Bicycle Inventory Management System (BIMS) Operating Manual

Code: https://github.com/aovadia/Capstone-Summer-2017

Capstone Bikes

Version 1.0.0

Thank you for purchasing the Bicycle Inventory Management System (BIMS). This manual shows how to operate the software and device smoothly and correctly. Make sure to read this manual carefully before using this product. Please note that specification and information are subject to changes without prior notice. Any change will be integrated in the latest release. The manufacturer assumes no responsibility for any errors or omissions in this document.

Introduction to BIMS

The Bicycle Inventory Management System (BIMS) is comprised of the software and hardware that allows you, the bike shop owner, to easily manage all of your bicycles from one secure application.

With BIMS, you will get realtime GPS tracking of each bicycle, along with a full suit of comprehensive analytics. With realtime GPS tracking and advanced analytics, you will possess anti-theft protection and bike health information at your fingertips.

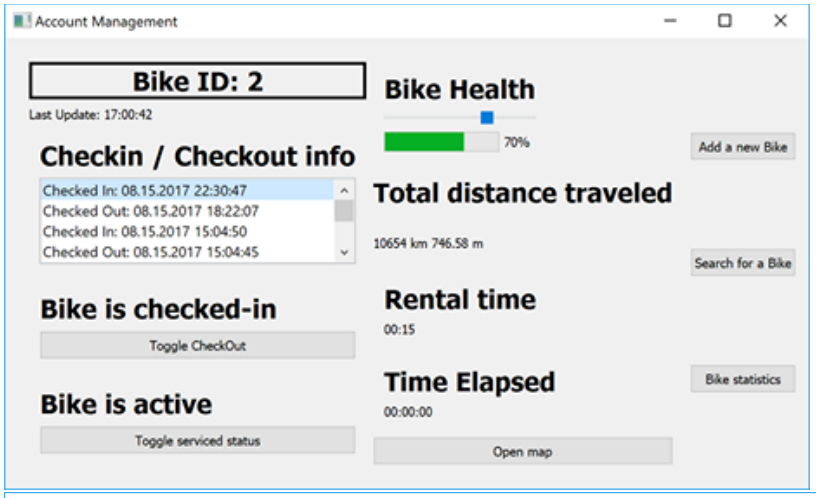
Specifications

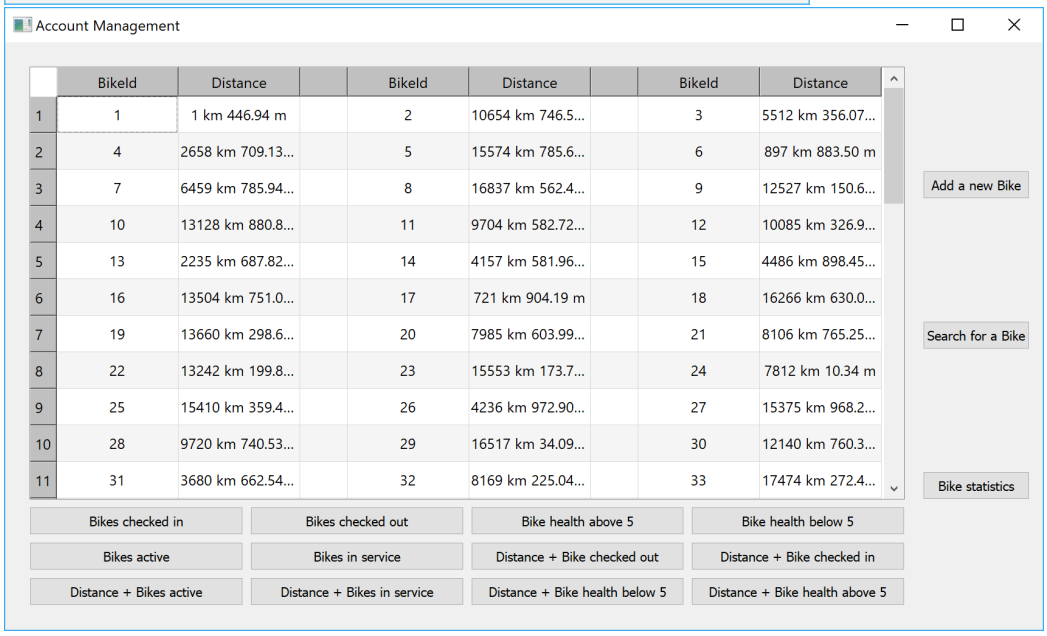
Hardware and Software Specifications

The Hardware

Item #	Name
1	**Raspberry Pi 3, Model B, 1 GB RAM, installed with Raspbian OS**
2	**RPI GPS Hat with GPS Antenna (GPS 900-1)**
3	**Unlocked USB 4G LTE Modem Huawei E397u-53 with sim card**
4	**Micro usb cable**
5	**Rechargable portable battery (input voltage is 5V, input current is 2A)**

The Software





Feature #	Description
1	**See the latest path travelled by any bike on a map (current coordinates of each bike are updated every 30 seconds)**
2	**Scan through advanced statistics**
3	**Monitor bike health and run diagnostics on all bikes**

Installation
Hardware and Software Setup

Amazon Web Services (AWS) MySQL Server Setup
We automatically provide you with a already configured and working server. However, if you wish to set up your own, you can follow the bellow instructions:

Custom AWS MySQL Server Setup
Visit https://aws.amazon.com/rds/mysql/getting-started/ for getting started with Amazon Relational Database System (RDS) for MySql.

Under your AWS console, create DB Instance and select MySql.

Configure your Database settings and launch the DB Instance.

Find your created DB Instance and save the Endpoint information.

From your AWS console, find VPC, go into security groups and find your VPC security group that the previous step automatically created for you. You can then add the IP address of the modem that your ISP provided for you

If, when setting up your 4G sim card, your Mobile Internet Service Provider ISP uses NAT (network address translation) to masquerade and block connection to a routable IP, you can add a Inbound Rule that allows any IP to establish a connection with your server as long as they know the credentials. Inbound rule: MySQL/Aurora (3306) | TCP (6) | 3306 | 0.0.0.0/0

Application Setup
Download the packaged executable application that we sent to you, and then run it.

Click on “Manage Bikes” and input your username and password.

Application Setup for Custom AWS MySQL Server

If you have set up your own AWS MySql server, then in the application's Qt source code you must input your valid server credentials.

Find the MainWIndow.cpp file and configure your server by inputting the correct:

Hostname, Username, Password, Port, and DatabaseName.

```
// Connect to the server
QSqlDatabase db = QSqlDatabase::addDatabase("QMYSQL");
db.setHostName("capstone-bikes.cphpxguj45gw.us-east-1.rds.amazonaws.com");
db.setUserName("db_admin");
db.setPassword("capstone");
db.setPort(3306);
db.setDatabaseName("Capstone_Bike_Shop");
db.setConnectOptions("MYSQL_OPT_CONNECT_TIMEOUT=15");
if(!db.open()) {
       QSqlError err = db.lastError();
       qDebug() << err.text();
}
 query = new QSqlQuery(db);
```

Raspberry Pi Setup for Custom MySQL AWS Server

If you have set up your own AWS MySql server, then you must input your valid server credentials in the Python script that is stored on the Raspberry Pi under: /home/pi/Desktop/gps/GPSInterface.py.

In the GPSInterface.py file, configure your server by inputting the correct:

Hostname, Username, Password, Port, and DatabaseName.

```
from geopy.distance import great_circle
import serial
import pynmea2
from datetime import datetime
import mysql.connector
from mysql.connector import errorcode

cnx = mysql.connector.connect(user='db_admin', password ='capstone',
                              host='capstone-bikes.cphpxguj45gw.us-east-1.rds.amazonaws.com',
                              database='Capstone_Bike_Shop')
cursor = cnx.cursor()
print("Connected to database...")
```

Raspberry Pi Custom Sim Card Setup

If you are using your own mobile ISP provider with your own sim card, you must ask your ISP for the Access Point Name (APN). APN standards differ from country to country. For more information about the local APN, inquire with your local GPRS network provider. The default APN on the Raspberry Pi is epc.tmobile.com.

Once you obtain your correct APN you must set it in the Raspberry Pi wvdial configuration file located in: /etc/wvdial.conf.

Operation Instructions

Operating the Software and Hardware

Operate the Hardware

Each chip comes connected to all of its modules (GPS and 4G Module). All you have to do is connect the chip to the rechargeable battery (making sure it is sufficiently charged) using the provided micro usb cable.

Once connected to the power source, you must wait 1-2 minutes for the chip to power on and for the 4G modem to display a solid blue light. GPS data will be transmitted every 30 seconds.

Assembly

Although the chip is already assembled, the assembly instructions are as follows:

Attach the GPS hat to the Raspberry Pi, covering pins 1 - 26.

Insert the provided sim card into the 4G Modem.

Plug the 4G Modem into any of the 4 usb slots.

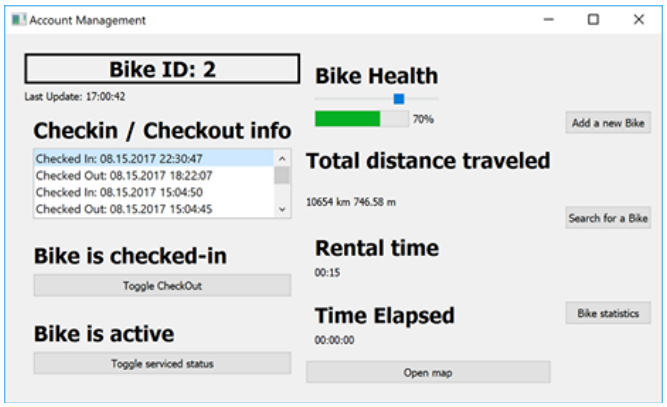
Operate the Software

Once you download the application you can click “Manage Bikes” in order to enter the login screen and input your credentials.

Once logged in successfully, you can explore features by navigating through the add a new bike, search for a bike, and bike statistics buttons.

Search for a bike

Enter the BikeId for the bike you wish to look up and click to *search for a bike*.

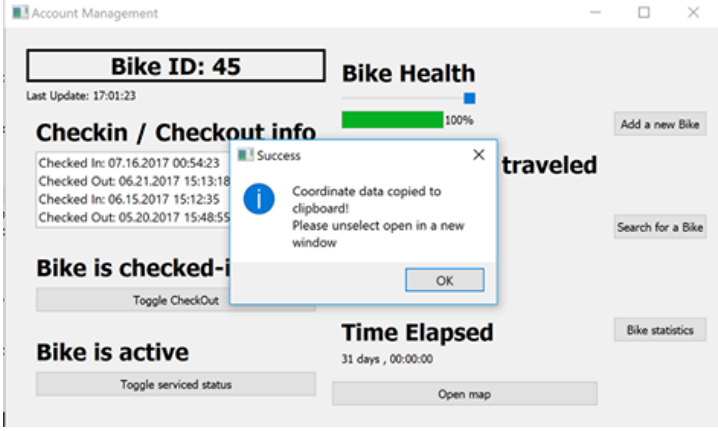


Here you are given:

Bike Health information (based on distance travelled), Checkin/Checkout information, total distance travelled information, rental time, time elapsed, option to toggle checkins/ checkouts, option to toggle service status, and option to open a map to see the latest bike path.

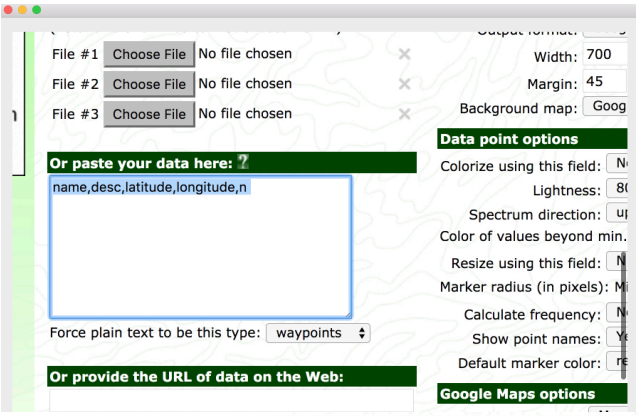
Open an Interactive Map to See the Bike Path

After searching for a bike, you can click on *open map* in order to see the latest path the bike has travelled.



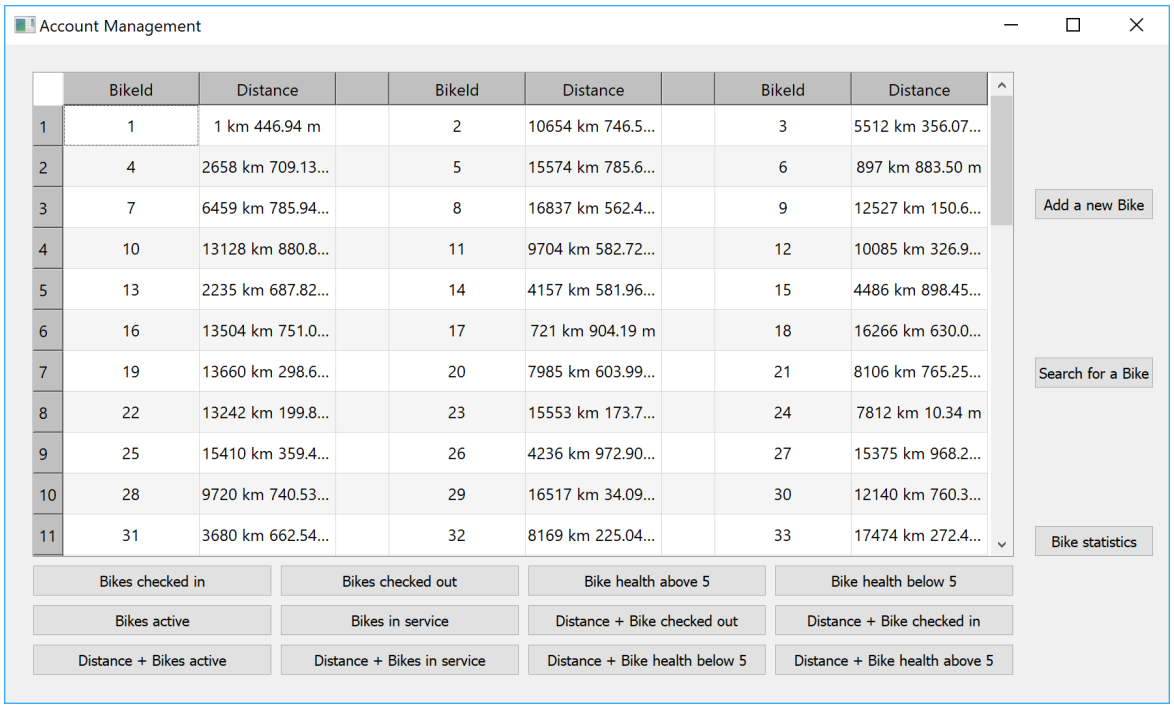
The GPS coordinates will be copied to your clipboard and a message window will appear.

After you click *ok*, a new GPSVisualizer window will open, allowing you to paste the coordinates into the text box and display the interactive map.



Display Bike Statistics

The *bike statistics* feature provides you with various analytics data of the bikes in your bike shop.



Add a New Bike

In order to add a new bike, enter the bike's id and press *add a new bike*. The bike will be automatically added to your AWS MySql database.

Cautions

Please comply with the instructions to extend the unit life:

1. Keep the unit dry. Any liquid, i.e. rain, moisture, may destroy or damage the inside circuitry.
2. Don't put the unit in overheated or overcooled places.
3. Don't use & store the unit in dusty places.
4. Handle carefully. Don't vibrate or shake it violently.
6. Please refer to the user manual before using the unit.