



## DESIGN AND DEVELOPMENT OF MODBUS BASED LED DISPLAY BOARD

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**Abstract:** In industries maximum machines are manufacturing Variety of products. So here main thing is needed to any company is real data or count of the products that are being manufactured. In most industries the data collected manually by the person in-charge is not shown to the supervisors in real time. Sometimes the data collected by the person in-charge is not accurate and can be misleading. To solve the issue we have created this MODBUS based LED Display board. This interprets the data given by the person in-charge and displays it on the LED Display board. Henceforth the data that is being displayed on the LED display is observable to all the workers and supervisors in real time. The project in this paper shows the perfect products that have been manufactured correctly and also those which has some defect in it. So that the workers and supervisor have a clear idea about how much work they have done and also they get the information about how many works they have to do more to complete the target.

**IndexTerms - MODBUS, PLC(Programmable Logic Controller), Microcontroller.**

### I. INTRODUCTION

In the world, the manufacturing industries are growing rapidly. The growth of any industry leads to increased work pressure load on the workers in that specific company. The productions in these companies are at larger scale. So the amount of wastage and environmental pollutions may increase due to improper management in the working area. In every manufacturing company there are selected employees who keep the data of the work done throughout the day, which helps the company to measure the amount of products manufactured/produced till date. Due to increased working load the data interpretation can be sometimes delayed to reaching to workers and henceforth the workers might produce more product than necessary or not even produced necessary target. Therefore to solve this problem and to convey this actual information about to every worker in the company in real time we have created this project. Our main purpose of project is to shorten the time required to convey the information to all the worker and supervisors. And also to minimize the production of extra products which may leads to wastage, also to save the money, energy wastage of company and the environment. Hence this product can be useful in industries which are growing rapidly.

### II. MOTIVATION

The most management is expecting high productions in industries. Rather, so many industries avoid to planning, that is industry expects the excellent production or fails to achieve, certain rectifications are yet needed. For best expectations, industries should face with number of challenges and hurdles that ask question them forever to their prior productivity and result to better success than before. The higher priority is also tends to minimize the loss due to the unnecessary productions of the products that are to be manufactured. The above mentioned hurdles are always and many times discussed. But, industries also troubleshoot an interesting challenge, always forgotten or not analyzed. Product production management is a challenge for industries throughout the world. This issue can damage the economy of the company by wasting on raw materials and faulty productions. Therefore, this issue can many times creates considerable production loss and yields unrequired attention to financial analytics. There is point to be noted is that production management technique have to be kept in keen supervision continuously. Rather, utilization of the man power for productivity, one of the industries should take care of consideration the fact of production management and to minimize the issue of wastage of product and increasing the environmental pollution.

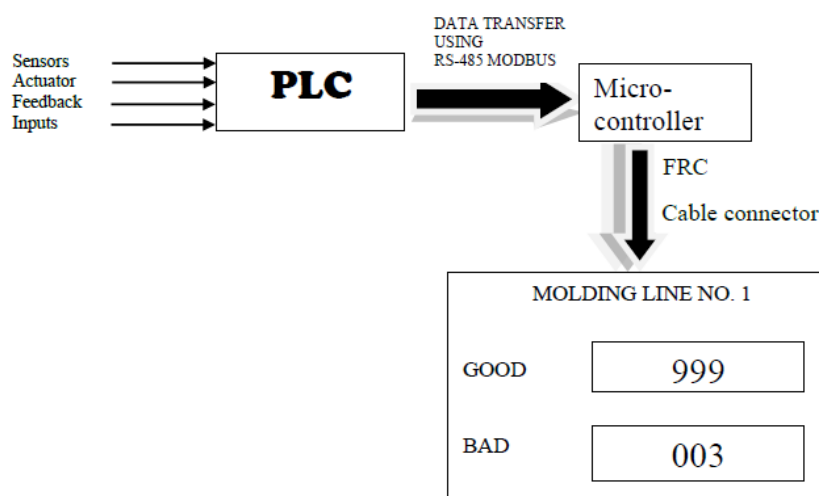
### III. LITERATURE REVIEW

Modbus, a consecutive topology of connection technique at initially introduced by Modicon in 1979 by use with programmable logic controller (PLC). Modbus rectifies into a standard connection technique also it is a usually normal technique for compatibility connection of electronic devices in current systems. Modbus is nothing but a successive connecting topology used by Mod icon revolved with programmable reasoning procedure by using controller. By another words, it is nothing but circuitry on consecutive tracks over electronic systems. The contraption defining the informative data is called

Modbus header and delivering interpretive information is Modbus Slave. In normal Modbus connectivity, it has single header with 247 Slave devices can accommodate. [3]

#### IV. METHODOLOGY

Number of inputs and outputs are present in a microprocessor-based controller with PLC. The functions related with controlling machineries and processes are controlled with memory which is programmable to save instructions in it. The logic functions like relay, timers, sequencers and counters can be executed by using PLCs.



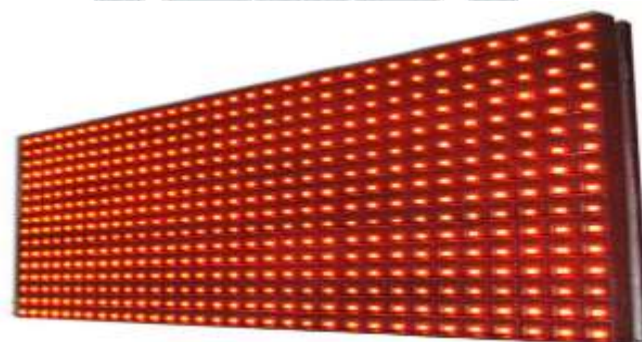
**Fig.1.** Block Diagram of MODBUS Based LED Display Board

In this paper the project completed using PLC and Embedded Atmega328p IC. It consist PLC (MODBUS RS-485), ATmega328p IC, P10 LED Display, MAX485 IC, 9-pin D-type connector, LM2596 IC, Trimpot10k, capacitors, Resistors, LED's.

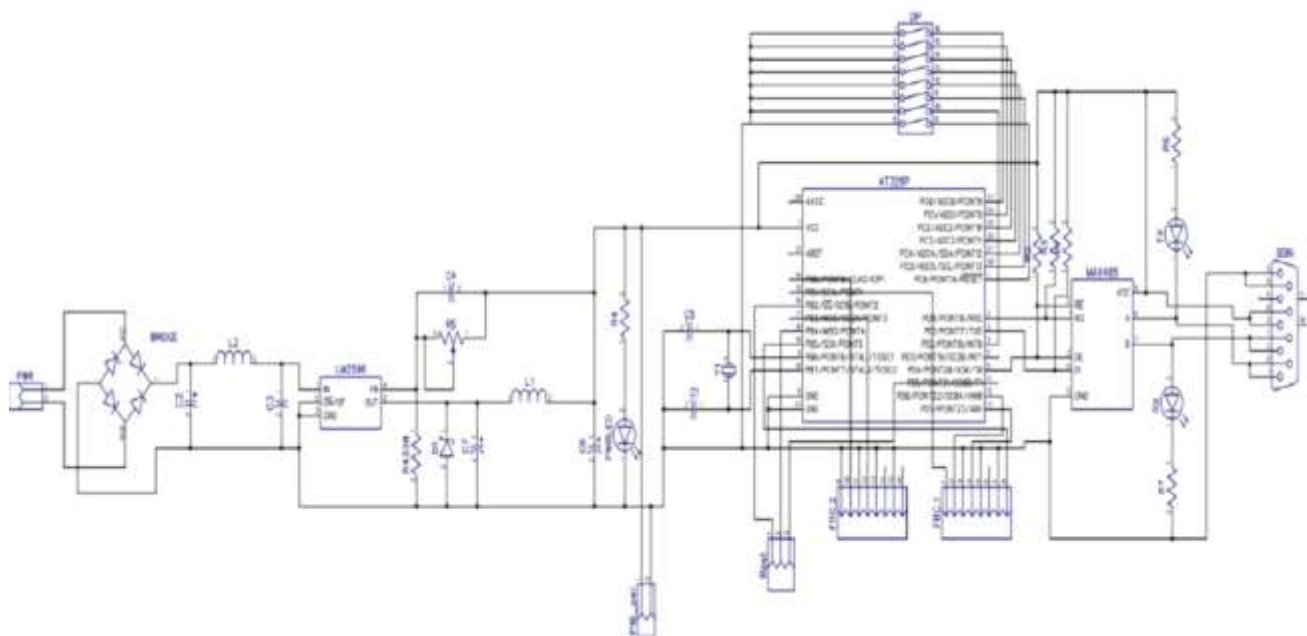
Whenever a product is manufactured then this data will be entered in the PLC as per program and instructions. Then using MODBUS RS-485 the data will transfer to our circuit embedded IC. Then as per program that data transfer to P10 LED display board using FRC cable connector. We can also show the separate production line or different shifts which are currently working. We can connect PLC to circuit using RS-485 up to 30feet. We can see count or data on LED panel as per Program. The values are displayed on LED. Whenever PLC reset their value then LED also reset their values. We can adjust station no. means we can connect up to 15 LED panel in this project. We can also adjust baud rate in this project 9600, 19200 are most common baud rate also include in our project this helps to communicate with PLC. This device is based for monitor the data or count and is developed especially for production monitoring in textile industries, casting industries, plastic industries, food product industries, etc. With continuous status of production of line appropriate actions can be made in advance to avoid any excess/less production.

#### P10 LED Display Board:

For indoor and outdoor LED display board, we can use LED Display module as P10 which is 32x16 (total LEDs used = 512). P10 32x16 (Total 512 LEDs) Variety of graphic or sign boards can be accomplished by using LED Display module as P10 which is 32x16 (total LEDs used = 512).



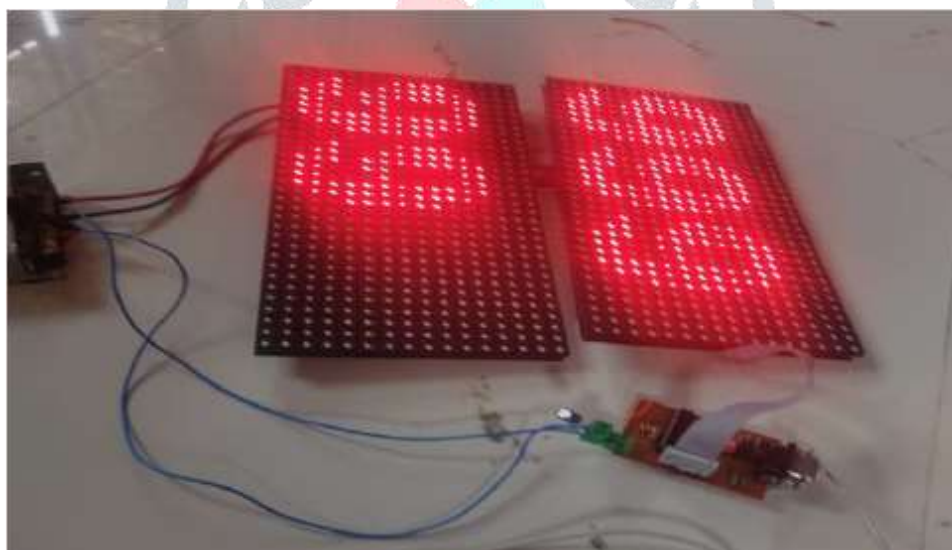
**Fig.2.** P10 LED Display



**Fig.3.** Circuit Diagram of the system

## V. EXPERIMENTS AND RESULTS

In this project we used PLC to collect the data from Sensors and actuators. Then this collected data is given to the microcontroller using RS-485 MODBUS protocol. Here the data received by the microcontroller is given to the LED display using FRC cable connector. The experimental system can be used for an estimate value of the product that has been manufactured and also give warning about created defective products.



**Fig.4.** Experimentation Image

## VI. CONCLUSION AND FUTURE WORK

In this paper we have explored a product which shows the data that has been entered in the PLC using RS-485 MODBUS system. In which the PLC is used to collect the data from Sensors and actuators. Then this collected data is given to the microcontroller using RS-485 MODBUS protocol. Here the data received by the microcontroller is given to the LED display using FRC cable connector. So the wastage of raw material will stop the losses of the company. Real production data will acquire by owner or supervisor then they can fulfill the sales requirements.

The problem of raw material wastage is became an attention seeking issue which needs to be managed in these days of rapid growth of industries throughout the world. Keen supervision yields proper and smooth production also considered by a lot of industries till date. Thus this project carries a great social relevance as it aims to address this problem. Our system helps to industries for reducing the wastage as well as losses of the raw material, energy and money.

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