Modelling the Trajectory of a Skydiver

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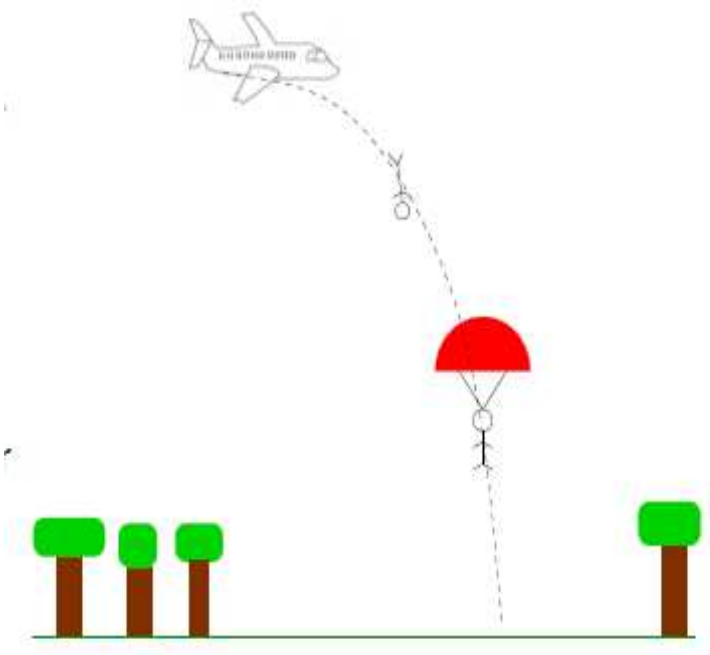
Skydiving

- Risk during skydiving should be minimized
- Cybernetic Parachute Release System (CYPRES)
- Determines height from measured barometric pressure
- Between 1991 and 2003 over 1000 fatal accidents prevented
- Many limitations, needs improvement

Considerations

- Aim : Model the trajectory of a skydiver as he falls
- Important Factors : Wind, starting velocity, drag due to the diver's posture and positioning during the skydive
- Difficulties : Measured data is very noisy due to changes in position and posture in the individual diver
- Goal : Data can be calibrated onto the physical model and the noise can be analysed and cleaned up.



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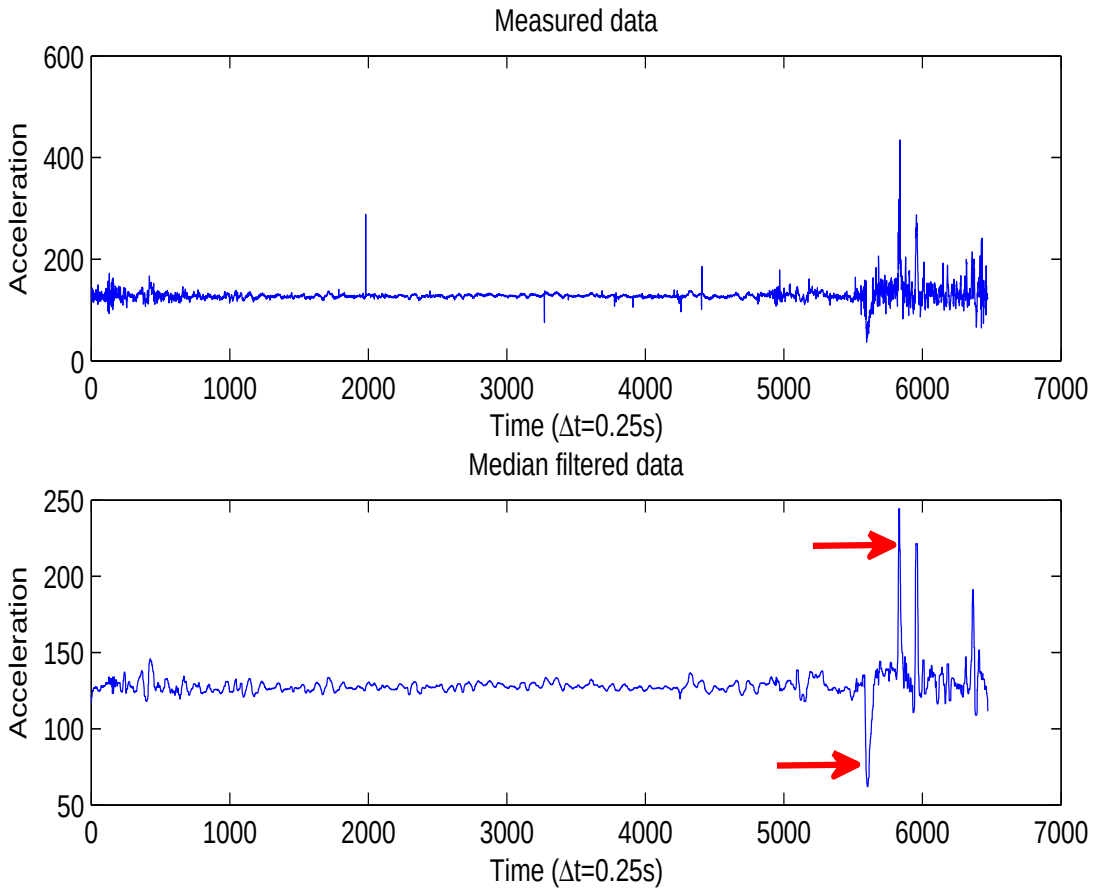
Jump Points

- Access to the data for acceleration in x,y and z axis and the height measurement of the diver
- Want to predict when the diver jumps
- This point can be measured if we filter the acceleration data
- Median filter used with window of size 21 timesteps (Delay= 2.5s)



Initial Velocity Approximation

- We need an approximation of the initial velocity to create an ODE model
- We do this by filtering the measured height data and then differentiating
- Moving Average filter applied
- Delay taken due to pressure change caused by the opening of the hatch