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Implementation

- **Slope Based Speed**

```
function out = assign_slope_based_speed( in )
out = in;
for i=2:size(in,1)
out(i,const.COL_SPEED) = 20 - 0.5*out(i,const.COL_SLOPE);
end
end
```

- **Segment Time**

```
out(i,const.COL_SEG_TIME) =
(out(i,const.COL_SEG_DST))/(out(i,const.COL_SPEED));
```

Implementation

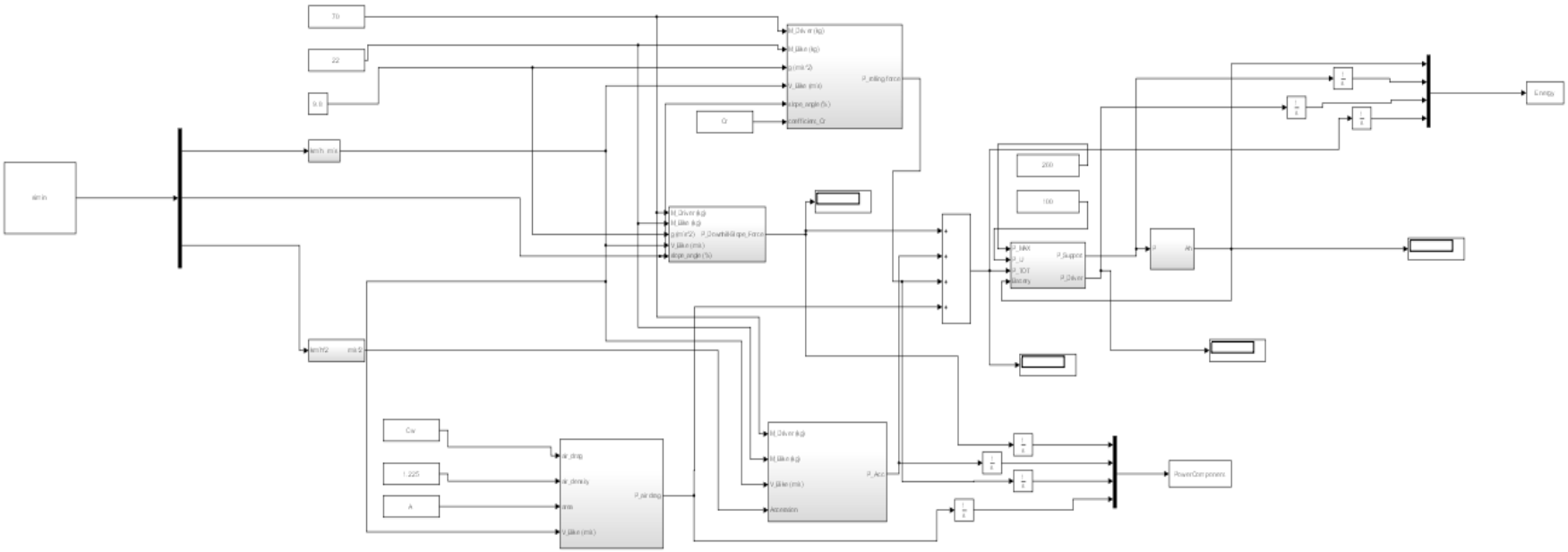
- **Accumulated Time**

```
out(:,const.COL_CUM_TIME) = cumsum (out(:,const.COL_SEG_TIME));
```

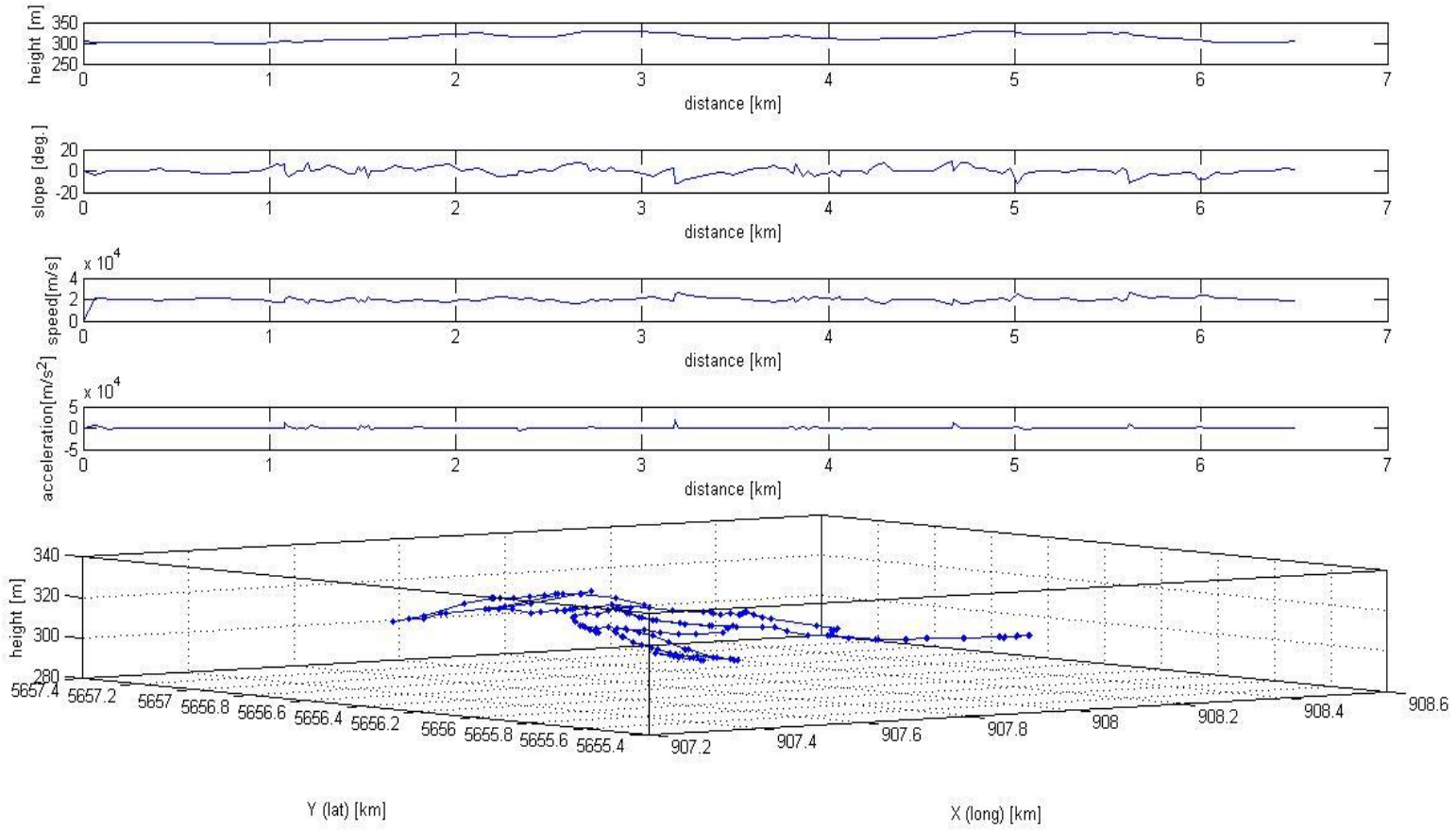
- **Segment Acceleration**

```
out(i,const.COL_ACC) = (out(i,const.COL_SPEED)-out((i-1),const.COL_SPEED))
                                    /out(i,const.COL_SEG_TIME);
```

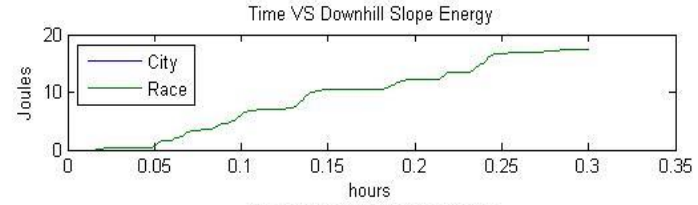
Implementation

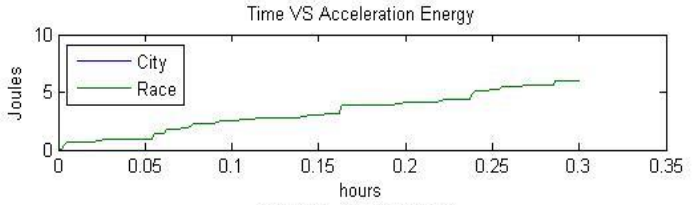


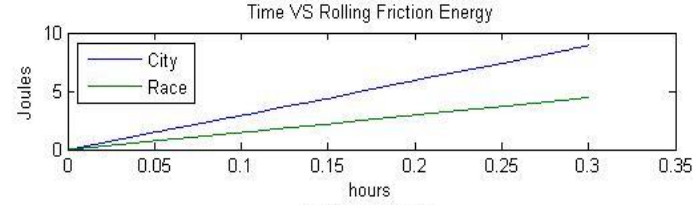
Results

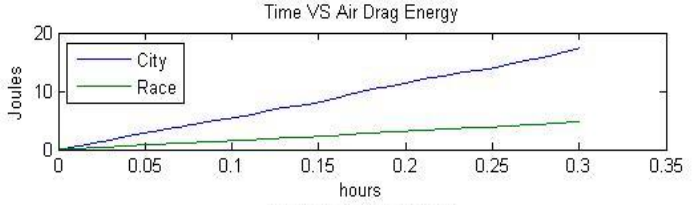

height [m]
distance [km]
slope [deg.]
distance [km]
speed[m/s]
x 10^4
distance [km]
acceleration[m/s^2]
x 10^4
distance [km]
height [m]
Y (lat) [km]
X (long) [km]

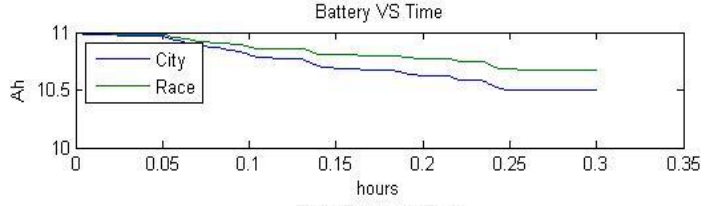
Results

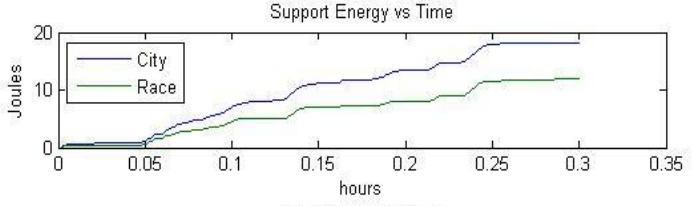

Time VS Downhill Slope Energy
Joules
hours
City
Race

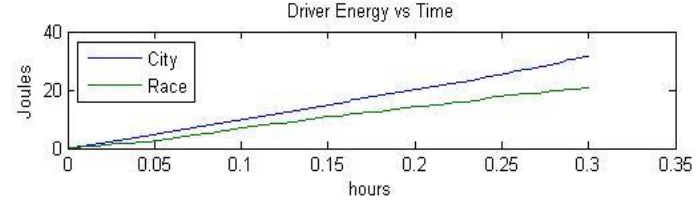

Time VS Acceleration Energy
Joules
hours
City
Race

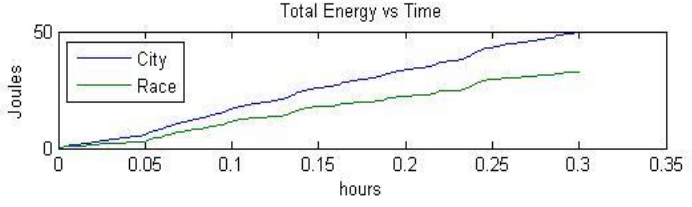

Time VS Rolling Friction Energy
Joules
hours
City
Race


Time VS Air Drag Energy
Joules
hours
City
Race


Battery VS Time
Ah
hours
City
Race


Support Energy vs Time
Joules
hours
City
Race


Driver Energy vs Time
Joules
hours
City
Race


Total Energy vs Time
Joules
hours
City
Race

Result

CITY BIKE

Battery and Energy required for City bike at the end:

Battery Support_Energy Driver_Energy Total_Energy

ans =

10.4982 18.0644 31.5728 49.6373

RACING BIKE

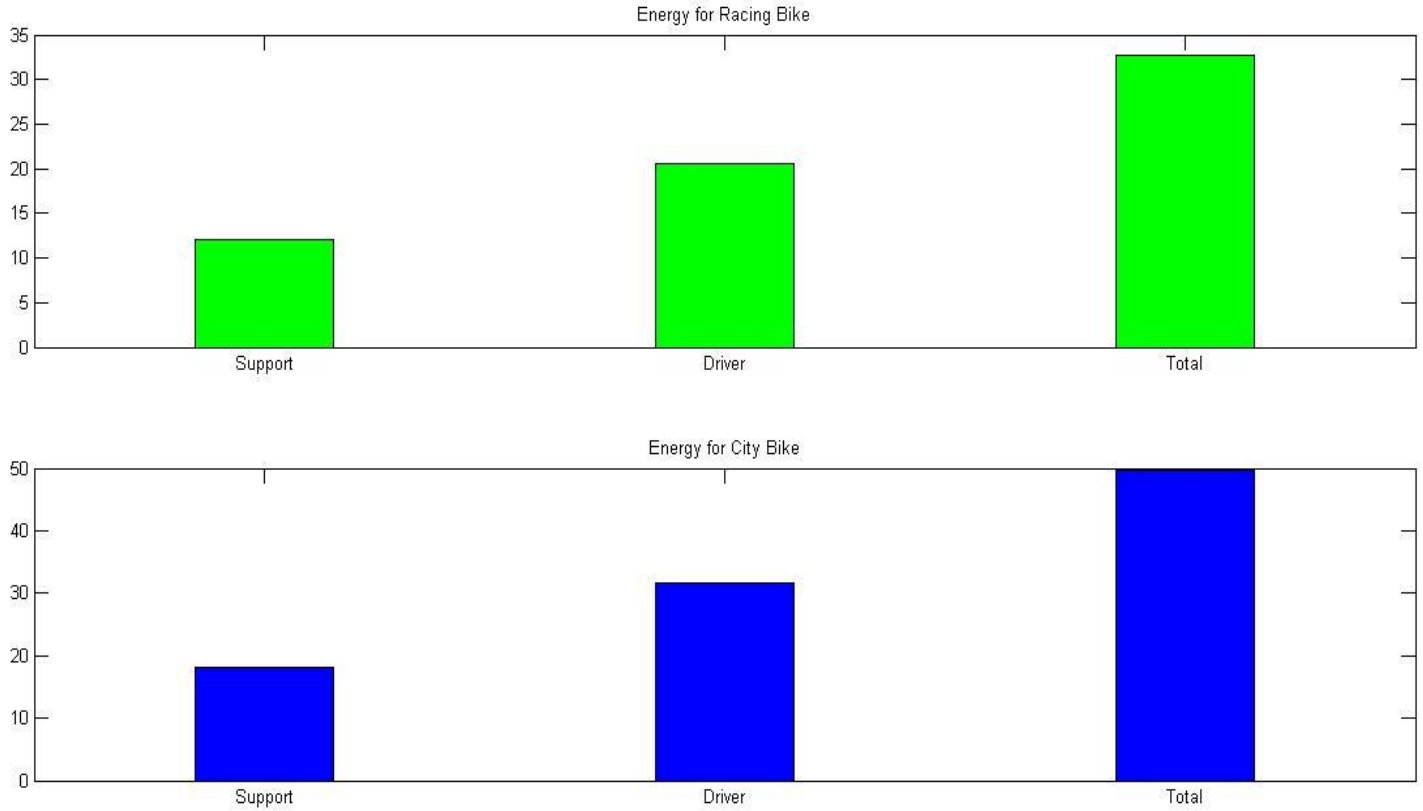
Battery and Energy required by the Racing bike at the end:

Battery Support_Energy Driver_Energy Total_Energy

ans =

10.6668 11.9936 20.6478 32.6414

Result


Energy for Racing Bike
35
30
25
20
15
10
5
0
Support
Driver
Total
Energy for City Bike
50
40
30
20
10
0
Support
Driver
Total