AI/ML EXP-1

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BRANCH	INFORMATION TECHNOLOGY - D
Experiment No	1

AIM:

a. To write down the PEAS System for the chosen Case Study: Autonomous Chess-Playing Robot

b. To implement Missionaries Cannibal problem using if-else

Problem Statement

PROBLEM STATEMENT:
   a. Autonomous Chess-Playing Robot takes input from the potentiometers, initializes the bit-board and plays the best possible move for that position. For the given intelligent system, mention the PEAS parameters.
   b. In the missionaries and cannibals' problem, three missionaries and three cannibals must cross a river using a boat which can carry at most two people, under the constraint that, for both banks, if there are missionaries present on the bank, they cannot be outnumbered by cannibals (if they were, the cannibals would eat the missionaries).

OBSERVATIONS AND RESULTS:
• **Performance:** Evaluation function bar, 2 points/win, 1 points/draw, 0 for loss
• **Environment:** Chess board, pieces, rules, move history.
• **Actuators:** 5 BLDC motors which control the motion of the robotic arm.
• **Sensors:** Potentiometers to detect the position of all the pieces on the board.

Code:

```java
import java.util.*;
import java.io.*;

public class Main {
    static int N;
    static StringBuilder sb = new StringBuilder();
    public static void main(String args[]) {
        N = Integer.parseInt(args[0]);
        go(N, N, 0, 0, true);
        System.out.println(sb);
    }

    static boolean go(int lc, int lm, int rc, int rm, boolean boatIsLeft) {
        if(lc + lm == 0) {
            return true;
        }

        if((lc > lm && lm != 0)|| (rc > rm && rm != 0)) {
            return false;
        }

        boolean ans = false;
        if(boatIsLeft) {
            if(lc >= 2) {
                ans |= go(lc-2, lm, rc+2, rm, !boatIsLeft);
            }
            if(lm >= 2) {
                ans |= go(lc, lm-2, rc, rm+2, !boatIsLeft);
            }
            if(lm >= 1 && lc >= 2) {
                ans |= go(lc-1, lm-1, rc+1, rm+1, !boatIsLeft);
            }
        }
        else {
            if(rc >= 1) {
                ans |= go(lc+1, lm, rc-1, rm, !boatIsLeft);
            }
            if(rm >= 1) {
                ans |= go(lc, lm+1, rc, rm-1, !boatIsLeft);
            }
            if(rm >= 2) {
                ans |= go(lc, lm+2, rc, rm-2, !boatIsLeft);
            }
            if(rc >= 2) {
                ans |= go(lc+2, lm, rc-2, rm, !boatIsLeft);
```

```java
        }
        if(rc >= 1 && rm >= 1) {
            ans |= go(lc+1, lm+1, rc-1, rm-1, !boatIsLeft);
        }
    }
    if(ans) {
        sb.append("M".repeat(rm)+"_".repeat(N-rm) + " " + "C".repeat(rc)+"_".repeat(N-rc)
+ " ================== " + "M".repeat(lm)+"_".repeat(N-lm) + " " +
"C".repeat(lc)+"_".repeat(N-lc) + "\n");
    }
    return ans;
}


}
```

Output:

```
PS D:\assignments\AIML> make java N=3
javac Main.java && java Main 3
MMM C__ ================== ___ CC_
MMM CC_ ================== ___ C__
MMM ___ ================== ___ CCC
MMM C__ ================== ___ CC_
M__ C__ ================== MM_ CC_
MM_ CC_ ================== M__ C__
___ CC_ ================== MMM C__
___ CCC ================== MMM ___
___ C__ ================== MMM CC_
___ CC_ ================== MMM C__
___ ___ ================== MMM CCC

PS D:\assignments\AIML>
```

Conclusion:

From the given experiment I understood the PEAS parameters defined for an agent (Autonomous Chess Playing Robot) as well as the implementation of the Missionary Cannibals Problem using simple if-else statements.