

Fire Extinguishing Robot

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Abstract: The purpose of designing fire extinguishing robot was to protect a building say house, from fire when left unattended. Hence an independent robot was made using embedded system, which would detect fire. Once fire is detected the robot approaches the fire and extinguishes it using centrifugal pump.

Keywords: Sri Jan Board, centrifugal pump, potentiometer.

I. INTRODUCTION

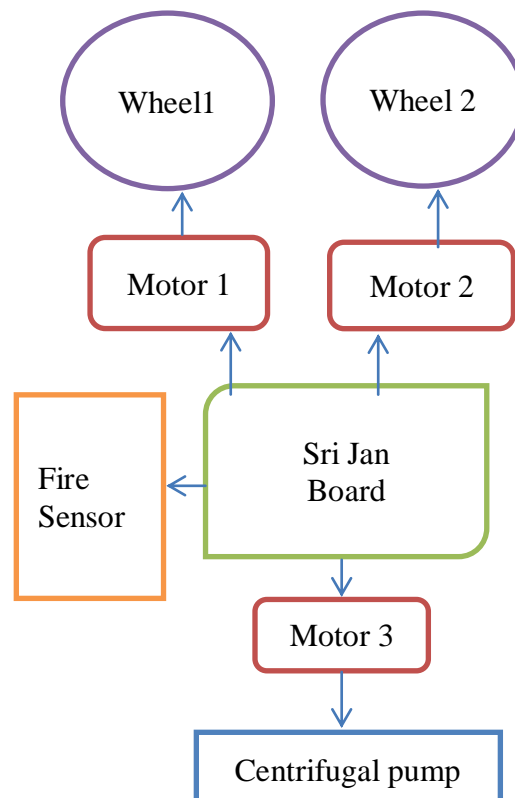
A robot is an intelligent machine which can perform task automatically once programmed and hence reduces human efforts and risks. Therefore robots are used in various hazardous working conditions. This fire extinguishing robot was designed to extinguish fire of a house when the house is left unattended thus reducing both human efforts and risks.

A robot's prototype was made and tested by considering a small circle of 60cm diameter as room and robot placed at its center. Wax candle was used as fire. The robot extinguishes the fire with the help of centrifugal pump which is mounted on it. The centrifugal pump was made by using bottle and a fan of water cooler pump.

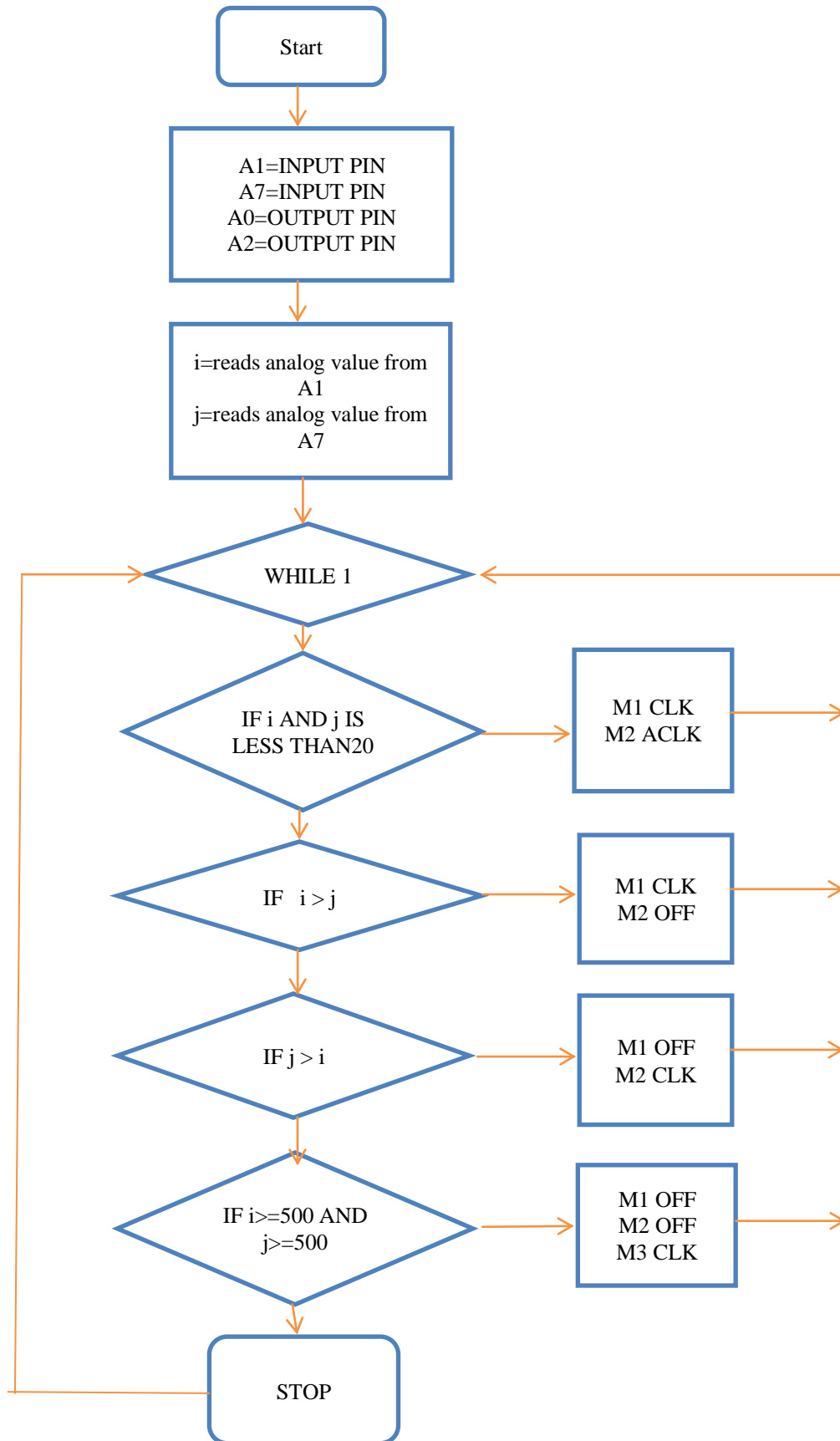
II. WORKING METHODOLOGY

The robot is programmed on a 8-bit microcontroller called "Sri Jan Board". The program was written with the help of software called "Atmel Studio 6", whereas the program was embedded and result of the program was seen with the help of "MegunoLink". The robot will start rotating around its own axis once it is started. As soon as it detects fire it will approach the fire as per the difference of reading on the two used. If the robot senses more intensity of fire from one side then that side wheel stops and opposite side wheel rotates. For ex. If robot senses more intensity of fire on right side then right side wheel stops and the left wheel rotates. In this way the robot approaches the fire's location. Once it approaches the fire then it stops at a safe distance. Now the centrifugal pump starts working and puts off the fire by spraying water on it.

III. BLOCK DIAGRAM



IV. ALGORITHM



V. PROBLEMS AND THEIR RECTIFICATION

Problems:

1. Both sensors were unable to give same output in same situation.
2. The robot was only rotating first even after detecting fire.
3. The robot was not stopping near fire.
4. The centrifugal pump was not pumping water at greater range.
5. The centrifugal pump was not working using Srijan board.

All the above problems were successfully rectified as follows:-

- 1) The resistances of the photodiode and the potentiometer of both the sensor was not same. Hence photodiode and potentiometer were chosen in such a way that both the sensors equivalent resistance must be same.
- 2) This was programming mistake, as robot was made to rotate outside the while loop.
- 3) Robot was not stopping near fire because the digital value of variables i and j was not same at any instant; because some small difference in the equivalent resistance of the two sensors. For rectifying this error we changed the program by giving three conditions at a time instead of two.
- 4) The centrifugal pump was not pumping water at greater heights because the size of impellor used was not nearly same as that of the pump; which is must.
- 5) To rectify this failure motor driving board was used, because in Sri Jan board for AT mega 8 there is provision for only two motors

VI. FUTURE SCOPE

This robot has lot of future scope. Since the range of the robot is limited, it can be equipped with GSM chipset so that it can communicate with other room where such fire detecting sensors are applied, and as soon as the robot gets message from other rooms sensors the robot will travel in that room and extinguish that fire. Again the chassis of the robot can be made more advanced and sophisticated so as to improve its water carrying capacity.

VII. CONCLUSION

The experimental model concludes that a precise and highly efficient fire extinguishing robot can be manufactured. The photodiode can be used to detect fire and centrifugal water pump can be used to extinguish the fire. Since small battery source was used for the working of the complete robot, it is concluded that the robot is energy efficient too.

REFERENCES

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BIOGRAPHY



The author is a student of mechanical engineering department, RCOEM, Nagpur. He was involved in various robotics project during his student life in college. Automation, Robotics are among his field of interest area.