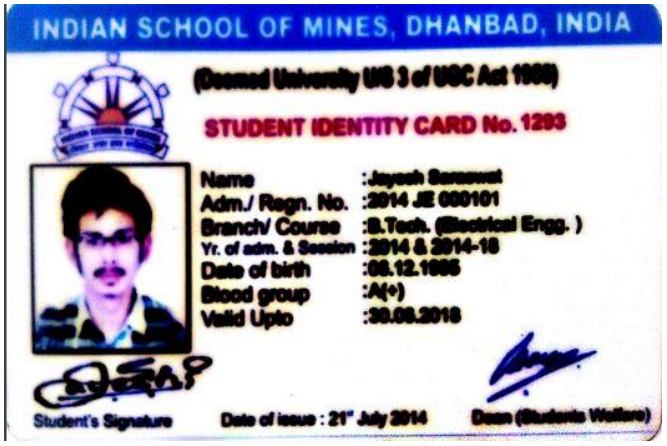
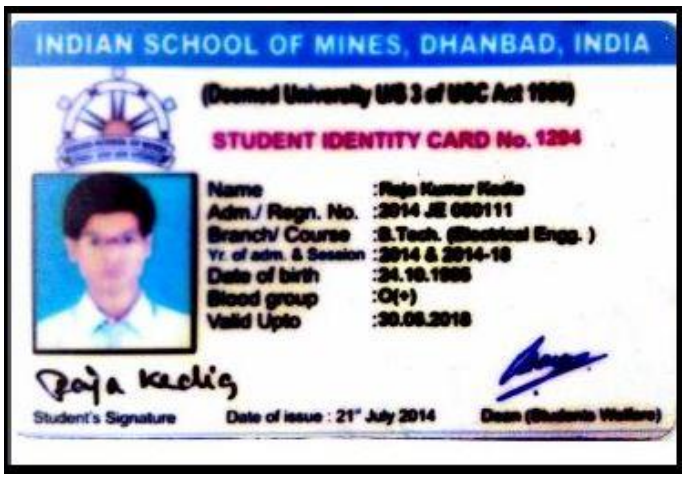






Project Abstract

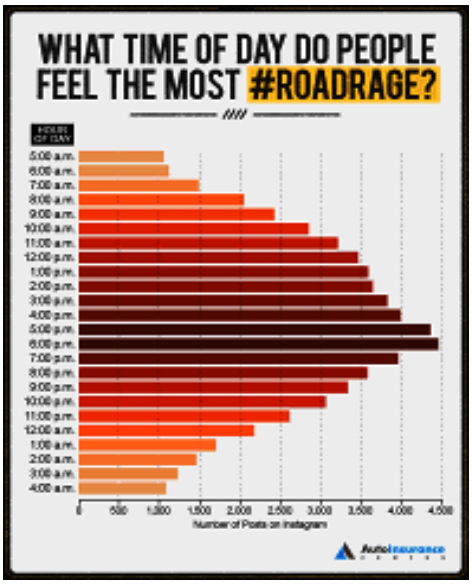
Over the last decade, the number of vehicles has substantially increased due to the extensive surge in the market share of automobiles. But, unfortunately, the available area is inadequate to meet up the present need which is the major reason behind traffic congestions and parking problems, the latter one being addressed here. Metropolitans especially in India succumb to a huge wastage of time, fuel and money due to these problems. Through deep introspection, it can be summed up that the boorish parking is one of the root causes of road accidents and traffic jams, the outcome of which is air-pollution and global warming. Currently, a significant amount of resources is being invested on innovative solutions to the aforesaid by the government and the concerned organisations. In this paper, an economical and optimal solution to reduce the ill-mannered parking has been proposed.

Team Members – Roles & Responsibilities

S.No.	Student Member Name	Role	Justification
1.	**Abdur Rahman Daanish**	**Technical**	Responsible for the Front –End App development and the Hardware side.
2.	**Jayesh Saraswat**	**Marketing**	Responsible for the marketing, promotions, designing and as a technical adviser.
3.	**Raja Kumar Kedia**	**Technical**	Responsible for the Back-end development of the application

Market Analysis

Fed up of traffic jams in India? Thought of any improvisation yet for the #OddEvenFormula of Mr. Kejriwal to reduce traffic snarls in Delhi? Like Delhi, there are many Indian cities that drive citizens crazy with traffic congestion. While it is very common to get stuck for 3-3.5 hours in Bangalore roads, Delhi takes some 2 hours to reach a distance of 10 km during peak hours. Some fastest growing Indian cities are only focusing on industrial and urban expansion while side-lining traffic woes. However, if the entire nation takes inspiration from the lesser congested and polluted ones like Kochi, Chandigarh, Surat and Gandhinagar, we will have a complete healthy environment to survive.



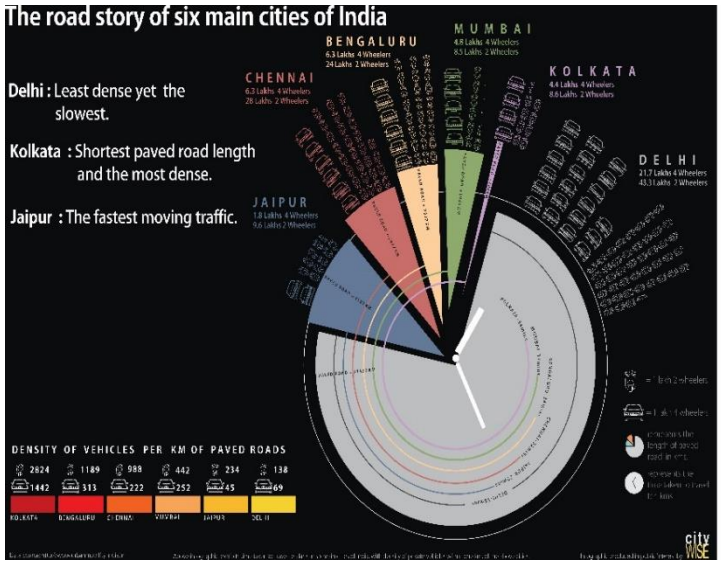
With families getting smaller and the total number of motor vehicles exceeding the total number of heads per family, the parking scenario is woefully falling short. The situation is such that on any given working day approximately 40% of the roads in urban India are taken up for just parking the cars (Source). As it is, the cities in India are highly congested Thanks to the poor and at times zero navigability, Indian cities are regarded as some of the worst options for living. One can also add other issues like accidents caused due to unmannered parking and air pollution to this mix and understand the enormity of the crisis.

People have so careless attitude that they don't bother to park their vehicles on the right place just because they don't have time to go to other parking spots as they recently faced a highly congested one and they have spent half of the day in searching for a 2 by 5 space corner burning a significant amount of money and fuel.

What will happen if it is possible to find an unreserved parking lots and reserve a one in just a single tap?

ParkIt app will lead you through congested roads to your destination. You can navigate the nearby parking lots, can reserve a space in a parking lot and enjoy a hassle free schedule.

This app will cover more than half of the Indian population rushing down the streets from noon to moon. According to the survey of urbanmobilityindia.in the traffic rush in metropolitan cities reaches to its peak. If people can easily find out a place to fire off their engines, then the traffic and accidents caused due to unmanned parking can be reduced to a better extent. **There are 45.3 lakhs 4 wheelers and 122 lakhs two wheelers registered in just 6 metropolitans (Delhi, Kolkata, Mumbai, Bengaluru, Chennai and Jaipur) which is a small fraction of the total population who will be directly benefitted through this app.** It will reduce the useless fuel consumption in traffic hassles and the invaluable time of the customers.



Current leading solutions:

In the last few years, Parking spaces are increased by introducing the concept of **Multi-Level Car Parking.**

Multi-level car parking is of two types – **conventional** and **automated.** Conventional multi-level car parking can be done anywhere – over the ground or under it. The open parking areas are more preferred as opposed to closed areas in case of parking above the ground as specialised fire protection systems and mechanical ventilation are not needed in this case. Automated multi-level car parking is more difficult to achieve in India considering the fact that it is entirely technology driven and does not involve much human element. As it stands now, India and Indians may not be ready for this technology.

ParkIt is an entirely new concept approaching in this direction. This easy to handle app can solve the issue of not getting an empty parking space easily even after the concept of Multi Level parking is introduced. The matter is, people don't get to know whether there is any vacant space or not in the parking lots they are approaching. ParkIt can easily address to this situation and will give unexpected results.

This app will reach to our customers through various social platforms and online App Stores. Its benefits will be shared in visuals to attract a larger crowd. Easy to use guide will knock every doorstep to reach to the grounds via YouTube videos. Moreover, social campaigns (#tags: achi_car_khareedi_h, #parkItkiya?) make people aware. People will have a direct link to download the app on android play store, windows store and the Apple's App store.

Proposed Design

A. Objective :-

We are standing at the edge of the world which is changing at a breath-taking pace. The production rate of automobiles is storming up increasing the chaos on the road. Every day, excessive amount of fuel and time is being burnt just to find a parking spot. We are looking forward to a flawless approach to reduce the ill –mannered parking especially in the overcrowded metropolitans which are the backbone of the nation.

B. Proposed Solution:-

Suppose we are moving on a road searching for a parking spot. We find a big parking lot and we move inside assuming a free space to get our car parked. But, as usual, we don't get any and as a result we have to move out of the lot into the congested road again searching for the indiscernible. At the end of the day, we only get frustrated on the loss of our invaluable time. **But, what if we knew there was no space in that parking lot? What if we knew about a free space nearby? What if we could reserve that space for us?** Well, that could have saved a lot of time, fuel and money. But most importantly:

IS THAT EVEN POSSIBLE?

Yes, it is and this is what is being realised by this project.
This project aims at creating an app named **"ParkIt"** in which every user will sign up using their credentials. Once the user signs up, the app will display his/her location on google map along with parking lots within 100m radius which have free parking spaces and an option to reserve a space in that parking lot. When the user reserves a place, the app will not show that space as free but will flag it as reserved which will tempt another user to reserve another parking space.
Here's the protocol:-

This surely arises many questions in the mind. Some of them are addressed below:-

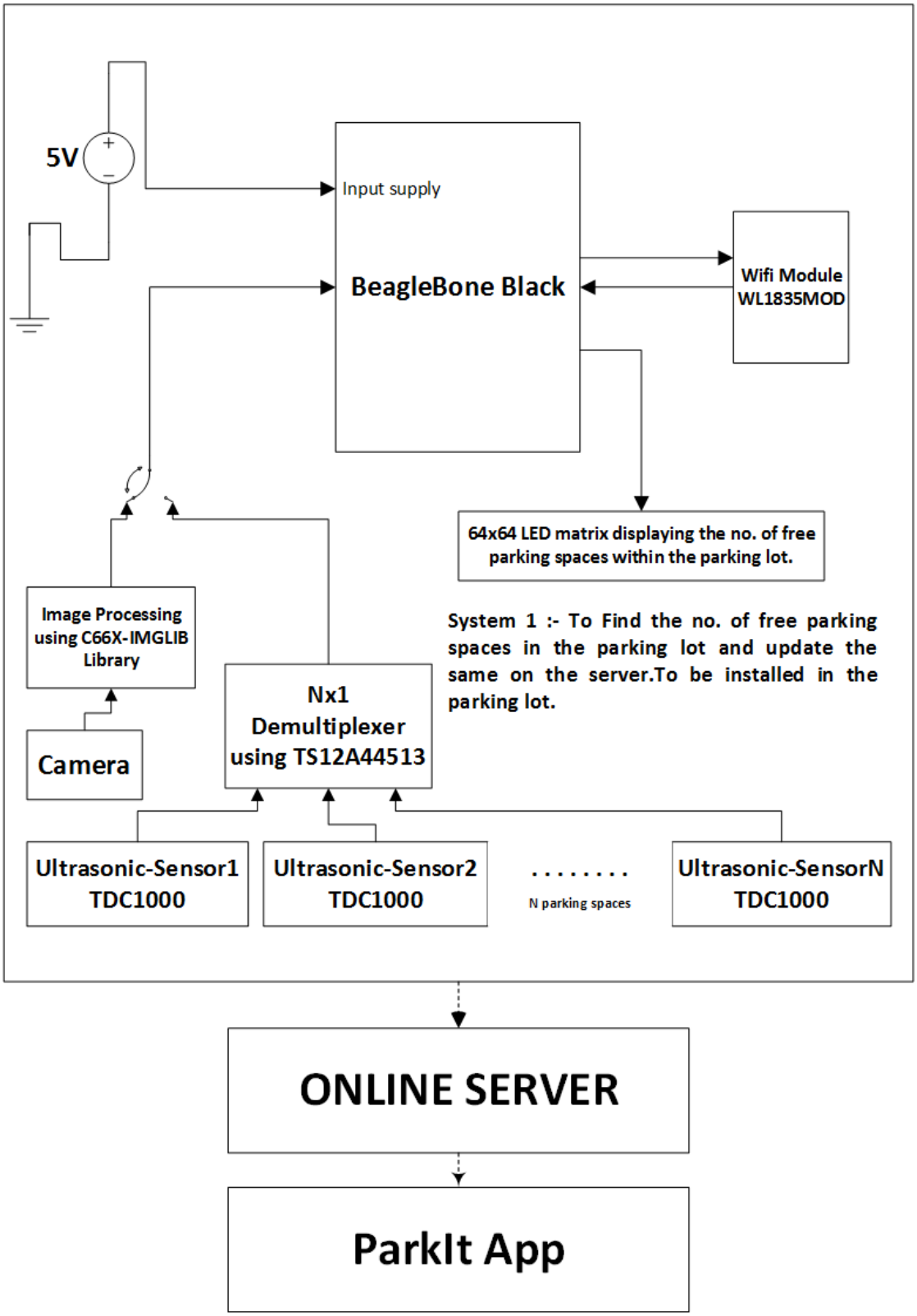
1. What if someone reserved the place but didn't occupy it for a long time?

Ans. The app will display the parking spaces within 100m radius. When the user reserves a place, a countdown of 5 minutes will be started on his/her screen. If he/she fails to occupy that place, it will automatically be flagged as free.

2. What if the internet connectivity is lost?

Ans. If the internet connectivity is lost, the user wouldn't be able to use the app but will be able to see the number of available of spaces which will be displayed on the entrance of every parking lot. This will be also helpful to those who are not using the app.

Block Diagram :–



Explanation of the Block diagram:-

System 1: This system will be installed at the parking lot. It contains a Beagle Bone Black Development board, a Wi-Fi Module, a DC supply of 5V to power all the ICs, a 64x64 LED matrix to display the number of free parking spaces inside the parking lot and a camera (CCTV may be used) or a set of Ultrasonic sensors equal to the number of parking spaces in the lot along with a de-multiplexer.
The camera takes the image of the parking lot which is processed by a software using the C66X-IMGLIB. All the parking spaces are painted white as the white – black combination has the highest contrast and can be easily distinguished by image processing. Also, the area in front of the camera is processed whether it is plane or is having contours. If it is having contours, it means that a car is present over there. When a car occupies a space the white paint of that space becomes invisible and thus can't be distinguished. Hence the software is able to distinguish one less space than earlier. Alternative to this method, every parking space in the lot is configured with an ultrasonic sensor which is present on the parking spot and detects whether the car is present above it or not. If present, the sensor sends a high (1) signal and if not, then a low signal (0). All these signals from all the sensors are de-multiplexed and sent to the beagle board which decodes the signal, counts the number of high signals and updates the same on the server using the Wi-Fi module. It also sends the number of high signals to be displayed on the 64x64 LED matrix (installed at the entrance of the parking lot).

Online Server: A server is necessary as an intermediate between the system 1 and the ParkIt app. The Beagle Board uploads the data on the server which is up and running all the time and the app fetches that data to be displayed on the phone.

C. Components Used :-

TI Part Number	Role/Functionality
Beagle Bone Black Development Board	Used for getting information from sensors and updating the same on the server using internet.
TDC1000	Ultrasonic sensor used to detect whether there is a car parked or not**.** Every Parking space uses one ultrasonic sensor.
WL1835MOD	Wi-Fi module used as an extension to Beagle Bone for connecting to internet.
TS12A44513	De-multiplexer to reduce the number of pins required to take input from the ultrasonic sensors.
64x64 LED Matrix	Used for displaying the no. of free parking spaces in the parking lot.
C66X-IMGLIB	Library used for processing image of the parking lot and detecting the no. of free parking spaces. Will be used as an alternative to the ultrasonic sensor (Part-2).

Non-TI Parts Used	Role/Functionality
Camera	For taking the picture of the parking lot
HC-SR04	Low Power Ultrasonic sensor which can be used as an alternative to TDC1000.
Wires	For Connection

Innovativeness of the Proposed Solution

ParkIt is one of the best solution for the raised issue in itself. The solutions introduced or accepted so far are basically focusing on developing more parking sites in limited areas but no one is leading in the direction of introducing an efficient manner to utilize these efforts.
ParkIt will prove to be an easy to handle free app for the customers to get benefitted. The low complexity of the app increases its performance and the items used such as the microcontroller , ultrasonic sensors and the de-multiplexer turns into a perfect cost which suits the total budget and thus prove to be an economically cheaper experiment in the way to reduce road chaos.
People can operate the app online as well as offline (partially) and manage their schedule accordingly.

Impact of the proposed solution

When people start using this app, they get to know where to lead to kill their engine. This will save the gallons of fuel burning in the engines running on the roads just to find out the 2 by 5 vacant space.
More importantly users will be able to cope up with their hectic schedules and no longer they will waste their time in unimportant things like searching parking spaces.
Traffic chaos will be reduced on roads which results to less accident cases and low air pollution. Metropolitans will suffer less and will be a better place to live in.