Architecture

The controller system's architecture has been modelled such that the safety and liveness requirements are always met, by using the various sensors, actuators, and other components present in the system. The main assumptions made here for simplicity are - the robots perform the actions commanded to them without any error, and the lamp performs the projecting process without malfunctioning. The other components may require the user to act upon them based on certain sensor data, and the corresponding user inputs have been described as interactions in chapter 3.

The architecture of the system is represented graphically using the diagram shown below. It consists of several components working in parallel to meet the requirements stated in chapter 2.

For the most part, the system is expected to function without the need for any user input, but certain cases have been identified in which user input is needed to meet the system's liveness requirements. These are indicated by green arrows in the diagram, and the corresponding sensor action indicating the need for user input is shown using orange arrows.

The components interact with each other internally, as shown using blue arrows. The information exchanged by them includes sensor data, actuator feedback (to indicate the pass/fail status of operations), and other status data as shown on the arrows. This information is observable but need not be acted upon by the user since the system is automated. It is needed by the components internally to make decisions about their respective actions based on the status of other dependent components.

The system never reaches a state of "completion" since it is expected to run continuously till one of the conditions requiring a user input is met (see chapter 2). Theoretically, if the user continually replenishes the input stack with new wafers and clears the output stack at the same rate, and if the airlock doors do not malfunction, the system can run for an indefinite period of time.