CLAIMS

1. A computer implemented method (100) for monitoring operation of a vehicle, comprising:
   - providing (110) a trip dataset comprising time data, and accelerometer data obtained from an accelerometer configured to measure acceleration in 3 acceleration axes, wherein the accelerometer is comprised in a mobile device being transported by the vehicle during data acquisition of the trip dataset, wherein the trip dataset corresponds to a vehicle trajectory;
   - dividing (150) the trip dataset into a plurality of trip segments; and
   - for each trip segment of the plurality of trip segments, by any of one or more microprocessors:
     - processing (120) the trip dataset into a uniformly sampled dataset;
     - producing (130) gravitational vector direction data by determining a gravitational vector direction;
     - transforming (140) the coordinates from mobile device coordinates into vehicle coordinates;
     - identifying (160) one or more acceleration events by comparing the acceleration data of the trip segment with pre-determined thresholds; and
   - reducing usage of the vehicle for transport tasks if the number of identified one or more acceleration events exceeds a safety condition,

     wherein determining the gravitational vector direction comprises determining median values in the 3 acceleration axes of each trip segment of the plurality of trip segments, that correspond to travel in a straight line.

2. The computer implemented method (100) of claim 1, wherein the pre-determined thresholds comprise a pre-determined acceleration threshold;
wherein the one or more acceleration events are vehicle speeding up or braking events along the vehicle trajectory and identifying comprises comparing an acceleration along an acceleration axis that follows the vehicle trajectory against the pre-determined acceleration threshold.

3. The computer implemented method (100) of claim 1 or claim 2, wherein the pre-determined thresholds comprise a pre-determined lateral acceleration threshold;
wherein the one or more acceleration events are vehicle turning events which are lateral movements in the vehicle trajectory and identifying comprises comparing an acceleration along an acceleration axis, which is orthogonal to the vehicle trajectory and orthogonal to the gravitational vector direction, against the pre-determined lateral acceleration threshold.

4. The computer implemented method (100) of claim 3,
wherein the safety condition is a pre-defined safety limit, and the method (100) further comprises: determining that the number of identified one or more acceleration events exceeds the pre-defined safety limit.

5. The computer implemented method (100) of any of claims 1 to 3, further comprising generating a report including the one or more acceleration events and generating a safety score based on the report.

6. The computer implemented method (100) of claim 5, further comprising sending the safety score to a service allocation server.

7. The computer implemented method (100) of claim 6,
wherein the number of identified one or more acceleration events exceed the safety condition when the safety score exceeds a predefined safety limit.

8. The computer implemented method (100) of any one of the previous claims, wherein the trip dataset further comprises gyroscope data; and the method (100) further comprises:
- determining, from the gyroscope data, instances of lateral acceleration.

9. The computer implemented method (100) of claim 8, further comprising:
- disregarding the instances of lateral acceleration when producing (130) the gravitational vector direction data.

10. The computer implemented method (100) of any one of claims 1 to 9,

wherein processing (120) the trip dataset into the uniformly sampled dataset comprises increasing a data rate of the trip dataset by interpolation, filtering the trip dataset with a filter, and decimating the trip dataset into the uniformly sampled dataset.

11~~10~~. A computer system (200) for monitoring operation of a vehicle, comprising:

- a mobile device (210) for being placed in the vehicle configured to provide a trip dataset comprising time data, and accelerometer data, wherein the trip dataset corresponds to a vehicle trajectory;
- an accelerometer (220) comprised in the mobile device (210) and configured to acquire the accelerometer data by measuring acceleration in 3 acceleration axes during transportation of the mobile device (210) by the vehicle;
- a computer executable code stored in a memory (230, 230'), configured to cause one or more microprocessors (240, 240') to:
  - process (120) the trip dataset into a uniformly sampled dataset;
  - divide (150) the uniformly sampled dataset into a plurality of trip segments; and
  - for each trip segment of the plurality of trip segments:
    - produce (130) gravitational vector direction data by determining a gravitational vector direction;
    - transform (140) the coordinates from mobile device coordinates into vehicle coordinates;
    - identify (160) one or more acceleration events by comparing the acceleration data of the trip segment with pre-determined thresholds; and
  - reduce usage of the vehicle for transport tasks if the number of identified one or more acceleration events exceeds a safety condition, wherein determining the gravitational vector direction comprises determining median values in the 3 acceleration axes of each trip segment of the plurality of trip segments, that correspond to travel in a straight line.

12~~11~~. The computer system (200) of claim 11~~10~~, wherein the pre-determined thresholds comprise a pre-determined acceleration threshold;
wherein the one or more acceleration events are vehicle speeding up or braking events along the vehicle trajectory and to identify comprises to compare an acceleration along an acceleration axis that follows the vehicle trajectory against the pre-determined acceleration threshold.

13~~12~~. The computer system (200) of claim 11~~10~~ or claim 12~~11~~, wherein the pre-determined thresholds comprises a pre-determined lateral acceleration threshold;
wherein the one or more acceleration events are vehicle turning events which are lateral movements in the vehicle trajectory and to identify comprises to compare an acceleration along an acceleration axis, which is orthogonal to the vehicle trajectory and orthogonal to the gravitational vector direction, against the pre-determined lateral acceleration threshold.

14~~13~~. The computer system (200) of any one of claims 11~~10~~ to 13~~12~~, wherein the computer executable code is further configured to cause the one or more microprocessors (240, 240') to generate a report including the one or more acceleration events and to generate a safety score based on the report.

15~~14~~. The computer system (200) of claim 14~~13~~, wherein the computer executable code is further configured to cause the one or more microprocessors (240, 240') to send the safety score to a service allocation server.

16~~15~~. The computer system (200) of any one of claims 11~~10~~ to 15~~14~~, wherein the mobile device is configured to send the trip data to a processing server (250), wherein the processing server (250) comprises the memory (230') and the one or more microprocessors (240').

17~~16~~. The computer system (200) of any one of claims 11~~10~~ to 16~~15~~, wherein the trip dataset further comprises gyroscope data; and the executable code is further configured to:
- determine, from the gyroscope data, instances of lateral acceleration.

18~~17~~. The computer system (200) of claim 17~~16~~, wherein to produce (130) gravitational vector direction data disregards the instances of lateral acceleration.

19~~18~~. A computer program product comprising program instructions, which when executed by one or more processors, cause the one or more processors to perform the method of any of claims 1 to 10~~9~~.

20~~19~~. A computer readable medium comprising program instructions, which when executed by one or more processors, cause the one or more processors to perform the method of any of claims 1 to 10~~9~~.