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SURVEY ON A CONCEPTUAL SMART BICYCLE

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Abstract—In the present day scenario, pollution free travel is becoming increasingly ubiquitous day by day as a flexible transportation mode. As bicycle is the most used pollution free vehicle in this world, bicycle riders expects the bicycle with improvised technical specifications. This triggers the need for a bicycle that has features like navigational capabilities for easy travel, automated lighting to save power, vehicular tracking to track in case of theft, et al. The dearth of such systems needs to be addressed.

I. INTRODUCTION

The exigency of finding alternate means of transport is of utmost priority these days; bicycles are the quintessence of pollution free vehicles. Requirement for a less strenuous navigation system is needed to keep one's eyes on the road. This engenders the need for an anti-theft mechanism fitted to bicycles given the fact that rising sales of cycles will be commensurate to bicycle related crimes.As far as safety is concerned, a plethora of cycle related accidents are during night time. Therefore, a necessity arises for automatic lighting based on the surrounding light intensity. In précis, the adumbration of the project would be to saves power as well as lives.

II. EXISTING SYSTEMS

1. SmrtGrips:

A kickstarter campaign – smrtGRiPS seamlessly integrates eyes-free navigation, haptic feedback notifications and a bike tracker. iOS and Android Ready.

Diameter: 15.8mm, Length: 152mm.

Battery life: One charge will last 3 months under normal use (2 hours of riding per day/Beacon in operation 24/7). Good for 800 cycles (at least 3 years).

Connectivity: Bluetooth Smart 4.2.

Device Compatibility: iPhones 4s & later. iPad 3rd Generation & later, and Android devices with 4.4 or above.

2. Schwinn CycleNav Smart Bike Navigator

Free mobile application paired with a handlebar-mounted smart-bike navigation unit designed to give riders turn-by-turn audio and visual navigation from their handlebars.

When connected to a smart phone via Bluetooth, provides audio commands and visual light indicators to direct riders to their desired destination.

With your phone in your pocket, basket or bag, your hands are free to steer while CycleNav speaks directions and flashes turn indicators making it safer and easier than ever before.

III. PROPOSED SYSTEMS

1. REGARDING NAVIGATION:

Utilization of OpenStreetMaps for the map layout. SDK's provided by various vendors can be used to implement the following features:

- Turn By Turn navigation using an alert mechanism.
- Proximity alerts for various distances.

- Indication by LED screen about the turns.

Reasons to choose these features:

- Smartphone can get stolen if mounted on the bicycle.
- Studying of GPS in addition to making an android navigation application.
- Since Google Maps can't be embedded in 3rd party apps for turn by turn navigation, there is more flexibility in the tools used.

2. REGARDING ANTI-THEFT:

Smart bicycle intends to track the bicycle by sending a pre-defined message to the GSM/GPS module which in turn sends back the cycle location to the owner. The owner can then find out if there is a change in position judging from his present location.

The materials used in this project:

- SIM908 which is a GSM/GPS module.
- Android application supporting automatic reading and sending of SMS.

The reasons why we are using this feature:

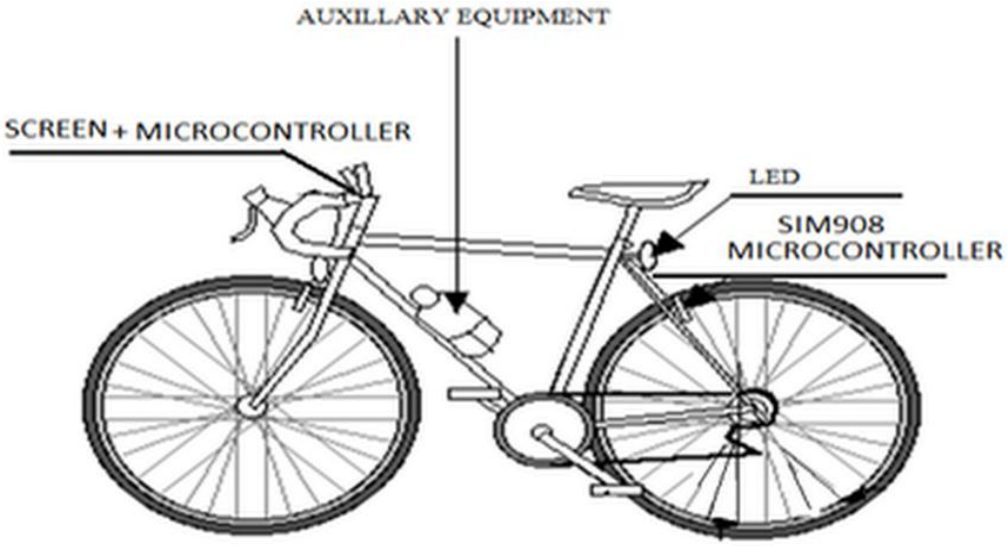
- Easy tracing of cycle in case of thefts which is ubiquitous.
- Can track present location of thief if the thief is in possession of the cycle

3.REGARDING AUTOMATIC LIGHTING:

This feature uses the concept of photodiodes. Depending upon the intensity of light falling on the photodiode, automatic light is switched on/off.

An ON/OFF switch is present for the user to engage the mechanism when the user wants to start cycling. This satisfies the mechanism of saving power when the user is not using the cycle.

IV. BASIC REPRESENTATION OF THE PROTOTYPE



V. OPERTARION OF THE COMPONENTS

1. NAVIGATION COMPONENT:

Sequence of events that occurs when an Android application running on a mobile device is interacted by the user:

- The android application has a destination text box field which is used to take the users **input**. When the user enters a valid destination and confirms the destination, the map computes the route to be followed.
- The information from the next maneuver to be taken can be extracted to find out if the next turn is left/right and the distance between the maneuver. The direction of the turn is showed on the LED screen.
- The data collected from the previous step is used to provide alert to the user about what kind of maneuver to take.
- When the destination has been reached, the navigation stops.

2. ANTI-THEFT COMPONENT:

In order to enable this feature the following steps have to take place:

- User first sends a message to GSM/GPS module which is attached to the bicycle. This message consists of the request for location.
- The module further verifies the details of the sender and if it matches with the predefined details, the location is sent back to the users' text inbox in the form of an SMS.
- This SMS contains the details of latitude, longitude. With the help of this information, the user can use these details to plot on a map.

3. AUTOMATIC LIGHTING COMPONENT:

The following steps are involved in the operation of the automatic lighting component:

- Depending upon the light intensity falling on the resistor which is connected to the arduino, the LEDs fit on the front and rear of the bicycle are lit up.
- A switch connection is established between the arduino and the LEDs in order to ensure that there is no wastage of energy.
- As light intensity increases, the resistance of the LDR decreases according to the formula R=500/Lux.

VI. CONCLUSION

It's a beneficial to ride a bicycle with a step ahead with navigation system, automatic lighting system and since the market prices are hiking, bicycle manufacturers are increasing the production cost, hence embedding an antitheft device which would send the coordinates of its location to the user s application would be very helpful from financial loss too.

In this learning process, automatic lighting system which are in class B segment cars, are implemented on bicycle which also demarcates from a normal bicycles. Also, it saves energy as it turns on only when light intensity is not of the human visible range.

Our third party application consists of an efficient navigation system , navigating the rider to the destination through the best routes possible, thus solving a new person in town the time as well as confusion based on routes to his destination.

VII. FUTURE ENHANCEMENT

An electric motor can be used to run the bicycle , powered by a battery that can be charged using a solar pannel.

A distance sensor can be used to automatically control the electric motor's speed in case of vehicles ahead. With an additional support wheels on parallel with the rear wheels can be used along so that making it possible for blind people to use. This also includes a voice enabled commanding system as well as voice indicator that detects barricades, humps, ditches etc from a camera fit near the headlamp that can detect the following 15 to 20 meters prior on the way, alerting the rider. Also a central database system can be used that could store the humps, barricades etc from the previous commuters or riders who has the application.

In case of a blind person riding ,an emergency number can be stored that would be alerted incase of high intensity of impact on a fall or a crash based on sensors reading that can also detect if a person is on the bicycle or not else would lead to system failure.

Bicycle's tyre structure can be changed based on honeycomb structure that doesn't need air to put on pressure .Also is puncture less.

VIII. ACKNOWLEDGEMENT

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