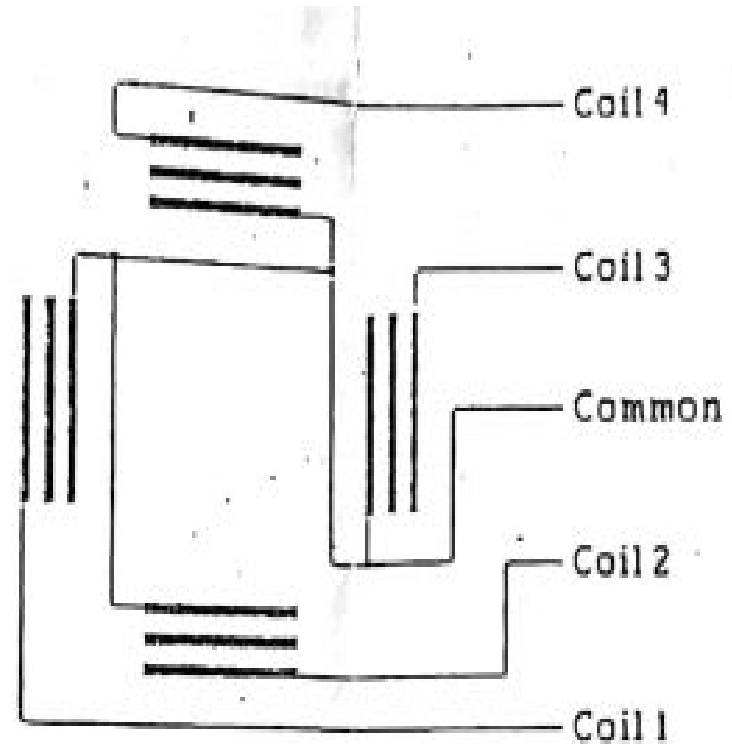
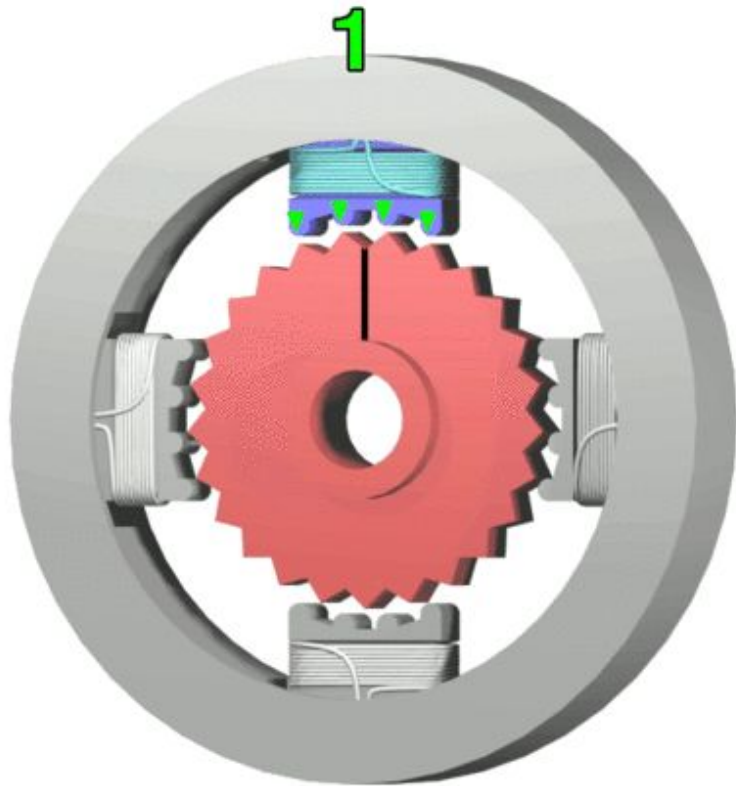




Stepper Motor

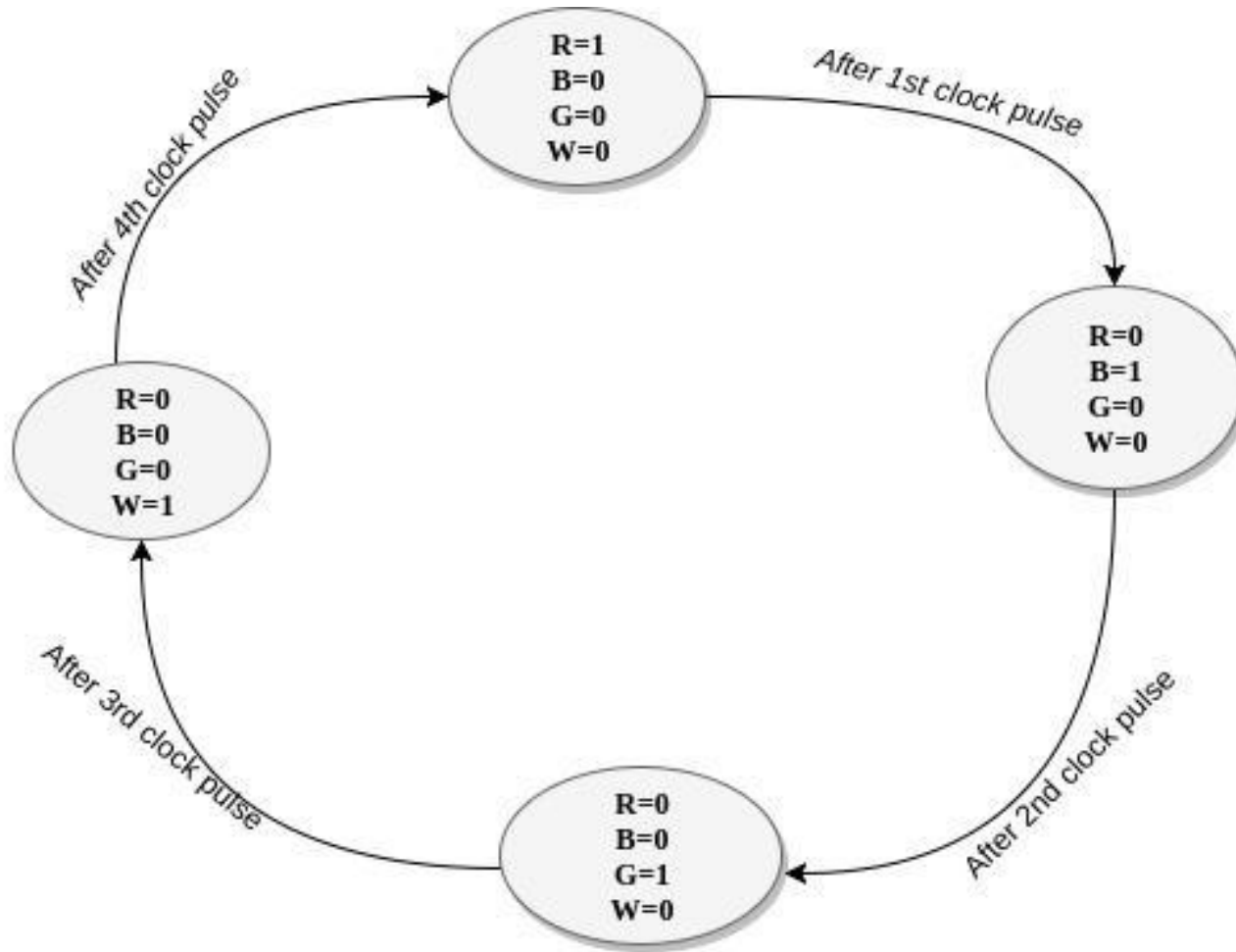
Motor that moves in steps

Abstract Idea of Stepper Motor



- 5 input terminals including a common point.
- Each coil associated with the terminals is excited alternately
- Excitation of the terminals leads the shaft to rotate($\sim 3.6^\circ$) in a clockwise/counterclockwise direction

Synthesis and Simulation



State Diagram

```
module steps(out_ter,  
    clock);  
    input clock;  
    output [3:0]out_ter;  
    reg [3:0]out_ter;  
    reg [1:0]m;  
    initial m=0;  
    always@(posedge clock)  
        m<=m+1;  
    always@(m)begin  
        case({m})  
            2'b00:out_ter=4'b1000;  
            2'b01:out_ter=4'b0100;  
            2'b10:out_ter=4'b0010;  
            2'b11:out_ter=4'b0001;  
        endcase  
    end  
endmodule
```

UCF File

```
NET "clock" LOC=V10;  
NET "out_ter<0>" LOC=B6;  
NET "out_ter<1>" LOC=D11;  
NET "out_ter<2>" LOC=H15;  
NET "out_ter<3>" LOC=F13;
```

Dividing the clock

```
reg [19:0]count;
reg clock1;
always@(posedge clock) begin //Dividing the clock frequency
count<=count+1;
if(count==1000000) begin
count<=0;
clock1<=!clock1;
end
end
```