

The thesis addresses the dynamic state estimation problem for the field of robotics, particularly for unmanned aerial vehicles (UAVs). Based on data collected from an UAV, we design several probabilistic models for estimation of its state (mainly speed and rotation angles), including the configurations where one of the sensors is not available. We use Kalman filter and Particle filter and focus on learning the model parameters using EM algorithm. The EM algorithm is then adjusted with respect to non-Gaussian density of some sensor errors and modified using model complexity penalization terms for better generalization. We implement these methods in MATLAB environment and evaluate on separate datasets. We also analyze data from a ground robot and use our implementation of Particle filter for estimation of its position.