

# Mechanical Engineering Master's Defense

Wind estimation and its effects on path following of UAVs, applying corrections in navigation

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## abstract

The presented work in this thesis is about Real time Estimation of wind and analyzing current wind correction algorithm in commercial of the shelf Autopilot board. The open sourced ArduPilot Mega 2.5 (APM 2.5) board by 3DR Robotics is used. Currently there is lot of development being done Unmanned Aerial Systems (UAVs), development in Aerial platforms, developing autonomous systems for them. This technology is at a stage where the specific missions can be designed and these UAVs can be trusted and deployed. But in some aspects there are still developments required to execute complex missions with greater efficiency. This would help in more reliability and increasing range of UAVs significantly. One of the problems addressed in through this thesis work is, current autopilot systems have algorithm which handles wind by attitude correction with appropriate Crab angle. But the real time wind vector (direction) and its velocity calculated is based on Geometrical and algebraic transformation between Ground Speed and Air Speed. This, lot of times leads to significant error while direction and velocity prediction, resulting into error in attitude correction. The same has been proved in this thesis with simulation and actual field testing. In later part, new ways to tackle while flying windy has been proposed.



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