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## ANDROID MOBILE APPLICATION FOR CYCLE SHARING SYSTEM

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### ABSTRACT

*Transportation is the basic need in day to day life. Urban transportation leads to the problems like environment pollution and traffic congestion. Bicycle is alternative transportation, which is eco-friendly, cheapest, convenient and user friendly mode of transport. Bicycle sharing approach can be made as regular usage which is good from both private and public point of view. The inhabitants and tourists can temporarily use bicycles for short distance. People can take cycle from one bicycle station nearer to them based on the availability by blocking the cycle for their usage. The bicycles can be returned after usage to any of the bicycle station nearer to your destination. Bicycle sharing system can use Barcode or QR code depending on traffic needs. Location of bicycle is identified using GPS which provides real-time location of the bicycle through GPRS facility, and also which serves as theft protection and in emergency situation. Further lithium battery attached to the bicycle can be used when the customer runs out of the charge in mobile. Payment can be made by e-banking or Debit cards or Credit cards. Aim of the proposed bicycle sharing system is to have pollution free and efficient public transport in high traffic areas.*

**KEYWORDS:** GPS, Bluetooth, GSM, QR code

### INTRODUCTION

India has launched “Digital India” program. Under this different type of activities is conducted by the government of India. Transportation is one of the important issues identified. Motorized traffic has impact human health and causes polluted air, road accidents, traffic congestion and waste of time by sticking in traffic. Construction of flyovers and widening of roads is just a temporary solution. Short trips can be planned using bicycles is the basic idea of Public Bicycle Sharing. People can take cycles based on their availability by checking the corresponding base station and return it to the base station nearby their destination. Various stations will be placed near popular destinations bus stop, trains stations, market areas. and other than these areas where trip or journeys on cycle can be made easily. Depending on the city size, bicycle sharing system may be several hundred to a few hundred bicycle stations across the city.



Global energy usage grows on an average at 2% per year among that 80% are from fossil fuels. Traditional transportation systems consume huge amount of fossil energy and also leads to serious air pollution

which is especially due to traffic congestion. Many urban peoples are living in a fastpaced life hardly don't have time to take physical exercises. Adults are adviced to take minimum 30 minutes aerobics and physical activity 5 days per week. Reduction in physical fitness and potential risk for chronic diseases is increasing due to insufficient physical exercise. Hence may administrators of the cities encourage people to use bicycle to improve their health and reduce traffic congestion.

In Europe, Bicycle share system began in 1965. Now a days, more, about 700 cities all around the world have their own bicycle sharing system program and more number of programs are starting every year. The largest systems are implemented in cities like Hangzhou and Shanghai of china having 90 thousand and 60 thousand bicycle respectively. Over the past 10 years, station-based bike sharing has been introduced to many cities all over the world and it is successfully working.

The current system introduced in Pune uses website for getting information about the bicycle stations commonly called base stations. Consumption and speed of internet facility for website is quite larger when compared to mobile applications. In this paper, we would like to introduce mobile applications for people convinence. Instead of the use of RFID card as additional component we use QR code for authentication and add lithium battery as additional component for use when consumer drains out of charge in their mobile phone.

## LITERATURE SURVEY

In last decade, different kind of system has been proposed by different countries. Some of the systems are reviewed below.

A smartphone based system called "Green Bicycling" has been developed for public bicycle sharing system using IoT. The aim of this system is to improve the experience of the cyclist and to use it for daily purpose. In this system, it allows the cyclist to get information about bicycle station spots along with number of cycles available. The network prediction model is used to find the location of the cycle. Along with these, in this system, there is provision for the system to measure how much calories burnt during the trip. The system application is developed in the Windows OS based Phone.

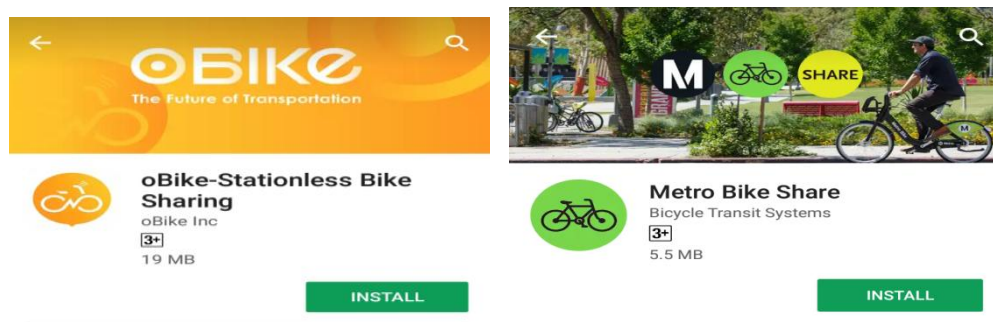
Bicycle Sharing system Analysis and Trip prediction is the model proposed by United states of America in which people can get and give back bikes at any stations very easily. The main purpose of Bicycle sharing system module is green and low carbon efficient system development.

An IOT based Solution for public bicycle sharing system was proposed by Kai-Way Chun, Chi-chia sun. The aim is to effectively reduced bicycle theft rate through localization method. The main proposed IOT introduce lithium battery charger to collect energy from the bicycle. It is working based on the remote operator to relocate spare's bike to reduce bicycle station congestion status. This is the Theft control mechanism.

Ying Zhangl, Zhengdong Huang is proposing the "Performance Evaluation of Bike Sharing System".IITC faculty, University of Twente, Enscheda, Netherlands, School of Urban Design, Wuhan University, Wuhan, China and give to name "Intelligent Transportation Systems."The advantage of this system is self service and manual. A public rent card is used to rent the bike and this card can be bought using any valid documents. The main disadvantage of this system is that the cost is not accurate.

Some of the mobile applications that we referred are: Obike Stationless Bike, Our Bike, Metro Bike Share, City

bike Liverpool, NYC Bike Map Offline, Café Bike, Rovereto Bike sharing. The disadvantages in these applications are tried to rectified in our application. Some of the application require facebook account for login and other does not have GPS facility. Updation of the application is not proper. Some application requires lots of memory space and in some application there occurs a problem in login during insufficient charge in your phone. For this we planned to use lithium battery for emergency purpose.



**Figure: Related Mobile Applications**

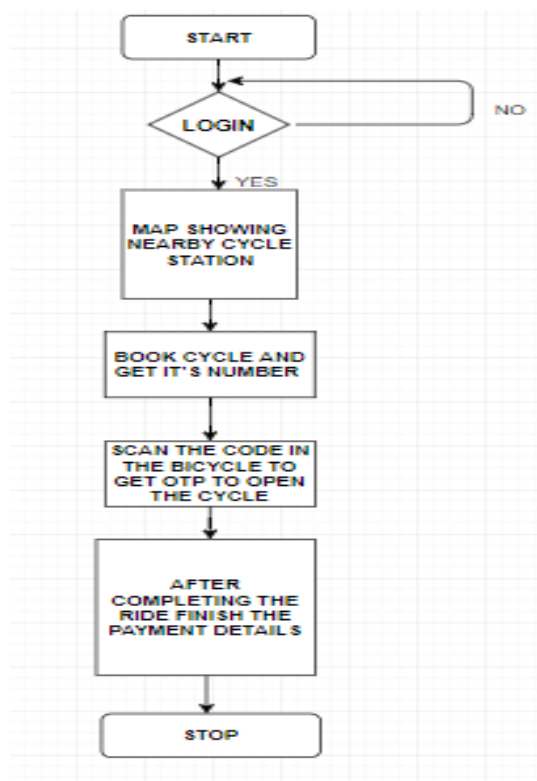
## PROPOSED SYSTEM

Traffic is the important issues identified by Chennai citizens. Widening roads flyovers are the temporary solution. Public bicycle sharing is the term for the use of the bicycle on a need basis for short trips without having to own one. Users can check out the cycle station at anytime of the day, use it and return it to any cycle station located nearby their destination. Various stations will be placed near popular and traffic prone areas like bus stop, trains stations, market place where trips and journeys on cycle can be made easily. Depending on cities number of cycle stations and bicycles are provided. For this purpose we decided to propose a system based on Smartphone application for public bicycle sharing system. This app provides information about the cycle station and spots the number of cycles, which can be rented based on the usage. Those cycles can be returned to the cycle station nearby to their location. In this app we use Bar Code Reader for smaller distance and QR Code for longer distance to unlock the bicycle and to avoid theft problems. Scanning of the code in mobile gives an unique code to the user through Bluetooth. User can login using that unique id. Missing of bicycle can be found by using GPS facility. Issue of lack of charge in mobile can be overcome by the usage of lithium battery. The clear description about the steps in cycle sharing system is clearly explained in preferable language. The cash can be paid after usage of the bicycle or can be paid in advance.

DISADVANTAGES OF EXISTING SYSTEM	ADVANTAGES OF PROPOSED SYSTEM
Uses QR code for security which drains lot of memory.	Uses QR code for longer distance and Barcode for shorter distance. Can save memory.
When battery drains cant use the application.	Uses lithium battery for emergency charging purpose and can continue working.
Uses RFID card for security purpose which it an reliable.	Uses digital number lock generated while scanning QR code or

	Barcode.
Developed in foreign countries and in India developed only as webpage which is not reliable and efficient.	Developing as an android application which is more user friendly and reliable.
Cycle station location and number of cycles available is not be accurate.	The details about the cycle station's location and number of cycle available will be accurate.

## MODULES WITH FLOW DIAGRAM



## HARDWARE IMPLEMENTATION

For security purpose we planned to design a cycle lock based on QR code and Barcode. Either the barcode or the QR code will be attached in the bicycle based on the distance the customer is going to travel. The person first need to scan the barcode or the QR code using this mobile app and it will be send to the server. The server will send a security number to his mobile phone and that number should be entered in that digital lock. If this number matches with that the lock opens else not.

The QR code stands for Quick Response code. A QR code appears to be a two-dimensional matrix barcode which consists of square dots arranged in a square grid. The working of a QR code is that the square dots aligned on the square grid are read or scanned by an scanning device like camera, until the image of the code is fully interpreted. Once the image is fully captured by a scanning device, it extracts the data embedded in the horizontal and vertical elements of an image

and presents it to the user.

A barcode is a linear representation of data which can be read or scanned by an optical device to provide information about the particular item. This representation is nothing but a systematic arrangement of various vertical parallel lines, which vary from each other by their width or the spacing present between them. The barcode is said to be one-dimensional encoding in nature, since the linear arrangement present in a Barcode is vertical. There are two types in barcode such as linear and 2D. The UPC (Universal Product Code), is a linear barcode which consists of two parts such as the barcode and the 12-digit UPC number. The identification number of the manufacturer is found in the first six digits of the barcode. The next five digits of barcode the product's number. The last enables the scanner to determine whether the barcode was scanned correctly or not which is called as check digit. A linear barcode can hold any type of text information. In contrast, a 2D barcode is more complex and can include more information in the code such as price, quantity, web address or image. A linear barcode scanner can't read a 2D barcode which requires an image scanner for reading the information embedded in a 2D barcode. Most barcode scanners consist of three different parts including the illumination system, the sensor, and the decoder. Barcode consists of black and white elements which are scanned by illuminating the code with a red light, which is then converted into matching text. More specifically, the sensor in the barcode scanner detects the reflected light from the illumination system (the red light) and generates an analog signal that is sent to the decoder. The decoder interprets that signal, validates the barcode using the check digit (the last digit in the Barcode) and converts the check digit into text. The converted text is delivered by the barcode scanner to a computer software system holding a database which contains details about the customer.

The QR code is same as that of barcode which is compared to an information matrix. The difference between QR code and Barcode is that a barcode stores information in the horizontal direction, whereas a QR can store both directions. So what QR codes are called as two-dimensional which stores information both in vertical and horizontal directions. Another advantage is that it takes only smaller space for storing information. The advantages of QR code is that it can store information hundred times to that of Barcode. When comparing the display of both conventional barcode uses ten times the amount of printing space than that of QR code for the same amount of information. A QR code can be scanned from any direction in 360 degrees and also eliminates interference and negative effects from backgrounds.



## SOFTWARE IMPLEMENTATION

Cycle sharing provides an ideal transportation for short trips and a feeder to other public transport options in newly developed cities and town. Bicycle sharing can help to reduce pollution, traffic congestion, noise and improve safety



on their route. For users, it is a healthy mode of transport, often quicker than other modes for short distances, without the need to maintain the cycle or worrying about where to park. Along with these GSM will be provided to our app in case of emergency such as cycle puncture or accident etc. For cycle sharing system we would like to create an mobile application. If the user need to use the cycle regularly they can create an account and can pay the cash in advance after knowing the facilities of our application. After login or signup the user can see the availability of the bicycle station near your locality and number of bicycle in that particular station. The user can book a bicycle, once the bicycled is allotted no other the user can allot it for particular time period. For security purpose we have used a QR code and barcode for unlocking the bicycle. For longer distance QR code and for shorter distance barcode to unlock the cycle. Either QR code or barcode will be attached in lock of the cycle. The user need to scan the code using the scan option in our app. Once it's scanned the administrator will send you a security code to be entered in digital pad of the lock on the bicycle. The security code cannot be used more than one time. The user can park the bicycle in any of the bicycle station near their destination place. The payment can also be done using our app through online banking.

## RESULTS AND DISCUSSION

In every ride, the bicycle-share remains elementary: user can get a bike from one place and return it back it to another place. In bicycle-sharing system is a service where bicycles are made available for shared use to individual's user on a short term basis. The bicycle sharing system allocates bicycle to the users securely and the authorized users can unlock the bicycle by successfully scanning the QR code provided in the particular bicycle. GPS provides real-time location of the bicycle by using GSM through GPRS, and also which serves as theft protection and emergency situation handling. Further lithium battery attached to the bicycle and use when the customer runs out of the charge in mobile.

## CONCLUSION

Main reason for the pollution in urban areas is the traffic congestion and it provides people with an worst environmental condition. The proposed system is implemented for limited distance. Usually people use bike for small distance which causes pollution and expensive than bicycle. For this purpose bicycle can be preferred. The system helps to meet the mobility, sustainability and economic challenges of the future. Bicycle sharing system leads to a pollution free and less traffic congested environment.

**Ethical clearance** - Not required

**Source of funding**- Self

**Conflict of Interest** - Android Mobile Application For Cycle Sharing System

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