Introduction:

Ozone is used for water treatment and since the gas is unstable at atmospheric pressure and temperature and is therefore produced on-site to be used for water treatment. The project here designs the supervisor control for one such ozone generation system. Oxygen is passed through the gap between the two concentric electrodes connected to a high-voltage AC source. Ozone is produced by the electric discharge between the electrodes.

This ozone is then used to treat raw water and since ozone has a short life span of about 20 minutes in clean water and hence the water after treatment does not have any trace of ozone and is colourless, tasteless and odourless.

Ozone Generation System:

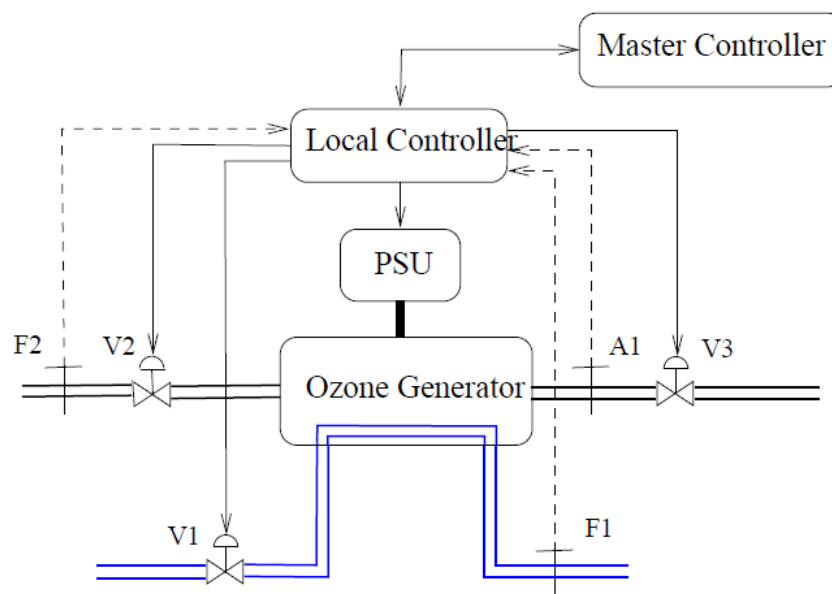The system used in the project is shown below:

Fig: Ozone Generation System (OGS)

The symbols used in the figure are:

1. Cooling water flowmeter: F1
2. Valve to control the flow from F1: V1
3. Oxygen flowmeter: F2
4. Valve to control the flow of oxygen: V2
5. Ozone concentration analyzer: A1
6. Valve from where ozone leaves: V3

Steps in designing:

In designing the overall plant, there are three main parts:

1. **Modelling of the components:** Under this section, each and every component in the plant is built and defined by using discrete event systems theory.
2. **Interaction of components:** This part of the project shows the interactions between the components and how they are connected and work together in the overall system.
3. **Modelling of the system:** Here the overall system is designed using the first two parts above which will ultimately lead to the designing of supervisor.

Important Components' Models:
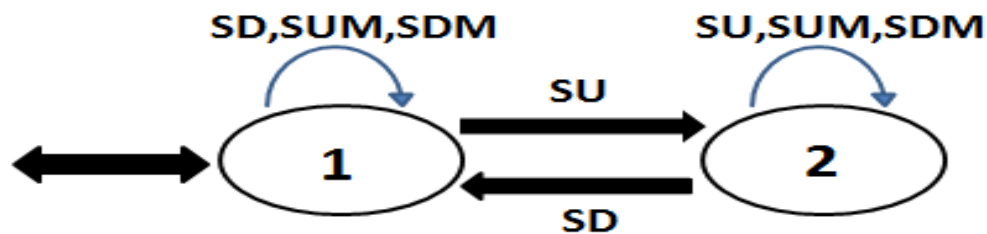
1. **Master Controller (MC):**

Fig: Model of MC

SU: Start-up command
SD: Shut-down command
SUM: Start-up message
SDM: Shut-down message

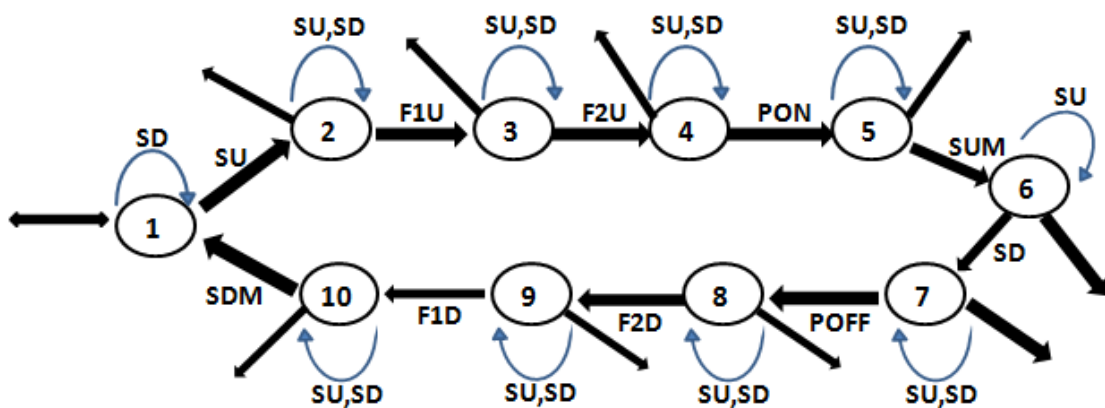2. **Overall Model for First Part of the Project:**

Fig: Model for specification 1 of the project

F1U: F1 ON; **F2U:** F2 ON
F1D: F1 OFF; **F2D:** F2 OFF
PON: PSU ON; **POFF:** PSU OFF

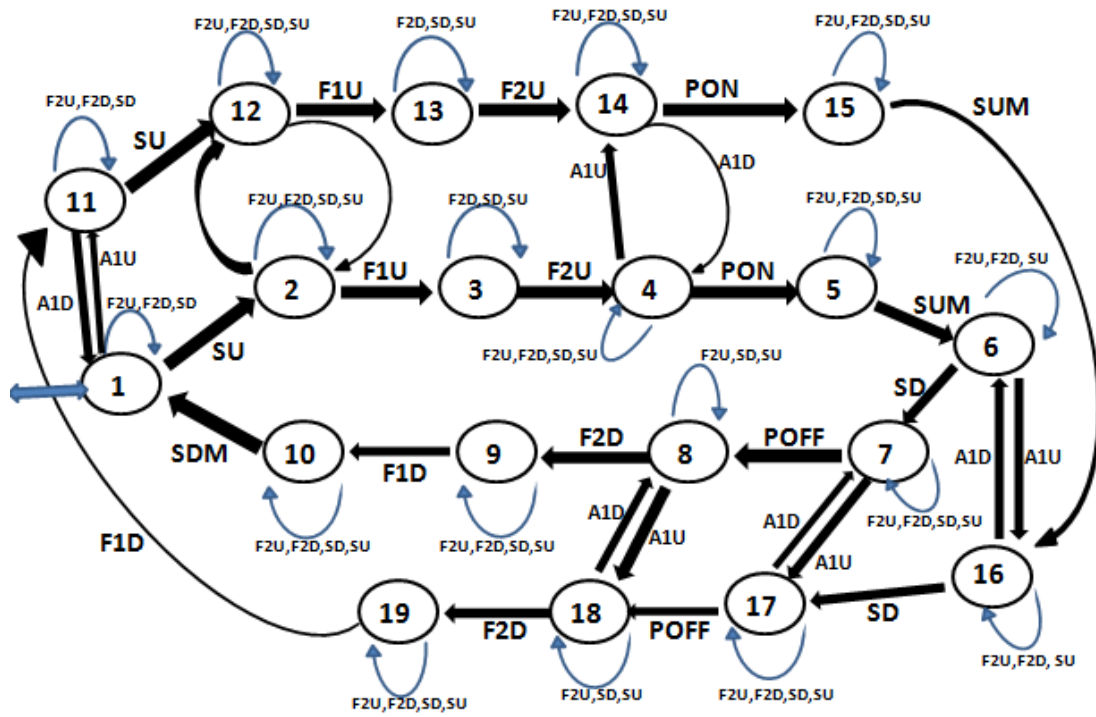### 3. Model for Second Specification of the Project:

Fig: The tracking automaton which is in sync with A1 and self-loop F2

A1U: Concentration becomes high
A1D: Concentration becomes low