

CYCLE LOCATOR AND ANTI THEFT SYSTEM

Team :

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Abstract :

A big problem faced by the students of IIT Patna is that they lose their cycles. Some get them back, after a lot of searching, and some don't. There are around 15 people in the CSE 2015 batch who have lost their cycles before the start of the second semester and have never found, of which two belong to our team. There are cases where our cycles are taken by some people during crucial times, such as before semester exams. The lost cycles are found at random places, like campus gates, at the blocks and sometimes at the canteen.

The following lines would depict why this problem is important. A cycle loss is a financial loss to the owner; an average cycle costs around Rs 3000. It creates a difficulty for the commuters, as the buses are relatively more crowded during the rush hours (9:00 AM, 1:00 PM, 2:00 PM and 5:00 PM). Many people who have lost their cycles commute on foot, as they don't get place in the bus. Commuting between the hostel and the tutorial block during extreme weather conditions (such as during the early days of January, where the temperature goes as low as 8C at 9:00 AM; in mid April, where the sun is directly overhead during 1:00 PM.) is not good for health. Commuting on foot during late hours is dangerous, due to the snakes which are occasionally seen beside the roads.

The "losing cycles" problem is quite serious, as it is frequently faced by many students. Our team would demonstrate the idea of treating this problem effectively, by creating a prototype, as a project.

Aims and objectives :

The objectives of our team for this course are as follows :

- 1) Prevent further cycle losses, by creating a system which notifies the watchmen at the gates, when our cycle is being taken by some other people outside the campus
- 2) Helping the owner to recover their cycle, by telling him the current location of the cycle, if he has lost the cycle inside the campus.

Existing systems :

A system, named as BikeTrack, exists, which addresses this problem. It was created by Ted Tsung-Te Lai, Chun-Yi Lin, Ya-Yunn Su and Hao-Hua Chu, Department of Computer Science and Information Engineering, National Taiwan University.

This system requires frequent recharging of the bluetooth tags. Also, due to the big size of the tags, the chances that the cycle thief would disable the tag by breaking it, is quite high.

Our system would use passive RFID tags, which wouldn't require any recharging at all. Theoretically, the life time of the tag, which would be placed in the cycle is infinity. Also, as the size of the RFID tags is very small, the chances of disabling the system are low.

Reference of the existing system :

http://www.csie.ntu.edu.tw/~yysu/BikeTrack_phonesense11.pdf

Novelty :

The novelty of our project is that it would also provide an assurance that the cycle can never be taken out of the campus, without the permission of the user; a feature missing in the existing systems. The user can control the cycle using his app.

The implementation of this would be very cheap for the participant. Each tag would cost around Rs 30, which once placed in the cycle, will not require recharging and maintenance. The RFID reader, which are relatively costly, once installed in strategically chosen locations, would also require minimum maintenance.

Also, from the data received through this system, it is possible to generate statistics and use them while making decisions regarding construction of new blocks, roads etc.

Hardware, software and technology used in our project :

For unique detection, we have used RFID technology. An RFID reader detects an RFID tag uniquely, by interrogating it with its magnetic field and recording its response. Also, every RFID tag has a unique EPC, which makes the idea of unique detection possible.

We have used android to implement our application. The data transfer to and from the application happens using Volley which stores in a remote xampp server MySQL

database. This database stores the last five locations of cycle with the time. In the application you can control when to allow your cycle to go outside the campus.

The data transfer between the RFID readers and the data base occurs through a data gateway – raspberry pi. The code for the data transfer uses java JDBC to MySQL connector, which first connects to the database, and then sends request on detection. All this happens in a very minute time, maintaining the essential feature, the real timing of our project.

The working of our project:

The RFID readers would be placed at the mentioned locations, on the map. If the reader triggered is not a reader placed at the gates, the reader would just send the location and the time to the database. If the reader at the gate is triggered, it would send the location to the database and send a check whether the user has permitted the usage of his cycle. If the user hasn't permitted, the alarm at the gates would be triggered. The guard would then stop the cycle from going out of the campus. If the owner permits the usage, no alarm would be triggered, and the rider could leave freely. So, if the owner plans to go out, he has to check a box in his app, otherwise, he would be stopped at the gate.

Additional resources :

- 1) 125KHz LF RFID tags, around 10 for demonstration.
- 2) 125KHz LF RFID readers around 5 in number.
- 3) 5 Raspberry Pis.