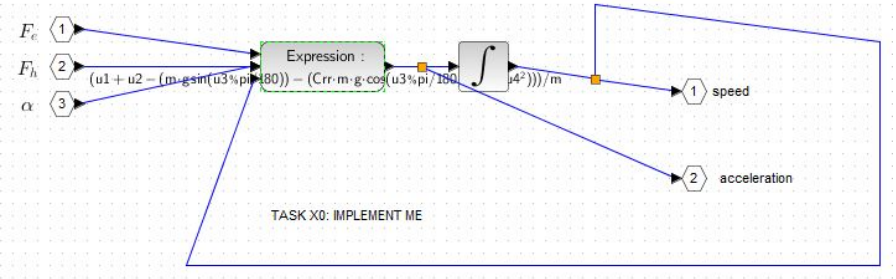
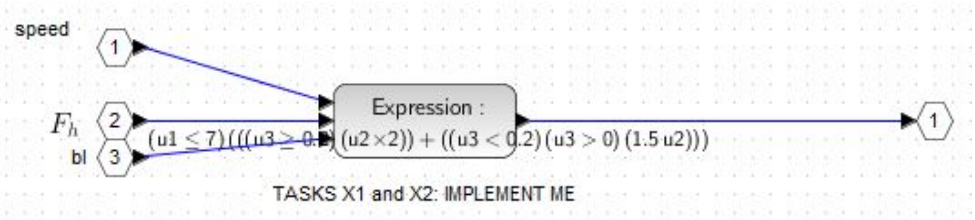
XCOS by Ali Dhanani 000470296

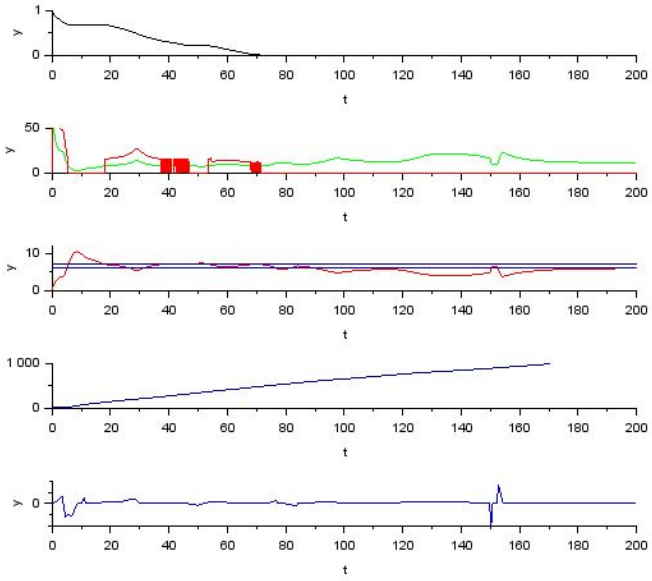
Task0:



I have implemented the equation that was mentioned in the xcos file with the k value rather than the entire drag force formula. Also, as the equation had required the v^2, so, as we had seen in the homework where we had used the $\frac{dy}{dx}$ and having the output of the expression used back as an input, I had used this approach here. As we know that $\frac{dv}{dt}$ means the acceleration value, and the integration of $\frac{dv}{dt}$ means the velocity value, I can use that value back in the diagram. Had have made the expression in terms of $\frac{dv}{dt}$. Furthermore, the cos and sin(u3) was giving incorrect result, so for that I had to change the value into the radiant format by using "u3*%pi/180". I have used this conversion for sin as well as cos values.

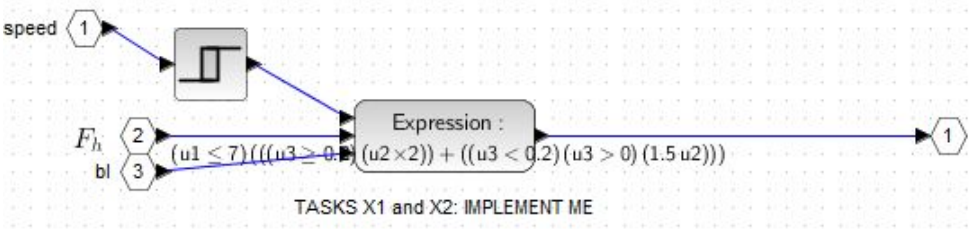
Task1:

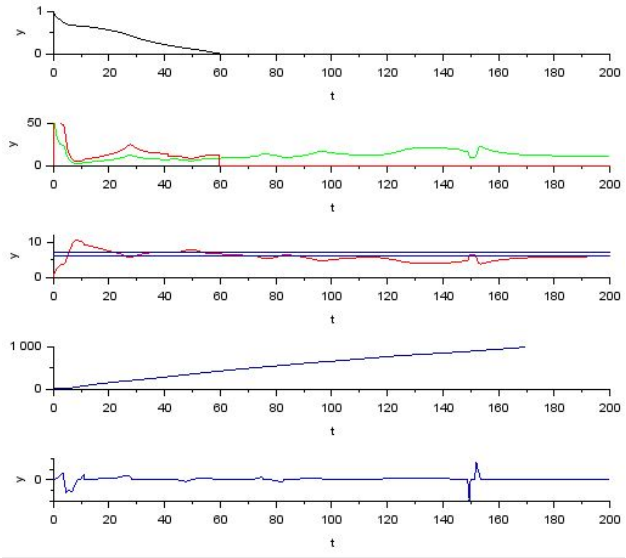




I had used the idea of (u1<=7)*(eq) because in the formula if the condition (u1<=7) is false, it will give an output as 0 because anything multiple by 0 is eventually 0. So firstly, this must be true as part of the task that if the speed > 7 then the output should be 0. After that I have used the or condition to check for either bl >= 0.2 or 0< bl < 0.2. At that point it will output F_h^2 or $\frac{3}{2}F_h$ respectively.

Task2:

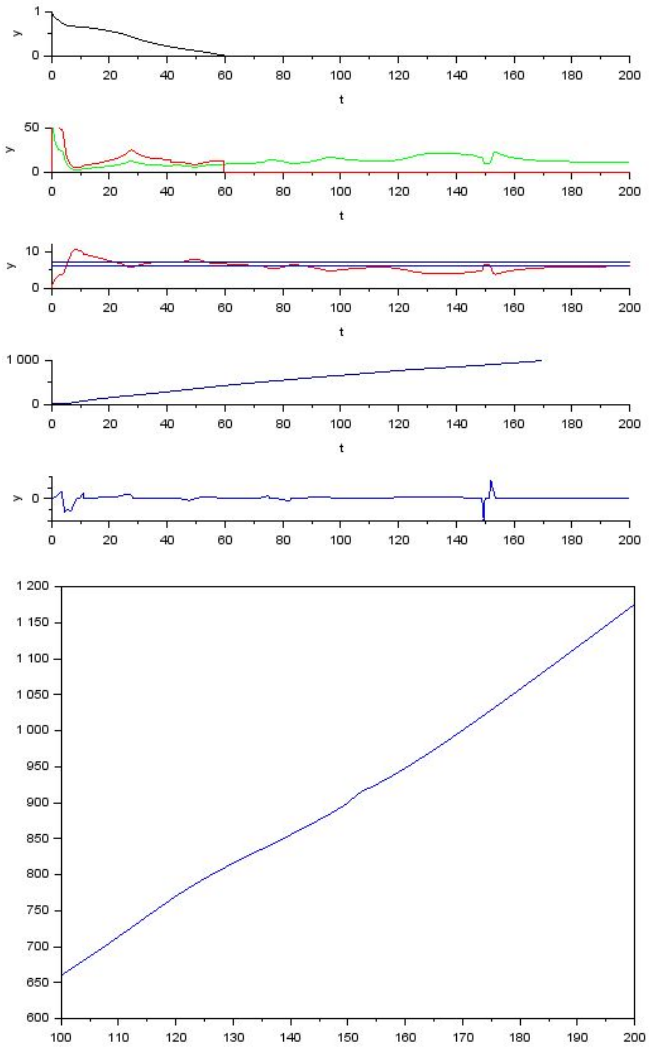




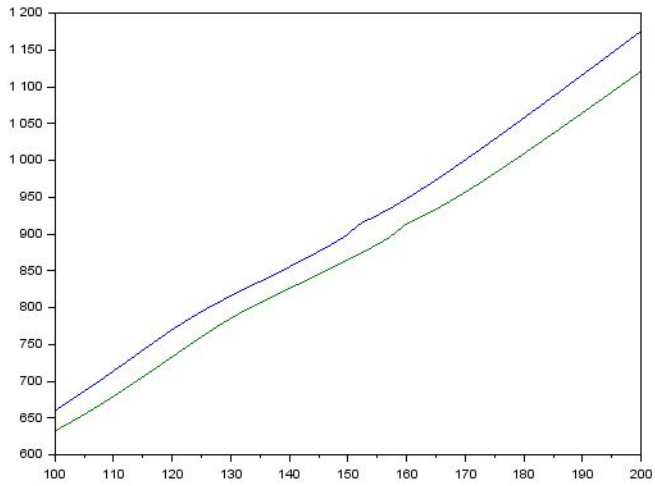
We have used here hysteresis, where we have controlled the speed for the 6 m/s and the 7 m/s, in the parameters of the hysteresis, where the idea is that it is turned on until it reaches value 7 and its turn off until it reaches value 6. So, the output that I think should be at 7 m/s be 7 and output at 6 m/s be 6.

Task3:

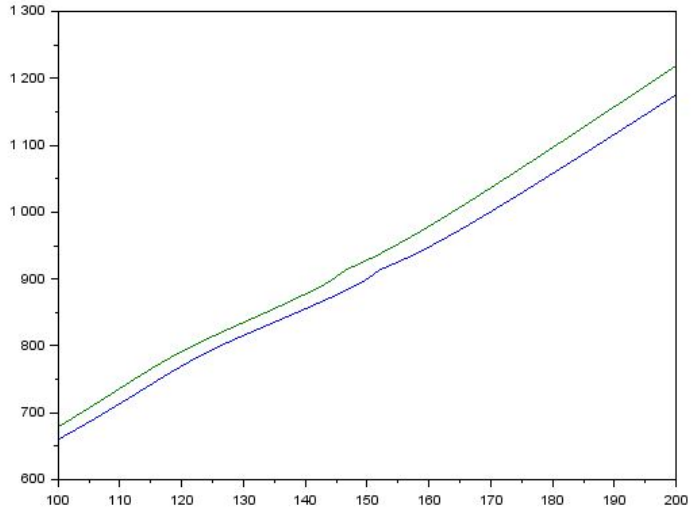
As the task had suggested we have to use the cvs file for the track of 1 km. With the normal parameters, we must save the result in A and then we must change any parameter that we want to show the difference in the graph.



This is a diagram for the simple variable A with no customization. Where it has described the distance increase from 660 position to 1200 with the clock variable of 200



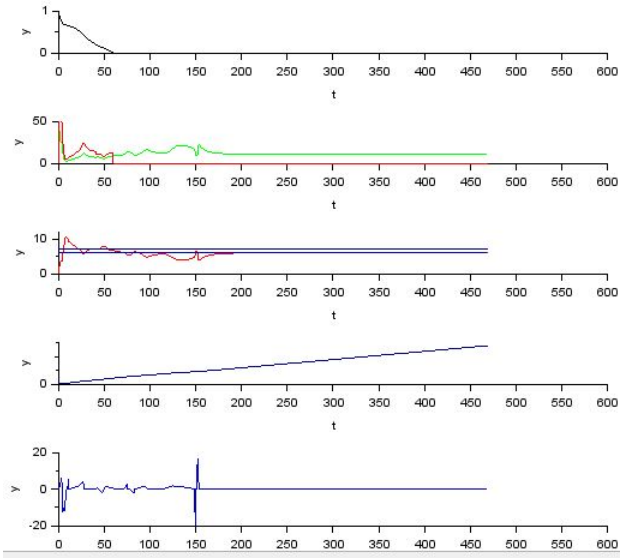
Here we have mapped the Variable B to the diagram, where we have changed the value of k from 0.25 to 0.30 which is related to the drag force. Here the green one is the variable B and Blue is the variable A. Both are increasing in the same way, but we can see that when we have increased the drag force from 0.25 to 0.30 is the distance gap of 100.



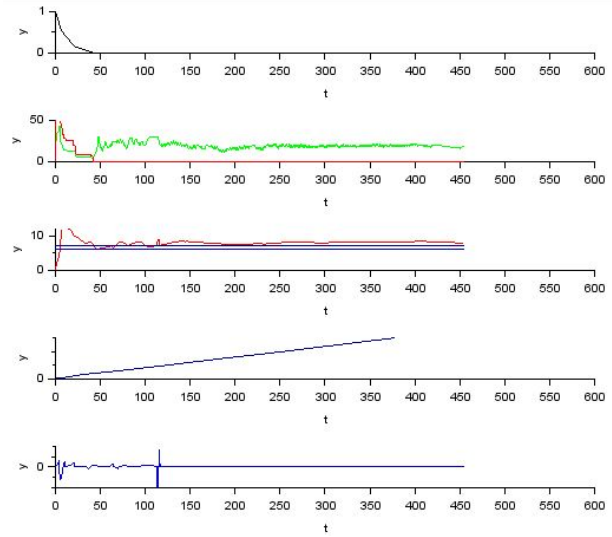
Here we have changed the crr from 0.003 to 0.001. We can see an increase in the value of the distance with a low crr value. Where crr is the rolling resistance.

Task 4 & 5:

With electrical assistance



Without electrical assistance



For the TK Scale, I have made the scale from 0 to 50 for the force to control the speed and motor assistance. Here we can see that the battery has died but till the speed is there depending on the human force only.

Reference:

https://forums.futura-sciences.com/mathematiques-superieur/516323-scilab-transforme-radian.html

https://x-engineer.org/graduate-engineering/programming-languages/scilab/basic-mathematical-functions-in-scilab/

https://help.scilab.org/docs/6.0.0/en_US/EXPRESSION.html

https://help.scilab.org/docs/6.0.0/en_US/HYSTHERESIS.html