

# Color based railway parcel management using PLC

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## Abstract :

Now-a-days product management in Railways is a big problem in every station generally problems in railways are time consumption, increased manpower, and decreased reliability. By using COLOUR BASED RAILWAY PARCEL MANAGEMENT SYSTEM we can reduce these problems. Our system plays vital role in railways parcel management system. The parcel is tagged with COLOUR Sticker; the parcel is travel through conveyor belt. The COLOUR Sticker is read by the COLOUR Sensor. According to that the PLC is took decision where to drop the parcel.

**Key words:** Color sensor, conveyor belt, PLC.

## INTRODUCTION:

Around 2 crore rupees for pilot parcel management system was sanctioned by rail board between 7 stations. On 1<sup>st</sup> November 2006 parcel management system started at New Delhi parcel office. Manual operation were carried out in last few years, which have several drawbacks. Hence leads to error in the system i.e. increase in manpower and it also slower the production rate, doesn't provide the accuracy in the required manufacturing process.

In order to get accurate result automation play a vital role since it can reduce the drawbacks which were faced during manual operation. Some of the advantages are listed below:

- 1) Low error probability
- 2) Production rate is high
- 3) Reduction in production cost

## 4) Decrement in no of accidents

Only the issue regarding automation is the cost affair. Due to use of high cost PLC the initial cost goes to high. In order to minimize this high cost, low cost dedicated PLC can be used. Our project color based railway parcel system is an application oriented project. Parcels are placed on conveyor belt, from these conveyor belts parcels are travelled. Followed by IR sensor which will sense whether the object is present or not. Parcels of different region are tagged with color sticker. Color sensors are used to read the color of sticker. Color of parcels are displayed on LCD. According to the color PLC decides where to drop the parcels as well as pushers for each boggy to drive the parcel. And so the operation will be conducted. Our project parcel management can make it easy since it can replace the previous method in less time, money and manpower.

## SYSTEM SURVEY:

In previous years the task of management of parcels was very difficult.



Fig. 1 Present scenario of railway stations

Then in 2006 Parcel management System was introduced in India. This system was implemented on 6

stations like Delhi, Kanpur, Howrah etc. This system uses Bar Code technology.

Following are the main features of Parcel management System:

- 1) Electronically weight of the parcels are captured directly
- 2) Universal windows for all destinations for booking
- 3) Weigh-ment and cash payment is possible
- 4) Tracking of parcels is there



Fig. 2 PMS Office

FIELD VISIT TO NASIKROAD RAILWAY STATION:



Fig. 3 Nasik road station

**MATERIALS AND METHOD:**

Sr. No.	Name of Components
1.	IR sensor
2.	Color sensor
3.	Microcontroller 89C51
4.	LCD(Liquid Crystal Display)
5.	Relay Driver ULN2803
6.	Relay
7.	PLC(14SS Series)
8.	Motor(for conveyor and pusher)
9.	Conveyor belt
10.	Resistors, Capacitors, Diodes, LEDs

• IR sensors:

IR radiations can be detected by device called IR sensor. Different types of IR sensors are available and can be selected as per the application. Types of sensors are:

- 1) Proximity sensor- used in touch screen phones and edge avoiding robots
- 2) Contrast sensor-used in line follower robot
- 3) Obstruction counter/sensor- used for counting goods and Burglar alarms

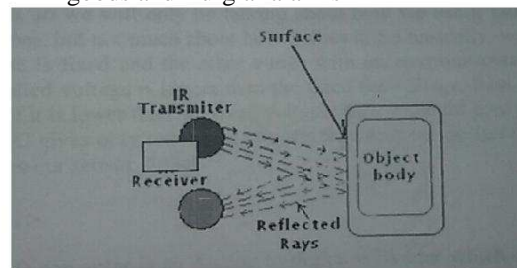


Fig. 4 Principle of IR

• Color sensor:

Color sensors are used to detect and determine the different colors. Each primary color are switched by the sensor one by one and the intensity of a reflected color by a surface of detection is checked. Then the reflected intensity is converted into 8-bit value which will be given to controller.



Fig. 5 #1185

- Microcontroller(AT89C51):  
 AT89C51 is 8-bit microcontroller with a low power, high performance CMOS 8-bit microcontroller with additional 8 K bytes of flash programmable and erasable read only memory(PEROM). It can be easily interfaced with PLC.



Fig. 6 AT89C51

- ULN 2803:

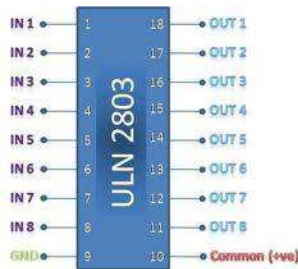


Fig.7 ULN 2803

**Features:**

- 1) Output voltage  $V_0=50V$
- 2) Input voltage=30V
- 3) Collector current=500mA
- 4) Base current=25mA

- Relay:  
 Relays are used for providing electrical isolation between two circuits. Relay consist of a coil which may be energized by low voltage circuit and one or more sets or switch contacts which may be connected to high voltage circuit. With the flow of current in a coil, magnetic field will attract a metal arm which creates a contact between normally open switch contact and the common switch contact.

- PLC:

PLC controllers are used in all automated system. PLC is a central part of a process control system. It is possible to connect more PLC controller to run more complex process. PLC's can be easily programmed and have an easy programming language. It has interfacing for inputs and outputs inside the controller. It can be easily reprogrammed depending on the applications. They are more reliable electronic instruments and can easily implement. Only problems faced by PLC are difficulty in finding errors, requirements of skillful workforce.



Fig.8 14SS delta PLC

**OPERATION:**

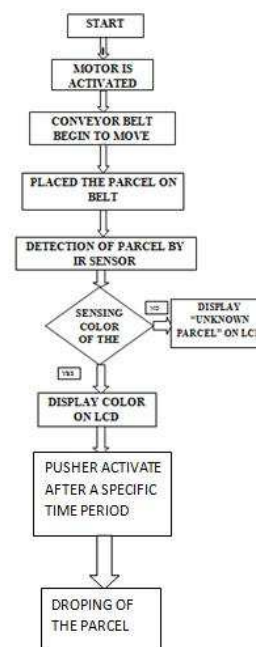
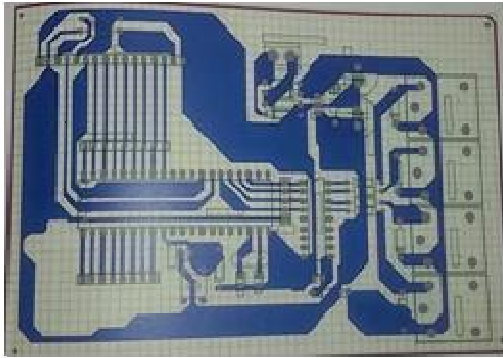


Fig. 9 Flow chart

**PCB Layout:**



**Working model:**



Fig. 10 PCB Layout and working model

**RESULTS AND DISCUSSION:**

Management Systems	No. of Parcels	Time Requirement(mints)
Traditional Method	10	15
Our System	10	5

Suppose there are 60 parcels on station. If these 60 parcels need to deliver at different states like Maharashtra, Gujarat and Madhya Pradesh. This work is distributed among 3 workers A, B, C.

Each worker is allocated 20 parcels. In one turn each worker is able to lift only 10 parcels.

Time required to lift and place 10 parcels=15 minutes

Time required to lift and place 20 parcels=15x2=30 minutes

So, each worker will take 30 minutes to lift and place 20 parcels.

Time required to lift and place 60 parcels=3x30 minutes=90 minutes

Now, By using our proposed system,

Time required to lift and place 10 parcels=5 minutes

Time required to lift and place 20 parcels=5x2=10 minutes

So, each worker will take 10 minutes to lift and place 20 parcels.

Time required to lift and place 60 parcels=3x10 minutes=30 minutes

From above analysis it is clear that proposed system is providing reliability and efficient management system.

**CONCLUSION:**

Thus, in railway and railway stations our system can be used. Sensors are used to detect the color which helps the workers to differentiate among the parcels of particular area very easily. Within the station conveyor belts are used to carry the parcels from one place to another. Time consumption is reduced, reliability is increased and manpower is reduced by using our model. Conveyor belt is user friendly which carries high weight, operator dependency is reduced and accuracy increases.

Major four aspects: System reliability, Less time consuming, Up gradation.

**REFERENCES:**

- [1] John W.Webb”programmable logic controller principle and application”, PHI, fifth edition.
- [2] <http://cris.org.in/CRIS/PDF/PMS.pdf>
- [3] <http://www.thinvent.in/railways/projects/pms/>
- [4] Muhammad Ali Mazidi, The “8051 microcontroller and embedded system”,pearson second edition.
- [5] <http://www.slideshare.net/praftek/parcel-management-system-1>
- [6] Visit at nashik road railways
- [7] Curtis Johnson “process control instruments technology” 8<sup>th</sup> edition pearson edition.