Video Link: https://youtu.be/iVIN_QFH49U

Assumptions:

1. The robot follows a white line on the black surface, the threshold to detect white line detection is set to 500. If the sensor value is less than white line threshold then it is considered as active.

2. The robot can be in the following states: Start, Forward, Stop, DriftLeft, DriftRight, Left, Right, and Turn180deg.

3. To control the direction of movement we have assumed PID correction values between the range (-100 to 100).

4. We have defined ranges of direction based on it, the decision of Moveforward/DriftLeft/Left/DriftRight/Right/Stop/BackWard state is made.
   i..e. If pidValue is between [-30 to 30] then it goes to Moveforward
   If pidValue is between [30 to 60] then it goes to DriftLeft
   If pidValue is between [-60 to -30] then it goes to DriftRight
   If pidValue is greater than 60 then it goes to Left
   If pidValue is lesser than -60 then it goes to Right
   If all sensors active then it goes to Stop
   If all sensors are inactive then it goes to Backward

5. In the Backward state, the robot rotates 180 degrees and then transitions only to the Forward state

6. Once the robot reaches the Stop state, it remains in this state

Description:

1. **MoveForward**: When the pidValue is in [-30 to 30] range, indicating the robot is aligned with the white line.

2. **Drifting Left**: When the pidValue is in [30 to 60] range, indicating the robot is requiring a small leftward correction.

3. **Drifting Right**: When the pidValue is in [-60 to -30] range, indicating the robot is requiring a small rightward correction.

4. **Left Turn**: When the pidValue is greater than 60, indicating the robot needs to turn left immediately.

5. **Right Turn**: When the pidValue is lesser than -60, indicating the robot needs to turn right immediately.

6. **Stop Condition**: When all sensors detect white, meaning the robot should stop.

7. **Backward Turn**: When all sensors detect black, meaning the robot is off-track and must turn around 180 degrees.

Input and Output

Five Sensors Values					Outputs		
sen 0	**sen 1**	**sen 2**	**sen 3**	**sen 4**	**v_l**	**v_r**	**dir**
795	787	300	787	799	100	100	1
955	955	350	959	989	70	70	1
150	250	300	800	800	50	70	2
700	708	300	195	695	30	20	1
700	700	350	700	700	70	70	1
999	999	500	325	227	70	50	3
709	188	290	717	730	20	30	1
730	730	730	730	730	50	50	4
755	755	300	759	775	70	70	1
729	720	300	207	707	30	20	1
200	250	300	888	898	50	70	2
788	788	360	788	788	70	70	1
900	880	500	314	213	70	50	3
709	188	290	717	730	20	30	1
209	259	400	877	879	50	70	2
999	999	999	999	999	50	50	4
702	701	300	701	701	70	70	1
700	700	300	200	700	30	20	1
900	900	500	300	200	70	50	3
200	200	200	200	200	0	0	0