

Data flow diagrams and structure charts are of limited use in these situations. Program flowcharts can be useful but an alternative is to concentrate on the changes of state that the input produces. This can be modelled using a state transition diagram.

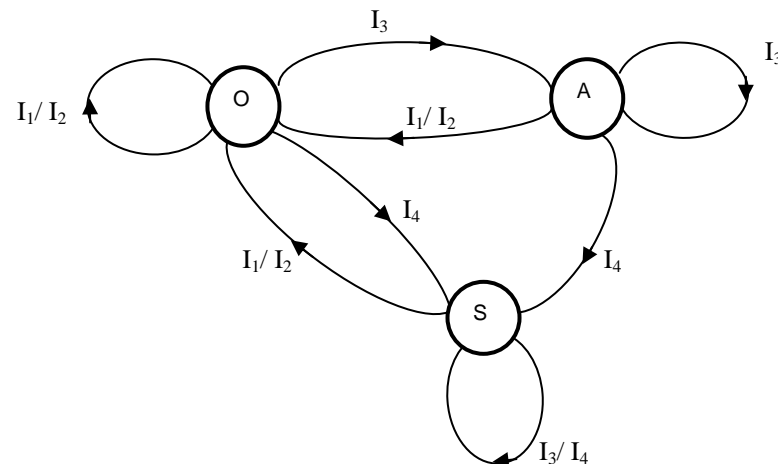
We will use an alarm system to show how this is done. A burglar alarm can be in one of three states: off, armed and sounding. To simplify things we will assume there are two inputs: a key switch that can be either on or off and a set of sensors that turn on when an intruder is detected but otherwise remain off.

The transition of the system from one state to another can be shown diagrammatically or in table form. A state transition diagram shows how the system moves from one state to another as the inputs change.

Key	Sensors	Condition
Off	Off	I ₁
Off	On	I ₂
On	Off	I ₃
On	On	I ₄

The burglar alarm system has two inputs that produce a total of four different input conditions as shown in the table.

The state transition diagram represents the different states of the system by circles. Lines are drawn from the circles to show which state the system changes to when each of the input conditions occurs. If there is no change of state for a particular input condition, then the line doubles back on itself. In the diagram below the three states of the alarm system are represented by O for off, A for armed and S for sounding.



The diagram shows that input condition I_3 for example (when the key is turned on but no sensors are reporting an intruder) changes the Off state to Armed, has no effect on the Armed or Sounding state. Note that the sensors returning to off after detecting an intruder in the Armed state does not stop the alarm sounding.

Current State	Input Condition	Next State
O	I_1	O
O	I_2	O
O	I_3	A
O	I_4	S
A	I_1	O
A	I_2	O
A	I_3	A
A	I_4	S
S	I_1	O
S	I_2	O
S	I_3	S
S	I_4	S

State diagrams are difficult to implement directly and their main purpose is to help in the preparation of a state transition table. This table shows the same information as a state diagram but in a more understandable form.

The state transition table on the left shows the transition for the alarm system and has been generated by writing down all the possible combinations of current state and input conditions and then using the state diagram to identify the next state.

Question 02

Two separate international hotel groups, each with its own information system, have merged to form a single new company. The new company now wants to replace the two separate information systems with a new one and has hired a systems development firm to do this.

- Explain the advantages of replacing two outdated systems with a new system based on modern technology. (5)
- A project manager will oversee the project. As part of the planning process he or she will need to decide in what order tasks must be done. Identify two tools that will help the manager do this. (2)
- The development team will include systems analysts. Describe the role and responsibilities of the systems analysts. (4)
- The system interface will be developed using prototyping. Explain what is meant by prototyping. (6)
- Data modelling techniques will be used in the project. Explain what is meant by data modelling. (4)

(g) Processing Methods

There are three basic types of processing system. They are transaction, interactive and real time systems. Each of these is appropriate to different situations. They vary in the type of