Synchronous Product Algorithm

To build the synchronous product of $A_1, \ldots, A_n$:
Create initial state $q_0 = (q_{01}, \ldots, q_{0n})$
Add $q_0$ to state set $Q$

While there are unvisited states $q = (q_0, \ldots, q_n) \in Q$:
  For each event $e$ that can be executed
    by each automaton $A_i$ in state $q_i$:
      Compute successor state $r = (r_1, \ldots, r_n)$
      Add $r$ to state set $Q$ if not yet present
      Create transition from $q$ to $r$ labelled $e$

Controllability Check Algorithm

To check whether plants $P_1, \ldots, P_n$ are controllable with respect to specifications $S_1, \ldots, S_n$:
Add initial state $q_0 = (q_{00}, \ldots, q_{0n})$ to state set $Q$

While there are unvisited states $q \in Q$ do
  For each event $e$ enabled by all plants $P_i$ in state $q$ do
    If $e$ is uncontrollable and there exists a specification $S_j$ that cannot execute $e$ in state $q$ then
      return "The system is not controllable."
    If $e$ can be executed by all specifications then
      Compute successor state $r$ such that $q \rightarrow r$
      Add $r$ to state set $Q$ if not yet present

Example: “Big Factory”