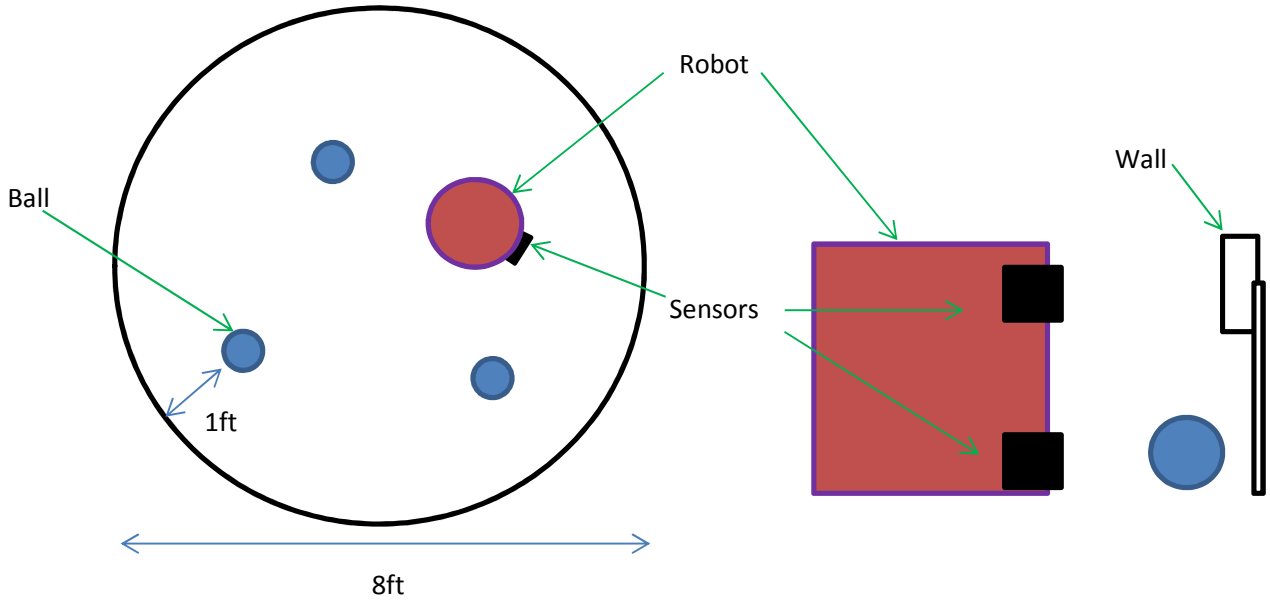


You are tasked to design a state machine for a ball detecting robot. The robot is placed in an arena that has a diameter of eight feet, enclosed by walls. The balls are randomly placed in the arena, but are at least one foot away from the walls. The robot has three modes of operation: it can move forward; rotate clockwise; and retrieve a ball directly in front of it. The outputs to initiate these actions are FWD, CW, and FETCH. The robot has been designed robustly enough that it will gather any balls placed in front of it at any distance, so long as the FETCH command is given. Assume that the robot may be initially placed at any arbitrary location in the arena.

The robot has two object detection sensors, each of which has been mounted at different heights: Sensor 1 is at the same height as the balls; Sensor 2 is at the same height as the wall. Both sensors provide a high signal when an object has been detected; they otherwise produce low signals. Use the designation SW to denote the Sensor 1 input, and SB to denote the Sensor 2 input. The sensors have a maximum detection range of three feet; i.e., if any objects are over three feet away they will output a low signal.

The robot has also been designed with two rotation detectors: signal ROT provides a high signal when the robot has made 1 full clockwise revolution. This signal is reset to low when the robot moves straight forward via the FWD or FETCH commands. A second detector, with a signal designated as CTR, goes high when the robot is pointed within ± 3° of the arena's center point.

Create a state machine that will search the arena for balls and will pick them up as they are detected.