In this paper, dynamic modeling of a one-wheel robot, which is subjected to nonholonomic constraints, was derived by using Kane's method. By imposing the constraints in the dynamic equations leads to system order reduction. This method can be applied without using Lagrange multipliers. So the computation complexity is reduced. The motion of the one-wheel robot integrated with a gyroscope for stabilization and steering was described. Numerical simulations are presented to verify validity of the model in agreement with the Lagrange's formulation found in early works by other researchers.