Implementation of Eco-Friendly Transport System by Using Arduino Solenoid, GSM Module & RFID Card Reader

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Abstract – Many people are more interested in cycling for fitness as well as sport. When riding finished, user can view and share your mapped rides and statistics, including miles travelled, calories burned, cost etc. Solenoid type lock is used to lock or unlock the bicycle based on the movement of its slug. Relay will control the solenoid type lock using low power signals. Here push buttons are used to take inputs from the user to determine whether the user is taking the bicycle or docking it. The RFID card reader is used to verify whether the user is valid or not. The liquid crystal display provides a guide to the user. The GPS is used to track the bicycle location.The bicycle locking stand was designed taking ergonomics into the consideration so that the user can insert into the stand easily. In this way the prototype of the system will be created.

Index Terms – Environment-friendly transportation, bicycle share system,GSM module, RFID,Micro Controller.

1. INTRODUCTION

Now-a-days most of the students and staff were using two-wheeler or four-wheeler vehicles as a means of transport in their college premises. Since these vehicles run on petroleum, compounds like co2,co,methanol etc… are produced which leads to climatic changes resulting Global warming effect.That's the reason we propose bicycle sharing system as Eco-friendly solution for transportation not only in college institutes but also for public usage.

Fig 1.Dock System

It is a service in which bicycles are available for shared use to individuals for short term basis. It is the procedure where people are allowed to take bicycle from one point and can be return in some other point . User should be responsible for any type of damage or loss until it is returned back safe .People at the site of parking have been upset by making the side walk less accessible .So, we propose dock system where group of bicycles are placed together at one place .The following system architecture represents dock system.

1. Arduino Mega 2560 microcontroller

It is basically used in communications and in controlling or operating many devices.ATmega2560 controls all the actions taking place in the locking and unlocking process of the bicycle.

2. Liquid Crystal Display panel

It provides a user interface which displays the sequential operations to guide the user. It is connected to Arduino micro controller.

3.Radio Frequency Identification card reader

It reads RFID cards and verifies whether the user is valid. RFID tag is placed in nearby docks. Radio frequency waves are continuously generating from card reader, and when the user comes in the frequency range he /she will be able to know whether the upcoming dock is having space for return the bicycle or not.

4. Ultrasonic sensor

The sensor has 2 openings on its front. Senses the presence of bicycle on the stand using ultrasonic principle. 5V supply is provided.

5. Relay

Controls the solenoid type lock using low power signals from the micro controller.

6. Solenoid type lock

It is unlocked in the power-on mode type, and locking and keeping in the power-on mode type, which can be used selectively for situations

7. Global System for Mobile Communication

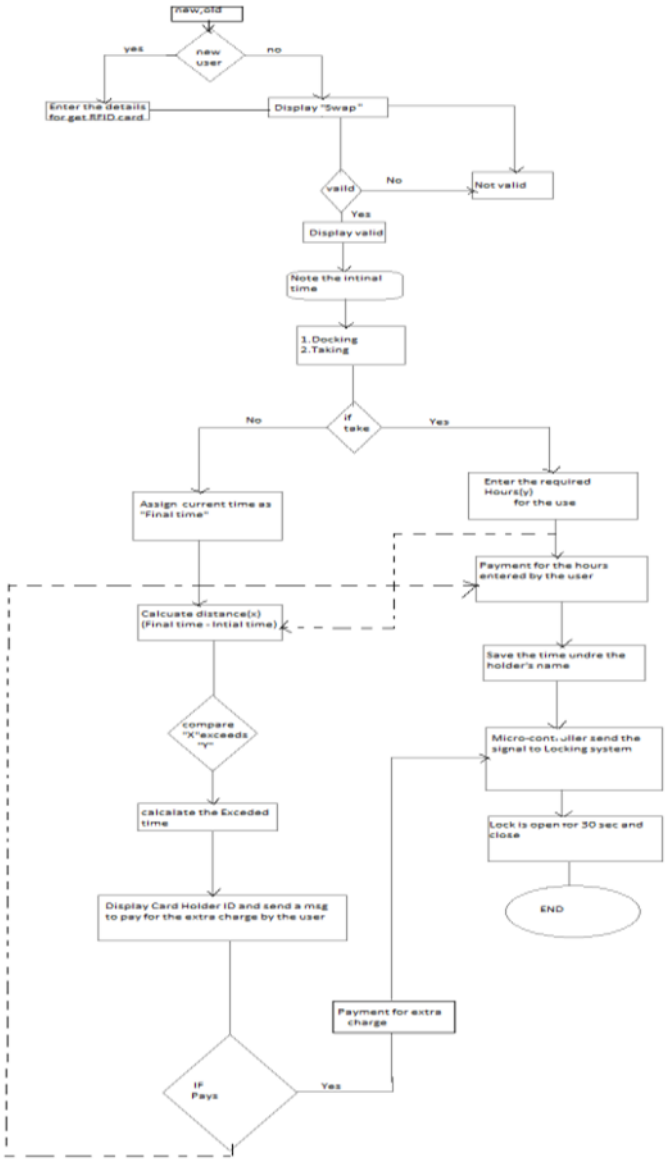
GSM is a cellular network, which means that cell phones connect to it by searching for cells in the immediate vicinity.SIM900 GSM module is used for sending a text message to the user and a bicycle share system supervisor when the user crosses the time limit. It is supplied from a 12V, 2A source.

2. FUTURE WORK

1. Designing more number of Docks.
2. Designing more number of Docks for Bicycle
3. All the information about user who access bicycle on a large scale will be stored in a data base
4. Bicycle location can be tracked using GPS
5. A buzzer is fixed to bicycle which alerts 10 min prior to docking time

3. SOFTWARE DESIGN

The flowchart demonstrating the sequence of operating the bicycle sharing system is shown in Fig



4. IMPLEMENTING SUSTAINABLE MOBILITY

Bicycle sharing, mainly for short-duration usage, can be an efficient took in global bicycle policy at local level. In an effort to reduce the number of car trips made in the city, and the associated pollutant emissions this scheme of bicycle sharing system was introduced. The objectives were to:

extend the bicycle sharing system to be available 24/7

encourage soft modes for home/school and home/work travel and related to leisure activities.

Dockless- No docks /docking stations required for bicycle parking .The user can leave the bicycle anywhere.It could cause clutter if cycles are left in a haphazard manner

Initially , user will be displayed of two options 1) New user & 2) Old user on the LCD panel. If he\she is a new user , the user has to enter the required details for getting RFID card. If the person is a cardholder , then the user is allowed to swipe the RFID card on the RFID reader. If the card is valid , LCD screen will display VALID. Otherwise it displays INVALID. The LCD will display options 1) DOCK 2) TAKE. If the user selects "TAKE" option , he\she will be asked to enter the required hours (Y) and payment for entered hours will also be done.

The time noted by microcontroller will be stored as 'initial time' under the cardholder's name. Microcontroller sends signal to locking system for unlocking a bicycle. Lock opens for 30 seconds and then closes. If the user is to "DOCK" a bicycle , then the current time will be assigned as 'final time'. Distance will be calculated using 'final time' and 'initial time'. Let the calculated distance be (X). Compare both calculated distance(X) and entered required hours(Y). If "X" exceeds "Y", then calculate the exceeded time and send a message to respective cardholder's ID to pay for the extra usage by the user. If the user is willing to pay, extra payment will be made. After then microcontroller sends signal to locking system which opens the lock for 30 seconds. If the user didn't pay for the extra usage , this amount will be added to the payment for the hours entered by the user when he comes next time.

5. PROPOSED SYSTEM

Different systems available in bicycle sharing are Docked and Dockless.

Docked – It requires physically installed docks where bicycles are "docked" when not in use. Cycles must be taken from and returned only to the docking stations. It requires dedicated space for the docked stations .The various options for the users to use the bicyce

In our proposed system, payment will be made based upon the input given by the user i.e, no. of hours required by the user. Using this required hours entered by the user, amount will be calculated.

To overcome this problem docks are implemented in our project

Docks are made available at all places for the convenience of the users.

6. PROBLEM DESCRIPTION

Dock less bicycle shares are services that allow short term rental of bicycles that can be parked on a sidewalk after use.

Due to this , some people have been upset at the site of bicycles parked in inappropriate places making sidewalks less accessible.

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