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# Incorporation of IoT in Assembly Line Monitoring System

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**Abstract -** *In this paper we propose a new technique in assembly line monitoring system, which incorporates the use of Internet of Things (IoT) in it. We suggest the implementation of this technique by using Master and Slave combination of electronic update Trackers. We are transferring each update of assembly line station to the statistics display, which is at the end of the assembly line by means of the Internet. This proposal will find its applications in various assembly line systems and will make it more efficient to supervise and will eliminate the need of manual data update of each component assembled on the assembling product.*

***Key Words***: **Internet Of Things (IoT), Assembly Line Monitoring System (ALMS), Electronic Update Trackers.**

## 1.INTRODUCTION

Effective data transfer is the need of the hour for most of the assembly line plants where hard-wired modes are used for sending updates to the main supervising station, which is a costly affair. Considering the main aim to reduce the cost of the overall assembly, we need to develop a system that sends the updates of every activity at the assembly stations to the main supervising station. So this system design aims at incorporation of Internet of Things (IoT) in the existing Assembly Line Monitoring System (ALMS) to eliminate the use of hard-wired connections for update the data and reduce the overall cost.

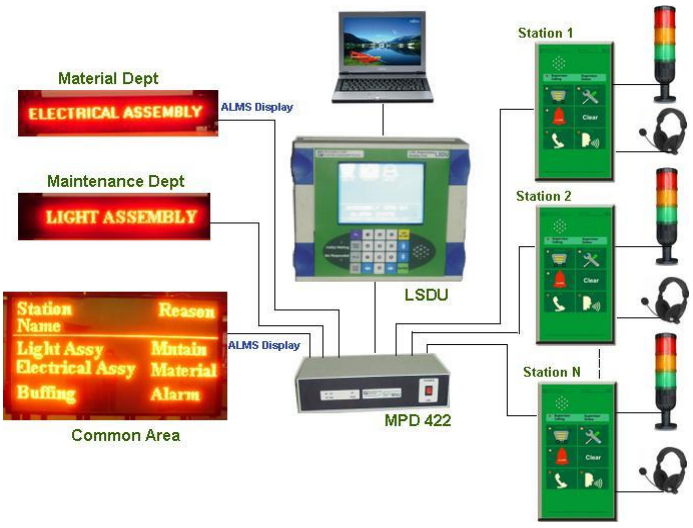
## 2. Literature Review

**Existing System:**

The Assembly Line Monitoring System designed by Process Care Systems helps in immediately sensing any hold up in any one of the stages automatically and communicates reason for hold up either automatically or with some more inputs from the operator at a particular stage instantaneously.

**Features:**

1) Station Monitoring Unit can status send if a station is non-operative automatically by continuously monitoring activity at the Station.
2) Programmable threshold time after which a station is declared to be Non-operative in the absence of activity.
3) Option is available to pickup extra four ON/OFF inputs from a process or machine.
4) Voice channel is provided to describe problem associated with a station to enable communication in a regional language.
5) LED based Jumbo displays can be integrated to publish problems at different stations.
6) Usage of LCD Supervisory display unit makes the system work in a stand-alone mode without any help of a PC.
7) Provision is made to segregate the reasons for Dysfunctional at several stations and route them to the respective departments to be displayed on an LED display board.[1]




## 3. Concept of Assembly Line

Assembly includes all assembly/subassembly processes and equipment required to

- Bring together, configure, align, orient, and adjust components and materials to form the end-product

- Physically attach parts, materials, and components, such as screwing, riveting, stapling, nailing, gluing, wrapping, interlocking, tying, fusing, sewing, welding, soldering, bonding, pegging, coupling, laminating, insertion, sealing, and similar activities (IMTI Inc., 2000; Yahya and Muhamad, 2004).

Assembly is an essential part of the total manufacturing process. Assembly costs are typically 25% to 50% of the total cost of manufacturing. The percentage of workers involved in assembly operations ranges from 20% to 60%. For an example of electronics industries, 40% to 60% of total wages are paid to assembly workers (Kalpakjian, 2001). Assembly often constitutes the last stage of a discrete manufacturing process. The accumulated processing value of the product is therefore high compared to other manufacturing processes at previous stages (Bellgran and Johansson, 1995).[2]

## 4. Internet of Things (IoT) : Overview

### A. IoT Definition

The term Internet of Things generally refers to scenarios where network connectivity and computing capability extends to objects, sensors and everyday items not normally considered computers, allowing these devices to generate, exchange and consume data with minimal human intervention. There is, however, no single, universal definition.

### B. Enabling Technologies

The concept of combining computers, sensors, and networks to monitor and control devices has existed for decades. The recent confluence of several technology market trends, however, is bringing the Internet of Things closer to widespread reality. These include Ubiquitous Connectivity, widespread adoption of IP-based networking, miniaturization, advances in Data Analytics, and the rise of Cloud Computing.

### C. Connectivity Models

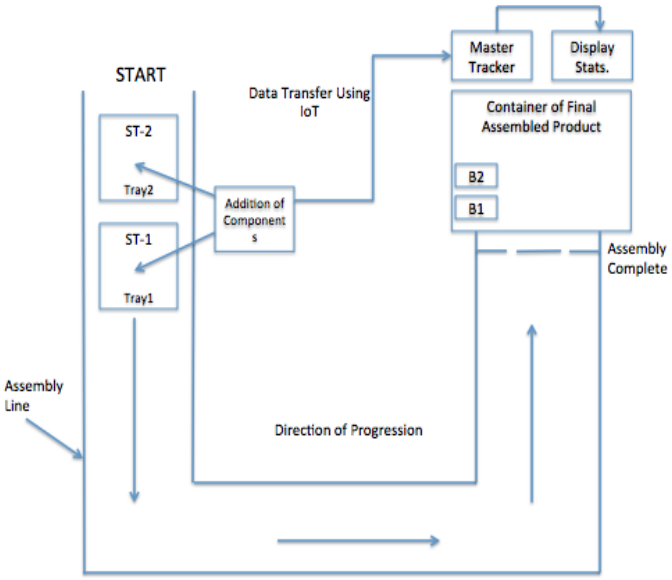
IoT implementations use different technical communications models, each with its own characteristics. Four common communications models described by the Internet Architecture Board include: *Device-to-Device, Device-to-Cloud, Device-to-Gateway*, and *Back-End Data-Sharing*. These models highlight the flexibility in the ways that IoT devices can connect and provide value to the user.

### D. Transformational Potential

If the projections and trends towards IoT become reality, it may force a shift in thinking about the implications and issues in a world where the most common interaction with the Internet comes from passive engagement with connected objects rather than active engagement with content. The potential realization of this outcome – a "hyperconnected world" — is testament to the general-purpose nature of the Internet architecture itself, which does not place inherent limitations on the applications or services that can make use of the technology.[3]

## 5. Proposed System

This paper aims at designing a technique for incorporation of Internet of Things (IoT) in the Assembly Line Monitoring System (ALMS) and makes the statistics of Assembly line available to the supervisor and other authorities of the Assembly plant on their internet connected devices. It has various components, which sums up to be a comprehensive monitoring system.




### A. Master Tracker (MT), Slave Trackers (ST)

Master and slave combination of trackers is preferred to keep the real time data entry of each component fixed on an assembling product. Whenever any component is fixed to the assembling product, every tray has a slave tracker on which the attendant has to update the placement of component. Slave tracker accepts the update from the attendant of respective station and transfers it to the master tracker.

### B. Display Statistics

Display statistics shows the total statistics of the contents of the box as well as it is connected to the Master tracker i.e. wherever during the assembly the product is assembled with any component it updates the in display Stats.

### C. Assembly Line

This assembly line is nothing but a generic representation of how any assembly line for any product can be but this paper primarily focuses on assembly line of small products. i.e. Phones, Tablets etc.

### D. Boxes (B1, B2)

Boxes represents the product is assembled completely and packed and ready for transportation to the warehouse. That's why boxes are kept into container of final assembled product.

## 6. Methodology

We propose the new method of monitoring the assembly line with the use of IoT in it. The process of implementing IoT in Assembly Line Monitoring System goes with the process flow, which starts from fixing a Slave Tracker in every Tray in which the product is going to get components fixed (Assembled). All the slave trackers are connected to the Master tracker at the end of the assembly line over the Internet. Whenever the component is assembled in the product, the attendant of that station has to update that on the Slave Tracker. The Slave Tracker is connected to the Master Tracker on the Internet and it transfers each entry done by attendant to the Master Tracker with respect to the stages of assembly. This process goes on the till the product is assembled completely and put in the box for delivering to the warehouse. The acquired data from Mother Tracker is displayed on the Statistics display which is connected to it or it can be transferred to the display of the Supervisor of the assembly plant in the monitoring room which all the detailed report of the assembly of each and every product.

## 7. CONCLUSIONS

The main objective of this paper is to establish the Internet of Things (IoT) based Assembly Line Monitoring system (ALMS) by using Master Slave Trackers. The proposed system will find its applications in various assembly plants where monitoring system of the plant can be changed to the proposed system to enhance the efficiency of the system.

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