Design and Implementation of Smart Chiller System using AVR Microcontroller

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Abstract— Chiller is the system to maintain the temperature of any reservoir at critical point and Operate the system in defined range of temperature. It is mainly used in the machines which gets heated and due to which the machine gets damaged. Mainly the present work is done for preventing diamond cutting laser diodes from damage. AVR microcontroller is used so that it is cost effective. It continuously keeps the water cool by Monitoring the water flow, level and temperature continuously. Control a pump of motor and compressor. Main task is to operate a solenoid valve for controlling the flow of gas. we set the temperature range and critical point of temperature using LCD and button mechanism. It has been made wireless using zigbee so that wireless monitoring from 1km distance is possible also the GSM 900 module has been attached to inform about the fault occurred in the system through message. Here, we are doing monitoring through lab-view software and programming has been done in micro C software.

Keywords— AVR controller, chiller, GSM, LCD, zigbee

I.   INTRODUCTION

Chiller is the system which is used to keep any water/air reservoir cool. It is mainly used in industries where the heavy machines are operated which needs low temperature and liberate the heat which can damage the device. Laser diode for diamond cutting ranging from 1 to 3.7 lakh of rupees can be damaged when its temperature increases so the chiller system which is commonly known as tray in industries are used for controlling the temperature of the device. The chiller can be on PLC or microcontroller based but the microcontroller based system is cheaper than PLC so, it is advisable to use microcontroller operated chiller. Chillers come in various size based on the requirement. They can be of different types like the indoor and outdoor compressor. Mostly up to now they have wired connection with the system and the tank as it is in proximity to the system and the operator is needed to take care of it. In this dissertation the efforts has been done and made it successful for making it wirelessly operable and message facility to the authorized person.

II.   PROBLEM STATEMENT

The problem faced by the industries is the installation of the chiller and its maintenance, the dissertation is done for making the chiller system of low cost so that it is affordable and maintained easily. Some of the systems are solar cells operated so they face problem when there is no sunlight. Also, when the quantity of the flow is not detected by the system then the cooling process stops when there is no water circulation and the device gets damaged. Level of the water should also be maintained for the proper chilling process. The present dissertation is related to the problem in the diamond cutting laser diode whose price is 1 to 3.7 lakh so , it is necessary to have the proper chilling. The problem of the water flow and the level and the temperature measurement can be done we need develop an industrially viable, cost effective and environment compatible and wireless monitoring and informing about the fault in the system.

2.1APPLICATIONS

It is applicable in the area where the temperature should be maintained.

1. *4p laser machine of diamond*
    It is used to maintain the temperature of the laser diode.
    It cools the heated diode.
2. *To meet specific temperature range.*
    Range of the temperature can be set.
    It displays the room temperature with the set temperature.
3. *Flow control*
    Flow of the water can be regulated.
    It helps in the flow control through pipes and sensors.
4. *Level indication.*
    It indicates the level of the water.

The water level can be set and if needed then the water can be filled automatically through valves.
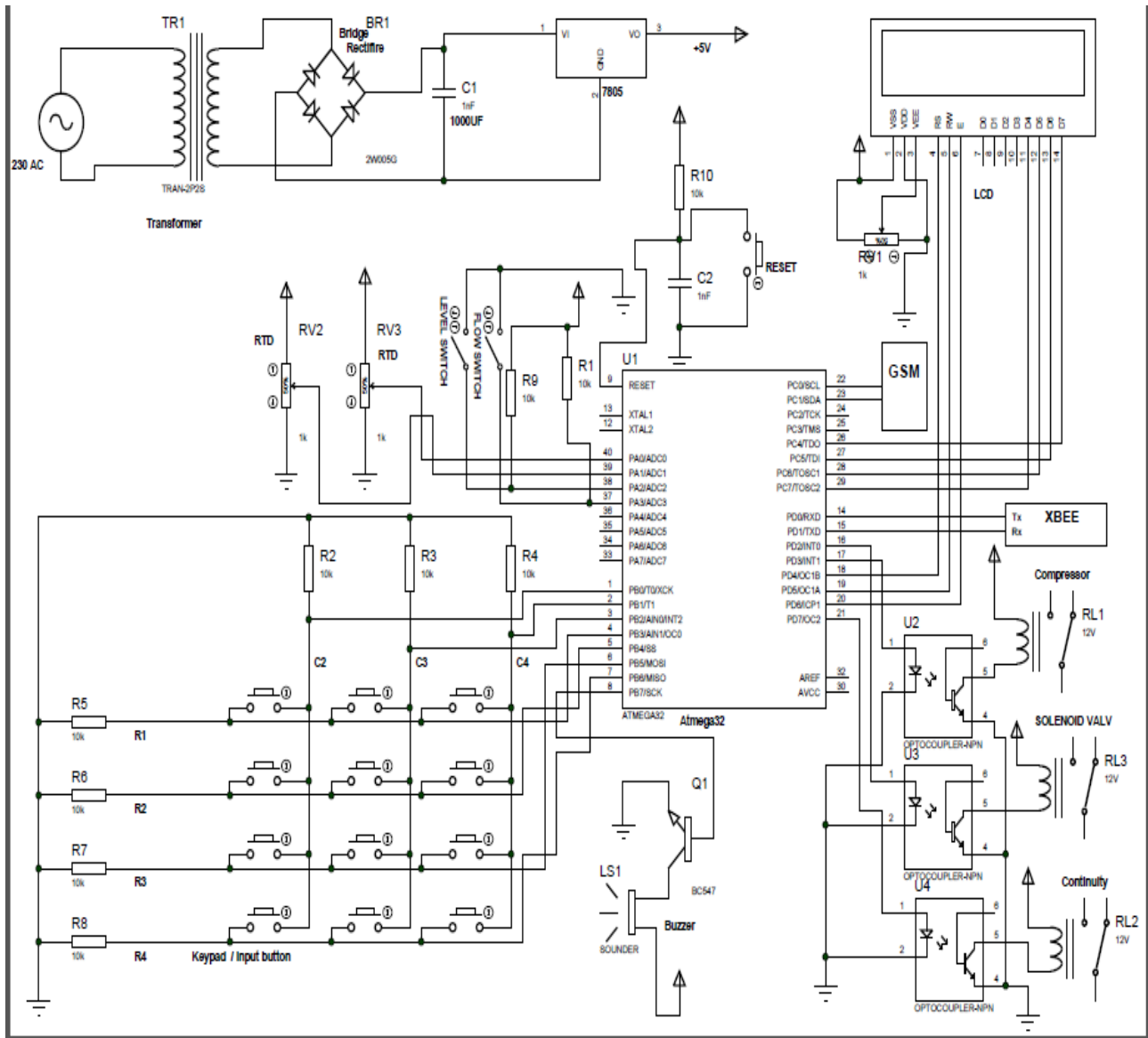
III.   CIRCUIT DIAGRAM
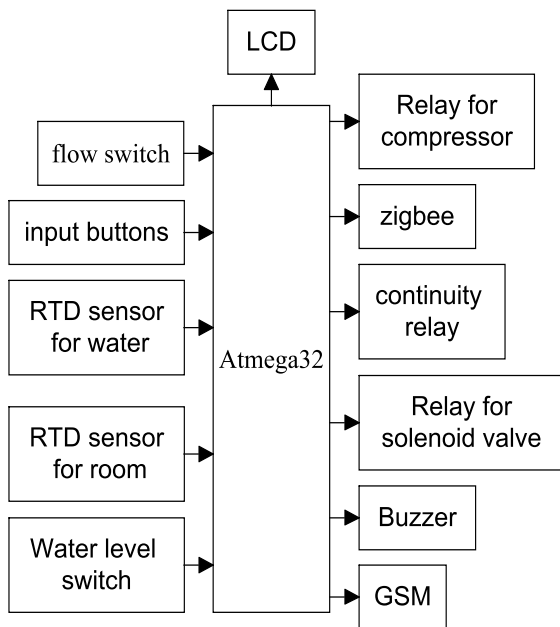Fig. 2: Circuit Diagram

IV. Figures

Fig. 2: Block diagram

Above block diagram describes about all the hardware devices to be connected with the AVR microcontroller. The direction of arrow shows the input and output devices to and from the microcontroller.

Software's are also used for various operations such as to design the circuit using proteus software, micro C for programming, for continuous monitoring lab-view is used.

Below fig:3 shows the flow of the whole system and each and every stage of the command given to various devices.

All the conditions are checked and after that the preferred command is given to the peripheral device.
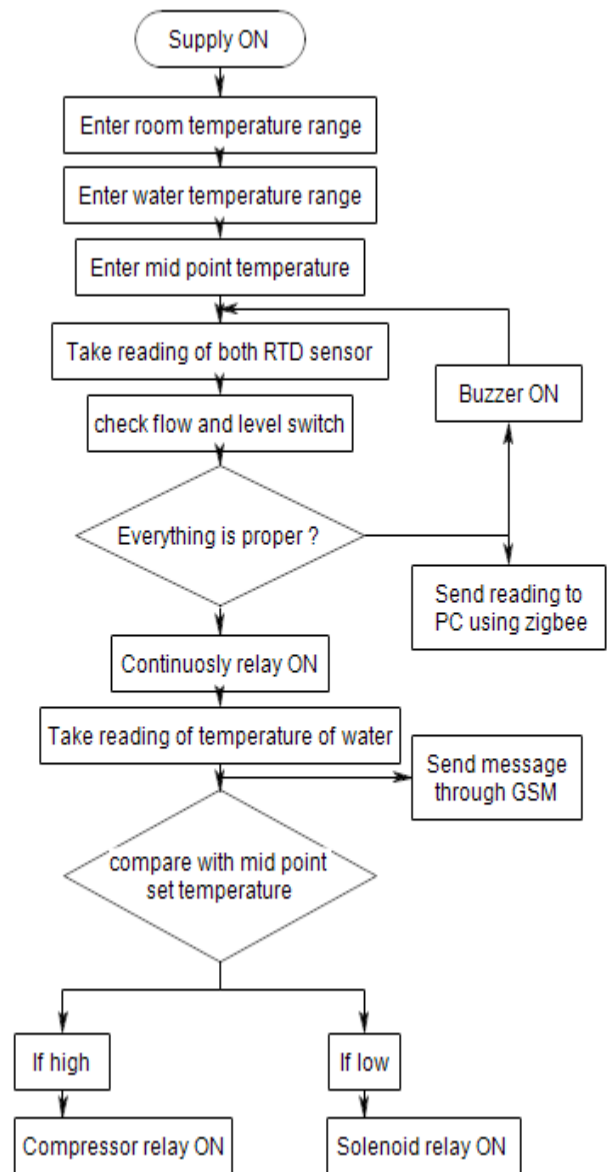

Fig. 3: flow of the system
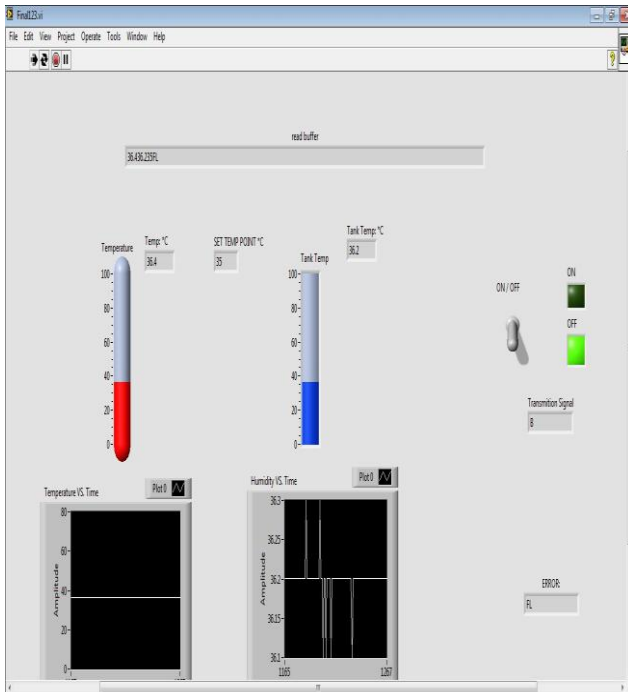
V. SIMULATION RESULTS

Fig. 4: result

VI. CONCLUSION

The chiller by controller is the step to reduce the cost of the chiller by maintaining the temperature of the water tank so that the costly laser diode for cutting the diamond can be prevented from damage. Flow of the quantity of the flow is maintained and the level of the water is maintained form the proper temperature maintenance of the water tank. The circuit which is designed is the appropriate design for the predefined flow and the objective of the research can be fulfilled. Continuous monitoring using lab-view up to 1km range can be done as zigbee is used and the GSM module is used for messaging to the authorized person.

ACKNOWLEDGEMENTS

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