module game_fsm.v

```
IDLE
  │
  ▼
P_TURN_WAIT  ◄── invalid move
  │
  ▼
P_VALIDATE
  │  valid move
  ▼
P_APPLY
  │
  ▼
P_CHECK ── Player win/tie?
  │  else
  ▼
AI_REQ
  │
  ▼
AI_WAIT
  │
  ▼
AI_APPLY
  │
  ▼
AI_CHECK ── else
  │
  ▼
GAME_OVER ── reset
```
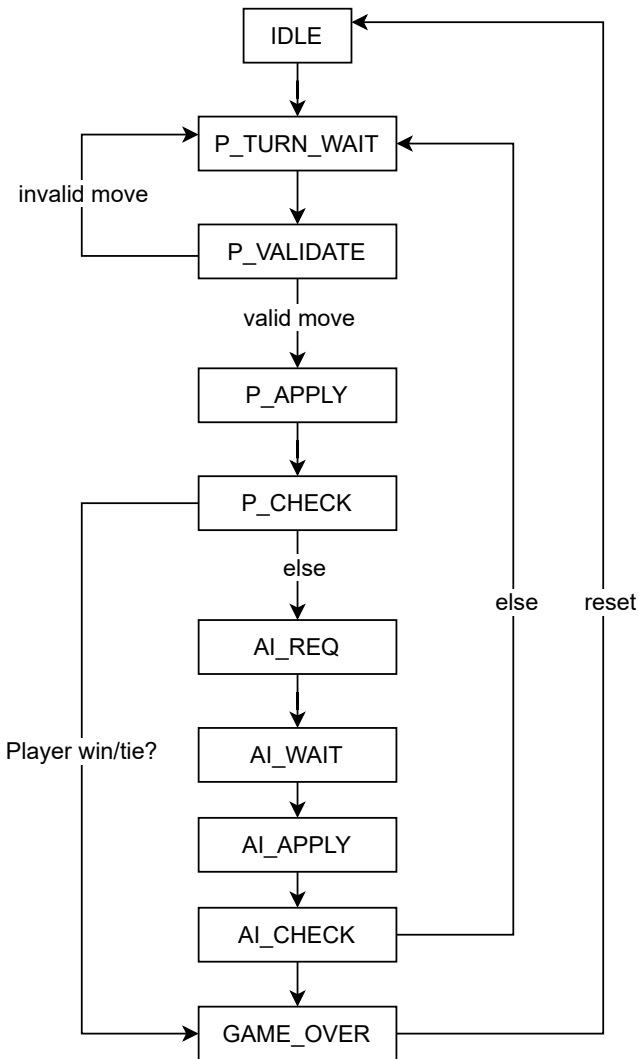
invalid move

valid move

else

Player win/tie?

else   reset

IDLE: wait for reset release / start condition.

P_TURN_WAIT: wait for player confirm with a selected cell.

P_VALIDATE: reject if occupied/out-of-range; else accept.

P_APPLY: write player mark; move_cnt++.

P_CHECK: win/tie? → GAME_OVER else AI_REQ.

AI_REQ: assert ai_req, go to AI_WAIT.

AI_WAIT: wait ai_ack, capture ai_cell.

AI_APPLY: write AI mark; move_cnt++.

AI_CHECK: win/tie? → GAME_OVER else back to P_TURN_WAIT.

GAME_OVER: hold result; wait reset (or new-game signal).