INJECTION MOULDING MACHINE MONITORING AND CONTROLLING BY MOBILE APPLICATION

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Abstract: An injection moulding machine is a machine for manufacturing plastic products by the injection mouldingprocess..For better output, efficiency and reliability of machine constant monitoring and controlling is needed. By using different sensor like LM35, RPM sensor, Flap sensor we will sense the output and monitor as well as control the parameters with mobile application. Monitoring and controlling process will be done by Arduino.

IndexTerms – **Injection moulding machine, Arduino UNO, Arduino IDE, Mi app inventor**

I. INTRODUCTION

One of the most common method of converting plastics from the raw material form to an article of use is the process of injection moulding. The injection system consists of a hopper, a reciprocating screw, barrel assembly, and an injection nozzle. To monitor different parameters of the machine such as Temperature, speed of the reciprocating screw, and to monitor if the flap is open or closed, different sensors have been mounted. These sensors are connected to the Arduino UNO board. Arduino collects all the data from the sensors and sends it to Bluetooth module and via Bluetooth all the parameters are displayed on the mobile app and can be monitored and controlled by the mobile application [1].

II.HARDWARE DESCRIPTION

2.1 Block Diagram

Fig 2.1 Block diagram of the Prototype
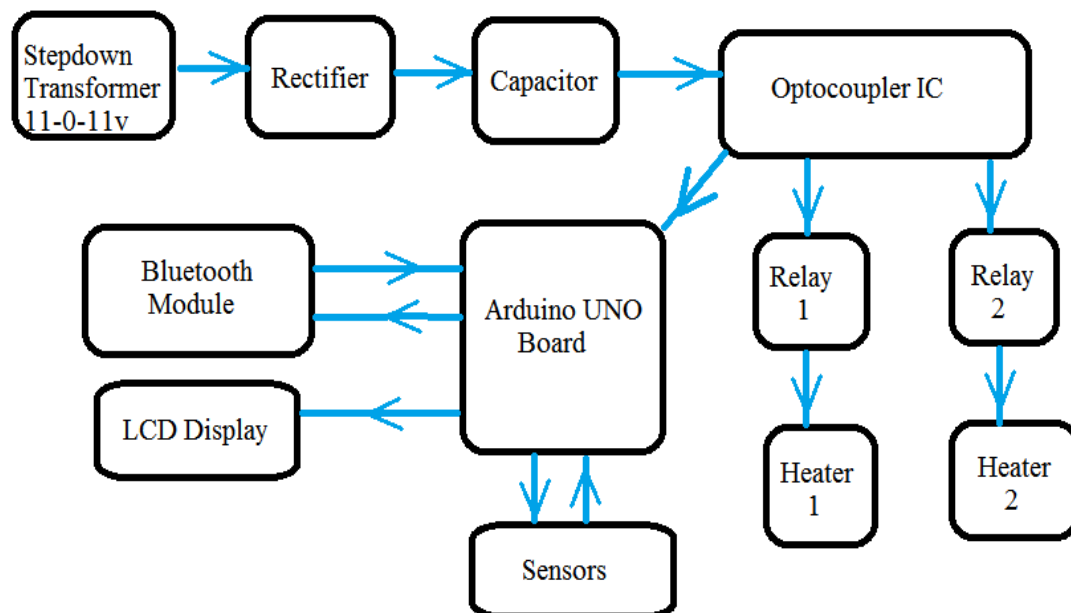
As mentioned in Fig 2.1 The First three blocks are of the power supply circuit. Then the optocoupler is which isolates the relay circuit and Arduino circuit. Arduino board is then connected to sensors which will collect all the data from the sensors then further it is connected to LCD and Bluetooth Module. The data from Arduino of the different parameters will be sent to LCD and Bluetooth module which is connected to mobile app via Bluetooth and all the parameters will be displayed on mobile app [2-4].

2.2 Injection moulding machine prototype

There is an injection moulding machine prototype shown in Fig 5.1 which consists of barrel, reciprocating screw, hopper, flap, heater, and motor. The mounting of different sensors is done at different places. Temperature sensor (LM35) is placed inside the barrel. Temperature sensor is used to measure the temperature inside the barrel. Another sensor which is placed near the flap is reed switch which senses opening and closing of flap. Speed sensor is mounted near the motor which consists of reed switch and a magnet, reed switch is kept static and magnet is placed on the reciprocating screw near motor as the reciprocating screw rotates and allows reed switch to sense the no. of rotations. All the data sensed by the different sensors is sent to Arduino which is then monitored in mobile application with the help of Bluetooth and on LCD as well. Here the controlling of temperature is done if the temperature inside the barrel goes above the set value then the relay of the running heater gets tripped and the heater goes off. As the temperature value goes below the set value selection of heater is done by mobile application and the heater gets turned on as per the selected heater[1].
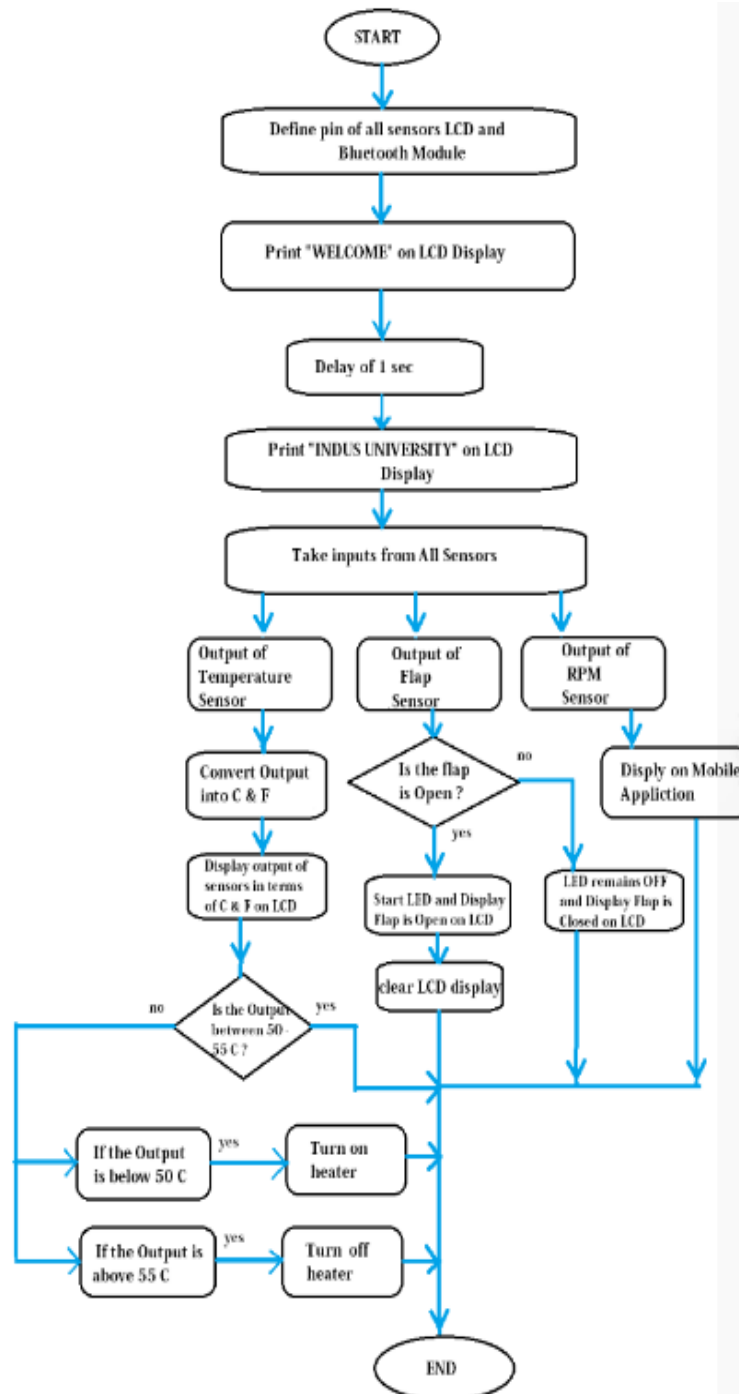
III.SOFTWARE DESCRIPTION

Fig 3.1 Flowchart of program

Fig 3.1 shows the Flowchart of the program.

IV.DEVELOPMENT TOOLS

4.1 Aduino IDE

In our research we have used Arduino IDE software for compiling the programs and uploading the programs to Arduino UNO board.
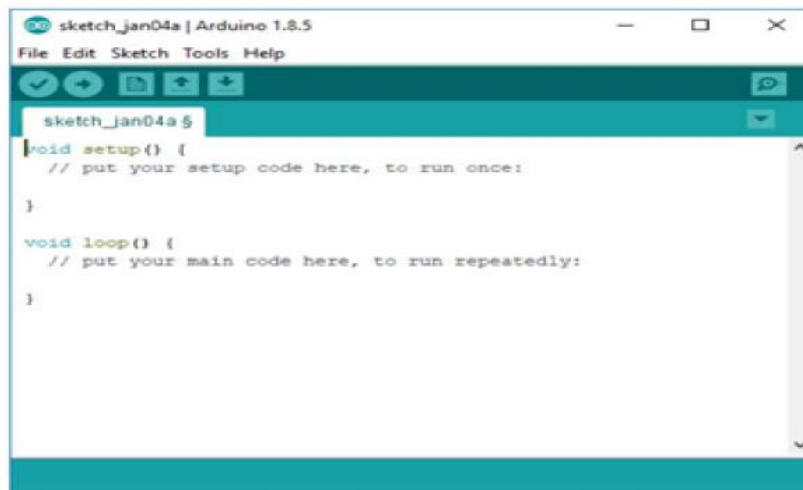

Fig 4.1 Arduino IDE

4.2 MIT APP INVENTOR

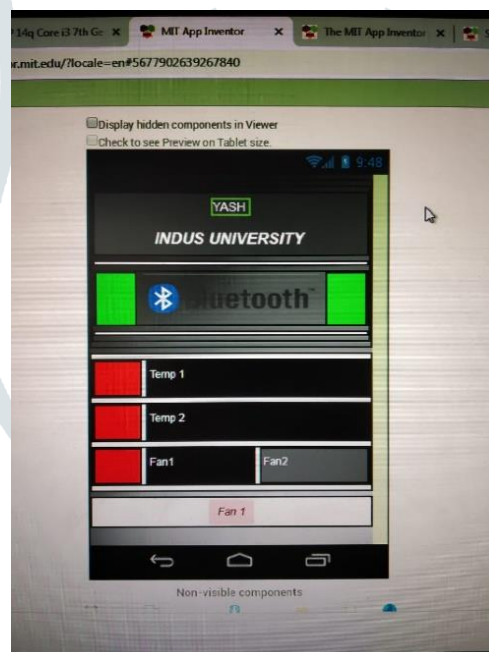The another tool we have used is Mit App Inventor for Devloping mobile application .

Fig 4.2 Customized app

The above image 4.3 is of our customized app. With the help of this app we will monitor different parameters such as Temperature, to check whether the flap of the machine is open or closed. Will measure the speed of the reciprocating screw. We can also control the temperature with the help of this app by switching the heater on and off.

V. RESULTS

We have made an injection moulding machine prototype which consists of barrel, reciprocating screw, hopper, flap,heater, and motor. We have placed different sensors at different places.Temperature sensor (LM35) is placed inside the barrel. Temperature sensor is used to measure the temperature inside the barrel. Another sensor which is placed near the flap is reed switch which senses opening and closing of flap. Speed sensor is mounted near the motor which consists of reed switch and a magnet , reed switch is kept static and magnet is placed on the reciprocating screw near motor as the reciprocating screw rotates and allows reed switch to sense the no. of rotations. All the data sensed by the different sensors is sent to Arduino which is then monitored in mobile application with the help of Bluetooth and on Lcd as well shown in Fig5.2 . Here the controlling of temperature is done if the temperature inside the barrel goes above the set value then the relay of the running heater gets tripped and the heater goes off. As the temperature value goes below the set value selection of heater is done by mobile application and the heater gets turned on as per the selected heater.

Fig 5.1 Results of the different parameter Displayed on Mobile

The above Fig. 5.1 shows the output of the different sensors on the mobile application. The data which is sensed by all sensors are sent to Arduino and from arduino it is sent to bluetooth module. The mobile application is connected via Bluetooth and all the data which is sent through the Arduino is shown in the mobile application.

Fig 5.2 Results of the different parameter Displayed on LCD

VI. CONCLUSION

Most practical engineering problems are complex in nature. This paper is about monitoring and controlling of Injection moulding machine using mobile application with use of arduino. These results do support this paper.

With the speed of changing technology today it is easy to lose sight or knowledge of the basic theory or operation of programmable controllers. Most people simply use the hardware to produce the results they desire. Hopefully, this report has given the reader a deeper insight into the inner workings of programmable controller and its role in mechanical operations. The idea of programmable controller is very simple to understand, but it is the complex programs that run in the the software that make them dif-ficult for the common user to fully understand. Hopefully this has alleviated some of that confusion.

VII. FUTURE WORK

- With the help of the hardware of our project we can increase the efficiency, output of product, measure the parameter for Injection moulding machine.
- In this project we can also use different more sensors which help to monitors and also control the system by different drives and microcontroller.

VIII. REFERENCES

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