In order to construct model for real-time system, timed automata was developed to analyze the system behavior which depends on implementation of time variables. This paper presents the definition of timed automata and the manipulation of this approach in system verification.

At first, the paper introduces the model of transition system. Time automata can make effective clarification of this transition state model. This system consists of state graphs labeled with set of event symbols. The system starts at initial state and shows the change of state with event. It can also interact with other transition system. Then this section describes system behavior with timing constraints by setting clocks. It introduces the definition of location and switch in this system. Formal type of timed automata has specific requirement for invariants, enable conditions and syntax. To clarify the definition of this theory, the paper uses a controller example to illustrate the change of annotation in state change. The state transition can be caused by time elapsing and location-switch.

After defining basic theory of time automata, this paper explains the reachability problem of location component in this system. Then it defines a new time-abstract transition system and UA as space whose event symbols only include time increments. In this system, the number of states and labels are infinite which results in stable state-space. To formalize the notion, it clarifies the definition of quotient timed automata with consideration of equivalence relation in region. Due to the complexity of reachability, clock zone is designed to improve region construction in zone automata. The use of matrices can efficiently present clock zones.

At last, this paper summarizes the basic definition and techniques for timed automata. It introduces tools, applications, method for verification and theory results. This paper briefly describes timed automata and I’m interested to get more details about implementation and the improvement of basic algorithms.