SMART BICYCLE BASED ON IOT USING RASPBERRY PI

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Abstract:

Design of Bicycle monitoring and tracking system using RASPBERRY PI is proposed. The smart module is used to track, monitor, and surveillance and finds the accident spot and intimate to the monitoring station. The proposed design provides information regarding cycle identity, speed, and position on real time basis. This info area unit collected by the Raspberry Pi by victimization totally different module and dispatch it to the watching station wherever it stores the knowledge in information and show it on Graphical program (GUI) that's user friendly.

Keywords: Block diagram of GPS, IR sensor, Raspberry pi

1. INTRODUCTION

This project consists of associate degree mechanical man primarily based remote bicycle disengaging system can give effective, real time bicycle location, mapping and reportage this info price and add by up the extent of service provided. A bicycle tracking system will inform where your bicycle is and where it has been, how long it has been.

The system uses geographic position and time info from the world Positioning Satellites. The system has an "On-Board Module" which resides in the bicycle to be tracked and a "Base Station" that monitors data from the various bicycles. This contains the information regarding position of rider and climatic conditions. The information given to watching station is in continuous manner and once the accident happens. The current industry is battling the problem of lack of knowledge concerning the performance of product and its sub systems throughout its usage, which can later be used for future development or rising this product or sub systems. This is mainly due to the fact that the collection of data from sub systems of gasoline vehicles is hectic and processing such large chunks of data is not possible. But with the advent of electric vehicles and owing to its simplistic design and lesser number of parts one can collect large amounts of data from the vehicle and use it for further research. With cloud connectivity, this data can be transmitted at real time and this paves way for an entirely new era in the transportation sector leading to intelligent connected transportation systems. Automotive grade Linux OS platform is an upcoming product whose development is completely open sourced and many automobile giants are already adopting this OS which can be used as base to develop informatics and infotainment systems and other applications based on the data. This paper presents an effort on how we can combine automobile, data processing and cloud connectivity technologies which are fundamental in establishing a connected vehicle system. Fundamental sensors like Speedometer, GPS and Accelerometer and gyro are used to develop the module using Raspberry Pi, the data from which is logged onto a database file and this info is transmitted via Wi-Fi and any GUI is developed to show ride metrics.

2. BLOCK DIAGRAM

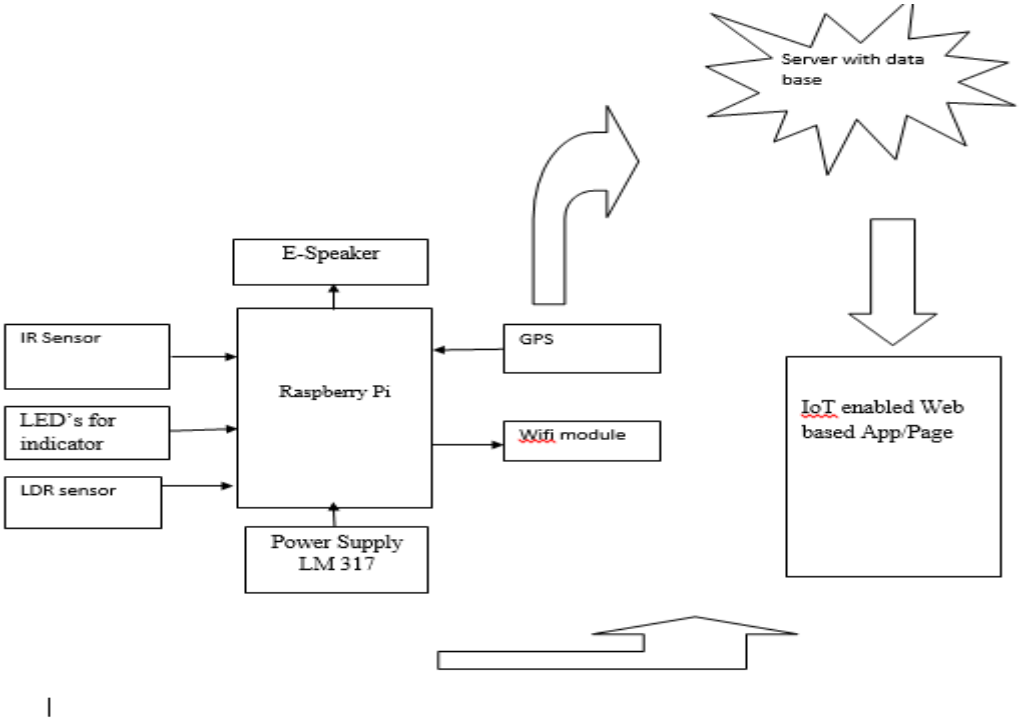

Fig 1: Block diagram of smart bicycle prototype

Basically the project is a Smart bicycle having advanced Raspberry Pi interfaced with different sensors like IR sensor for distance maintenance and accident avoidance, GPS for position tracking, Indicators for automatic direction indicator and E-speaker for voice command and Wi-Fi for updating data to server is as shown in fig 1. All the above hardware's are connected to bicycle to continuously track the data. In case of any fluctuations the hardware inform the rider first using E-Speaker and then the Raspberry Pi will send the data to server and server will send the data to mobile App of the care takers. The care takers can be able continuously track each and every detail of rider from anywhere in the world with the help of Internet of Things.

3. RASPBERRY PI

The history of the Raspberry Pi was primarily introduced in 2006. Its main concept is based on Atmel ATmega644 which is particularly designed for educational use and intended for Python. A Raspberry Pi is of small size i.e., of a credit card sized single board computer, which is developed in the United Kingdom(U.K) by a foundation called Raspberry Pi. The main motto of this foundation is to promote the teaching of basic computer science in the education institutes and also in developing countries. The first generation of Raspberry was released in the year 2012, that has two types of models namely model A and model B is as shown in fig 2.

Raspberry Pi can be plugged into a TV, computer monitor, and it uses a standard keyboard and mouse. It is user friendly as can be handled by all the age groups. It does everything you would expect a desktop computer to do like word-processing, browsing the internet spreadsheets, playing games to playing high definition videos. It is used in many applications like in a wide array of digital maker projects, music machines, and parent detectors to the weather station and tweeting birdhouses with infrared camera.

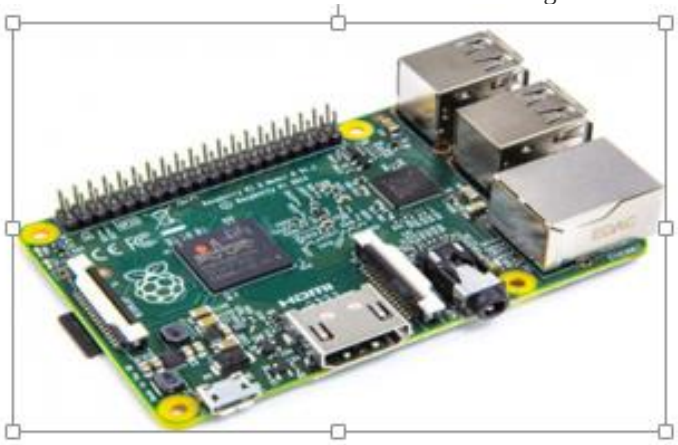

Fig 2: Raspberry pi board

4. IR SENSOR

An infrared sensing element is associate degree device that emits so as to sense some aspects of the environment. An IR sensing element will live the warmth of associate degree object similarly as detects the motion. These kinds of sensors measures solely infrared, instead of emitting it that's known as as a passive IR sensing element. Usually within the spectrum, all the objects radiate some sort of thermal radiations. These kinds of radiations square measure invisible to our eyes which will be detected by associate degree infrared sensing element. The electrode is just associate degree IR light-emitting diode (Light Emitting Diode).

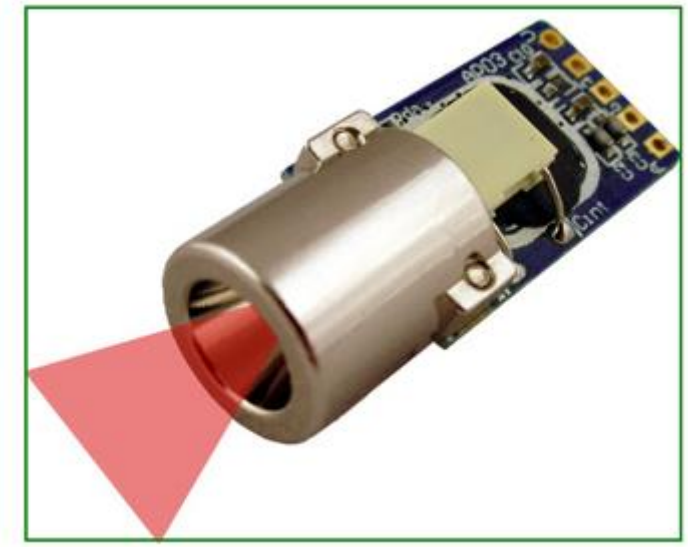

Fig 3: IR sensor

An infrared sensing element circuit is one in all the fundamental associate degreed fashionable sensing element module in an device. This sensing element is analogous to human's visionary senses, which may be wont to observe obstacles and it's one in all the common applications in real time. This circuit comprises of the following components in this project, the transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module. An IR output terminal of the receiver varies relying upon its receiving of IR rays. Since this variation can't be analyzed in and of itself, therefore this output can be fed to a comparator circuit. Here an operational amplifier (op-amp) of LM 339 is used as comparator circuit is as shown in fig 3.
When the IR receiver does not receive a signal, the potential at the inverting input goes higher than that non-inverting input of the comparator goes low, but the LED does not glow.
When the IR receiver module receives signal to the potential at the inverting input goes low.
Thus the output of the comparator (LM 339) goes high and the LED starts glowing. Resistor R1 (100), R2 (10k) and R3 (330) are wont to make sure that minimum ten mA current passes through the IR light-emitting diode Devices.

5. GPS

GPS or Global Positioning System is a satellite navigation system that furnishes location and time information in all climate conditions to the user. GPS is used for navigation in planes, ships, cars and trucks also shown in fig 4. The system offers crucial skills to military and civilian users round the globe. GPS provides continuous real time, third-dimensional positioning, navigation and temporal arrangement worldwide

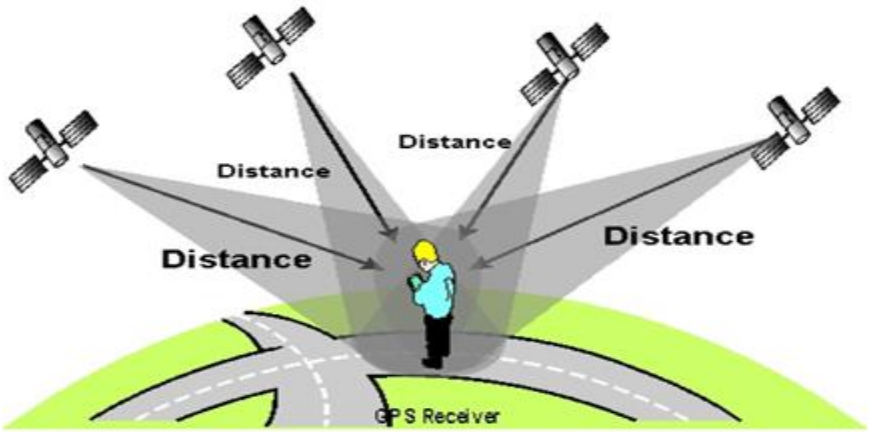

Fig 4: GPS

The GPS system consists of three segments:
1) The space segment: the GPS satellites
2) The system, operated by the U.S. military,
3) The user section, which has each military and civilian users and their GPS instrumentation.

6. Internet of Things

The Internet of Things (IOT) is a scenario in which objects, animals or people are provided with single identifiers and the capability to automatically transfer and the capability to automatically transfer data more to a network as shown in fig 5.Without requiring human-to-human or human-to-computer communication. IOT has evolved from the meeting of wireless technologies, micro-electromechanical systems (MEMS) and the internet.

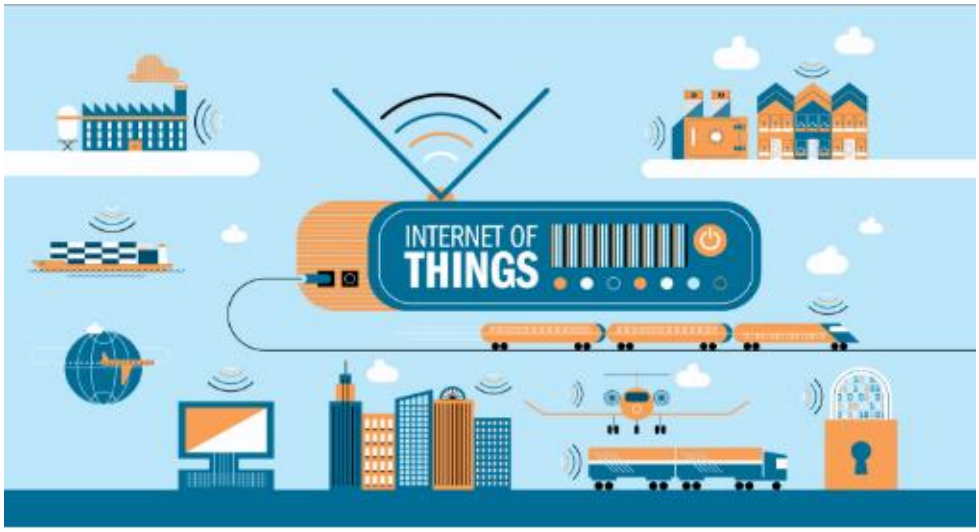

Fig 5: Internet of things

7. Technical specifications

A.Operating voltage of embedded circuitry is 3.3vdc
B. Current consumption of device in active mode 200mill amp
C. Operating frequency of device is 10MHZ to 60MHZ

8. Advantages

- Economical
- Portable
- Low MAINTENANCE COST
- GIVES VOICE BASED GUIDANCE.
- AVOIDS ACCIDENT BY USING PROXIMITY TECHNOLOGY.
- LOCATION WILL BE SENT TO APP IN CASE OF ANY EMERGENCY.
- RIDERS HEALTH WILL BE CONTINUOUSLY MONITORED USING HB SENSOR

9. Applications

- It can be in safety for two wheelers.
- It can be used in sports bicycles.
- It can be used for adventures rallies.
- Smart bicycle's help keep cyclists safe on roads with new technology
- Allowing cyclists to use their Smartphone on the go

10. Conclusion

In this project we have proposed an Informatics system which displays the riding information onto any device which can run a web page. Given that info} assortment and data show area unit freelance of every different one has the advantage of coming up with the webpage to show ride information in his own manner. In future one connects battery info to the module to see for battery standing and different important sensors to the module and may interpret the information remotely. The Wi-Fi based communication can be replaced by the mobile internet from the service provider to maximize the network range.

11. References

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