

# Android Application for Analysis of Productivity of Precision Machine Shop.

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## ABSTRACT

Often, manufacturing equipment is utilized without a planned maintenance approach. Such a strategy frequently results in unplanned downtime, owing to unexpected failures. Scheduled maintenance replaces components frequently to avoid unexpected equipment stoppages, but increases the time associated with machine non-operation and maintenance cost. The emergence of Industry and smart systems is leading to increasing attention to predictive maintenance (PdM) strategies that can decrease the cost of downtime and increase the availability (utilization rate) of manufacturing equipment.

## I. INTRODUCTION

An accurate record of all the machines and operators and displays their status and the jobs assigned and completed by them. Using this system, the administrator of a workshop/factory/machine shop can seamlessly monitor and supervise over the day-to-day operations. Machining is a form of subtractive manufacturing wherein a material is cut to a desired shape and size by a controlled-material removal process. Large machine shops have a wide variety of machining tools and equipment such as lathe machines, CNC machines etc. Such machine shops also employ multiple skilled workers to operate these machines. As a Machine shop, factory, or workshop expands its operations; the number of machines and the workers employed also inevitably increase as a by-product of growth. Managing the increasing employees and machines using conventional paper-based methods of management could cause chaos and confusion. This may also result in increased idle times of both machines as well as employees. This Machine Shop Project helps in automating and streamlining the process of management.

## II. LITERATURE REVIEW

The concept of productivity developed within the 18th century, when it indicated the ratio between inputs (such as human and non-human resources) and manufacturing processes and outputs (products and services). The concept of productivity expanded over time to varied areas and subjects. the foremost frequently-used macro-economic concept of productivity consists of partial and total factor productivity, and for a few time it's been wont to measure the company competitiveness of certain countries and industries. Partial factor productivity indicates outputs and single inputs, especially the connection between labour and capital, while total factor productivity means the connection among multiple inputs and outputs, additionally, various sorts of productivity-related

These past studies, on the other hand, were unduly focused on measuring and analysing productivity, resulting in constrained sets of knowledge such as TFP (total factor productivity). The longitudinal meaning of productivity was not taken into account in these investigations. To overcome this constraint, this study used an analysis strategy that was distinct from previous research and aimed to create novel findings as a result of this process.

The goal of this research is to determine general trends in productivity-related studies in manufacturing and to draw conclusions from keyword analysis of productivity-related literature. Furthermore, the goal of this research is to uncover future trends in productivity studies. We expect that these tendencies may aid scholars in analysing the findings of previous investigations.

In [1] "This SLR introduces and categorises the assembly line problems handled by machine learning, specifies the targeted industrial domains, describes the machine learning methods employed, and explains the models' adopted independent and dependent variables. The analysis

identifies open problems that need to be addressed and research avenues that should be pursued. An assembly line is a sequence of consecutive activities set up in a factory where ingredients are refined to produce a finished product that may be used again. motor stool, wind turbine parts. In order to implement method study and time study techniques to improve the work process to meet the customer demand.

As per [2] The work presented here was done in an industry that makes engine covers, motor stools, and turbine parts, with the goal of implementing method research and time and motion study approaches to improve the work process and meet client demand. Productivity is a tool for enhancing a product's quality. Productivity development is a critical aspect in surviving and breaking new ground in the work that is done in the Machining sector for continual improvement.

As per [3] This study gives a theory on the design and manufacturing of special purpose machines that has aided corporate manufacturing sectors in meeting client demands. In this current circumstance, the company's ultimate purpose is to maximise profits. Productivity increase is one of the strategies to accomplish this goal. Companies employ a variety of techniques to address the challenge of increasing productivity. The root cause of the problem was investigated and determined, necessitating the design and manufacture of a special purpose machine capable of performing face milling and counter centring operations in less time while maintaining the required dimensional precision.

In [4] "A study of machine efficiency and its effects on line balancing has been introduced to the internet in this research." To aid in the investigation, the task time on the specified machine was used as an efficiency criterion. For a variety of reasons, machines are used to reduce the time required to do specific operations. It is not necessary to choose the highest machine efficiency as the optimum answer if the management has limited resources of varying efficiencies.. This study examines the various efficiencies of the added machine, as well as the impact of those efficiencies on line balance, in order to select the most efficient machine. This will result in a reduction in idle time between workstations and an increase in production flow. For this case study, the task is timed as the efficiency criteria.

As per [5] "This paper aims to provide a comprehensive review of recent advances in Machine Learning techniques widely applied to PdM for smart manufacturing in I4.0. Smart systems, machine learning (ML) inside AI (AI),

and predictive maintenance (PdM) techniques are now widely used in industries to manage the health state of commercial equipment, thanks to the advent of Industry 4.0. It is now feasible to collect huge amounts of operational and process data thanks to digital transformation towards I4.0, information techniques, computerised control, and communication networks created from various pieces of harvest data in order to create an autonomous failure detection and diagnosis with the goal of reducing downtime, increasing component utilisation, and extending their remaining usable lives. PdM is unavoidable for sustainable and smart manufacturing.

As per [6] "This article is about increasing productivity at the factory floor, such as at the station, cell, or line level". There are a variety of approaches to achieving these gains, and various people have varied sentiments and attitudes toward productivity gains. On a factory level, productivity can be defined as added value per employee, whereas on a cell or station level, a common productivity metric is the number of goods produced per hour of planned production time. Investigation is done on the economic impact of several productivity definitions at three different levels in manufacturing firms. Physical output per labour was found to be the most prevalent productivity measure employed at the beginning and middle management levels.

As per [7] This research included an assessment of the effectiveness of machine use inside the chosen manufacturing organisation. The investigation was conducted using the OEE approach, which stands for Overall Equipment Effectiveness. Machines with a low level of efficiency were suffering from problems with machine and device supply. On these lines, all of the causes of machine downtime were investigated. The analysis takes under consideration the particular results from the assembly process and covers the amount of 1 civil year.

As per [8] The major goal of this study is to improve the structure of a manufacturing unit with a clear focus on increasing productivity. After a thorough study of knowledge using software simulation techniques, an attempt is made to examine the entire layout design of the assembly line, from raw materials to finished product output, and revised layout.

As per [9] This work contributes to this field's research by methodically analysing literature and identifying research gaps. The major indicators of AI applications boosting resource efficiency are also provided to practitioners. Improvements in industrial output that are sustainable are critical for

combating global climate change and the resulting ecological crises. In this setting, resource efficiency can immediately lead to major improvements in generating firms' environmental performance. This paper gives an overview of current AI applications and how they impact resource efficiency.

As per [10] At both the machine and line levels, descriptive statistics were generated. The availability (A), performance efficiency (PE), and quality rate (QR) of the OEE components were also

### III. PROBLEM DEFINITION

The company needs to maintain its valuable data production. The body should find a way to adopt world best practices in productivity in order to reach excellent level of Production performance. Hence to analyze the efficiency of the machine and to predict the productivity and keep track of the Production this project is developed.

### IV. METHODOLOGY

#### A) System Overview

Machining is a form of subtractive manufacturing wherein a material is cut to a desired shape and size by a controlled-material removal process. Large machine shops have a wide variety of machining tools and equipment such as lathe machines, CNC machines etc. Such machine shops also employ multiple skilled workers to operate these machines. As a Machine shop, factory, or workshop expands its operations; the number of machines and the workers employed also inevitably increase as a byproduct of growth.

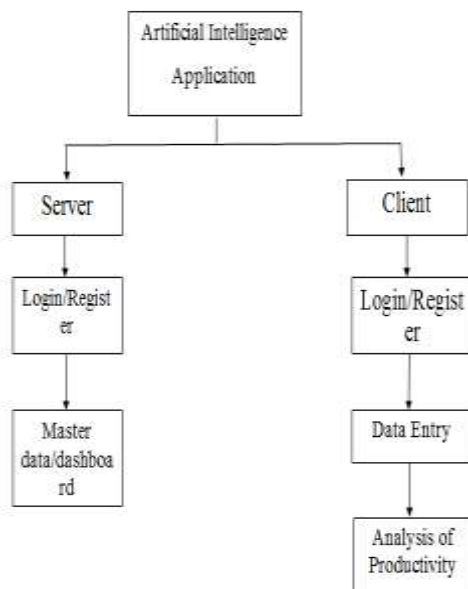


Fig 1. Flow Chart

The above figure shows the flow of the application.

calculated. Failure and repair data analysis identifies important spots in the assembly process that need to be addressed right away to improve the road's functionality. The findings reveal that the components PE and QR should be enhanced quickly in order to maximise road production and efficiency. It can also be used by machinery makers and, as a result, bottled product manufacturers in the beverage industry to improve the planning and operation management of bottling production lines.

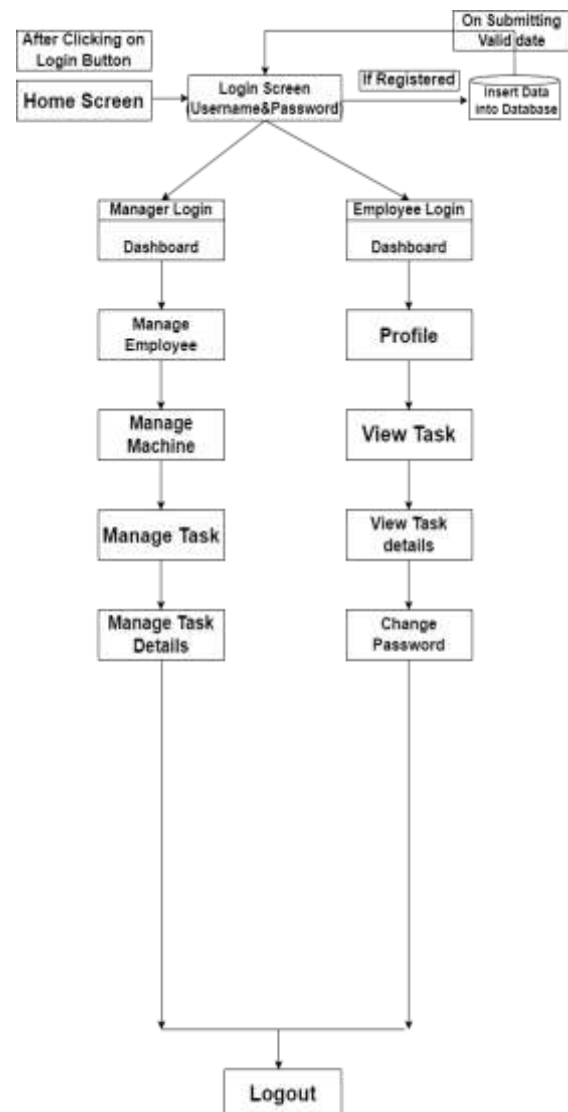


Fig 2. Architecture of Application

Above mentioned figure shows the architecture of the application and the actual work flow of application.

#### B) Software Modules

##### 1. Manager:

- Login: Only registered managers can only login the application.

- Dashboard: It has Manage Employee, Manage Machine, Manage Task
  - Manage Employee: In it manager can add, update, delete employee basic info like name, email Id, contact, password for login employee app.
  - Manage machine: In it manager can add, update, delete machine related like machine number, name, status.
  - Manage task: In it manager can assign task for employee with task details like task name, employee name, date, start time, end time. Manger can sort the data according to date, employee name, and machine name for individual employee details.
  - Add Details: Once manager assign task to employee then he/she have to add task related details like cycler time, idle time, machine hours, no load, power failure, machine breakdown, others.
  - Logout: For logout the application.
2. Employee:
- Login: Only those employee can login who's added by manager.
  - Task: It shows list of tasks according to date with task details like cycle time, idle time, machine hours, etc. If he/she started their task on machine they have to change status Start. if he/ she finished their task on machine they have to change status End. according to status Actual Start time, Actual end time update automatically.
  - Change Password: If employee want to their password which is provide by manager so, he/ she can change it from here.
  - Logout: For logout the application.

## V. PROPOSED ALGORITHM

Algorithm 1:

Search Algorithms

Binary Search is used on a sorted dataset. In binary search, the first comparison is made with the mid-position element of the list. If at this stage the value gets matched, then we return the value. If not and the value is less than the middle element, then it would be present in the lower end of the array and if it's greater than the element would be found in the other upper half of the dataset. This procedure is useful where there are large numbers of elements in an array.

## VI. PROPOSED FRAMEWORK

A. Manager:



Manager Login



Manage Employee



A screenshot of a web form titled "Manage Machine". At the top, there is a label "Component Name" in red. Below it, there are ten input fields, each containing the number "000". At the bottom of the form, there is a grey button with the text "UPDATE DETAILS".

Manage Machine

B. Employee:



A screenshot of an "EMPLOYEE" login page. At the top, there is a red header with the word "EMPLOYEE" in white. Below the header is a logo for "Machine Shop" featuring a colorful building icon. Underneath the logo, there are two input fields: "Enter Email ID" and "Enter Password". At the bottom, there is a red button with a white login icon and the text "LOGIN".

Employee Login



A screenshot of a "Manager Main Activity" dashboard. At the top, there is a red header with the "Machine Shop" logo. Below the header, there is a sidebar menu with four sections: "Manage Employee" (with a person icon and "Manage Employee" text), "Manage Machine" (with a gear icon and "Manage Machine" text), "Manage Task" (with a calendar icon and "Manage Task" text), and "Logout" (with a door icon and "Logout" text).

Manager Main Activity



A screenshot of a "Task Details" form. At the top, there is a red header with the text "Select Date" in white. Below the header, there is a white input field with the placeholder text "Select Date". Below the input field, there is a list of tasks labeled "Task 1" through "Task 9".

Task Details



Task List



Change Password

## VII. CONCLUSION

As we know, large scale manufacturing industries have large amount of machines which makes hard to record the info of machine and to stay the track of productivity and dealing of workers schedules. Hence, to assist the manufacturing industries to research the assembly machines time to time and eases the paperwork with technology.

This study helps you find out how we will increase the efficiency of the manufacturing machine industries.

## VIII. FUTURE ENHANCEMENT

This Android Machine System has been designed keeping in mind the problems faced by large factories and machine shops and helps with automating and streamlining the process the management to machines and operators and enabling administrators to easily supervise over the operations and maintain the maximum levels of efficiency possible.

## REFERENCES

- [1]. 'Ziqiu Kang, CagatayCatal, BedirTekinerdogan.; "Machine Learning Application in production lines: A systematic literature review."
- [2]. 'ParshettySiddheshwar, PatilAbhijit, GundAbhay, TakmogePandurang, FulariUmesh, BhusannaOmkar, WaghmareKrushna, ReghiwaleRamjan .' "Paper on Time and Method Study Productivity Improvement in Machining Industry by using Time Study and Method Study Techniques."
- [3]. 'Sayajipatil, Jaydeep.S.Bagi'. "Productivity Improvement through development of Special Purpose Machine Tool-A Case Study."
- [4]. 'RashaJabbar, SawsanSabeeh.' "Study The Effect of Machine Efficiency In Production Lines Balancing " Study the effect of machine efficiency in production lines balancing."
- [5]. 'Zeki Murat Çınar, AbubakarAbdussalamNuhu, QasimZeesha, OrhanKorhan , Mohammed Asmael and BabakSafaei' "Machine Learning in Predictive Maintenance towards Sustainable Smart Manufacturing in Industry 4.0"
- [6]. 'Peter Almstrom.' "Productivity Measurement and Improvements: A Theoretical Model and Applications from the Manufacturing Industry"



- [7]. ‘EdytaCartas,SilvieBrovoza.’ “The Evaluation of Efficiency of the Use of Machine Working Time in the Industrial Company – Case Study”
- [8]. ‘RajkumarSharma , Prof. SajidQureshi, Dr.VivekBansod.’ “Productivity improvement in manufacturing unit analysing production machines and facilities.”
- [9]. ‘Lara Waltersmann, Steffen Kiemel,, Julian Stuhlsatz, Alexander Sauer ,Robert Mieke.’ “Artificial Intelligence Applications for Increasing Resource Efficiency in Manufacturing Companies—A Comprehensive Review.”
- [10]. ‘Panagiotis.H. Tsarouhas’. “Evaluation of overall equipment effectiveness in the beverage industry: a case study.”