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Since the late 18th century, scientists have struggled to explain the seemingly random movement of organelles within the cell. Employing modern fluorescence microscopy, it has been revealed that organelles are moving relatively quickly along actin filaments using myosin motors. However, the direction of these movements remains unknown and a mathematical method for predicting their simultaneous movement has yet to be discovered. By taking advantage of the celebrated Kalman filter and incorporating the recorded movements of organelles via automated time-lapse imaging, an appropriate algorithm for tracking simultaneously the fast movements of these organelles is constructed. This algorithm is the first step of creating a set of robust computational mechanisms which will enable cell biologists to address further questions on organelles' movements in a quantitative fashion.