Applied Industrial IoT

Project on

IoT Solutions for the problems faced in Tool Bit Manufacturing Industry

Group No: G-69

1.Shamyukta Bose
2.Shanmuga Sundaram M
3.Hanuman Shabarish S
4.Sindhu S

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AIM:

To solve a typical problem that Tool Bit Manufacturing faces, with an industrial IoT solution.

PROBLEM STATEMENT & SOLUTION:

The Tool Bit Manufacturing Industry faces problems due to different factors with different sectors of the industry. The major problems faced are:

- No clarity on machine usage and effectivity
- Lack of data due to manual data entries
- High value parts with inaccuracies in production quantities
- No internet or cloud based solution allowed
- Complete manual recording and resource intensive ERP entries

The solution for the above Problems is specified below:

- Using analytics tool offer energy consumption data
- On-premise server for storage of cloud data
- Making use of same language for all the machines to use the data effectively
- Limited shift change time must be implemented

PROJECT DESIGN SPECIFICATIONS:

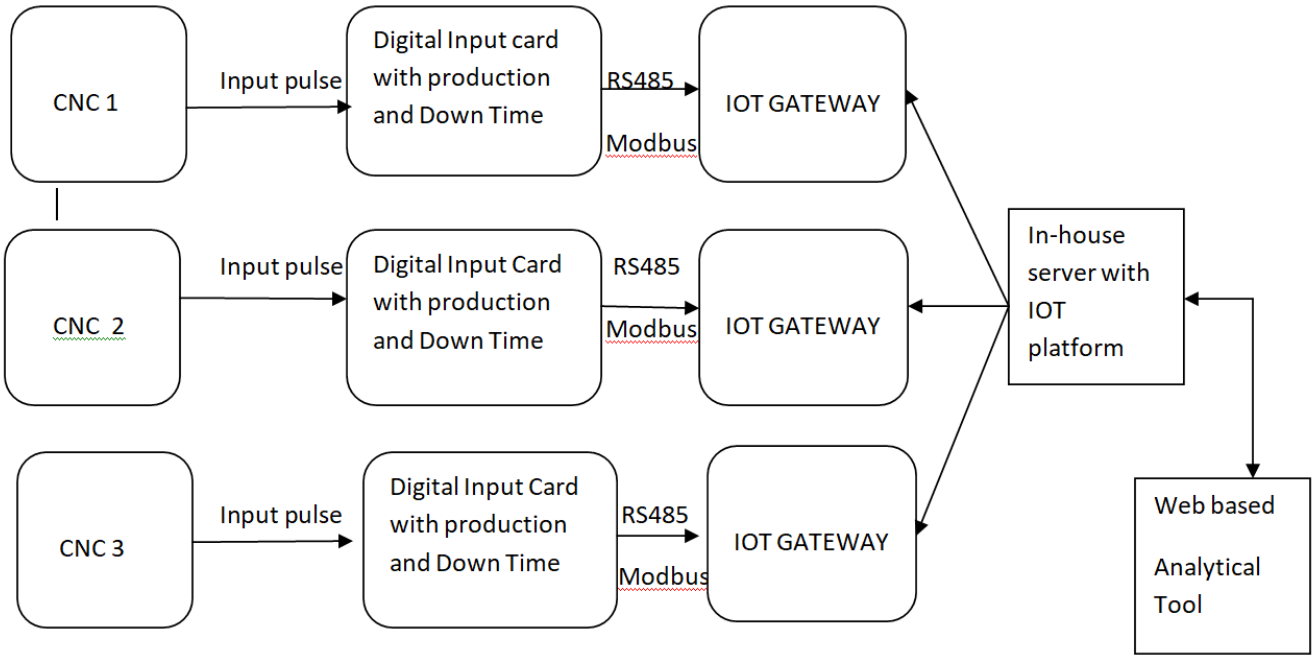
- ENERGY CONSUMPTION: It is one of the largest expenses in Tool Bit Manufacturing Industry. In order to save the energy, every machine is connected to energy meter of panel meters. The regular monitoring will give an indication in case of unexpected variation that needs to be addressed.

- PRODUCTION MONITORING: Analytics on energy usage enables effective trading in the open market. The energy meter is connected to a digital counter that measures the production count. Thus, the production count has to be monitored.

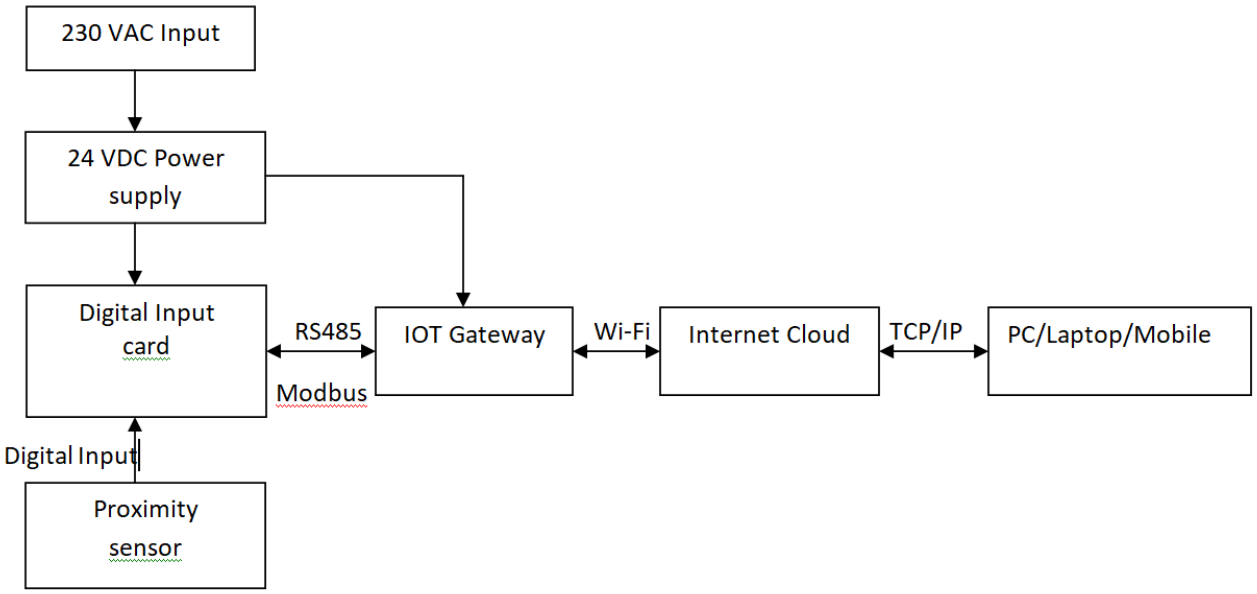
- COMMUNICATION PROTOCOL: All the controllers and devices are connected to the IoT gateway through RS485 Modbus protocol, and from there, it is sent to the cloud using GPRS or Wi-Fi.

- INTEGRATION OF DATA TO AN IoT PLATFORM: All th edata collected from the above parameters are integrated to an IoT platform deployed on local or a cloud server. The IoT platform translates the data to information like graph, trends, alerts and other business intelligence reports. The IoT Integrated production results in significant savings on expenses, which will significantly impact annual savings, and ROL can be witnessed.

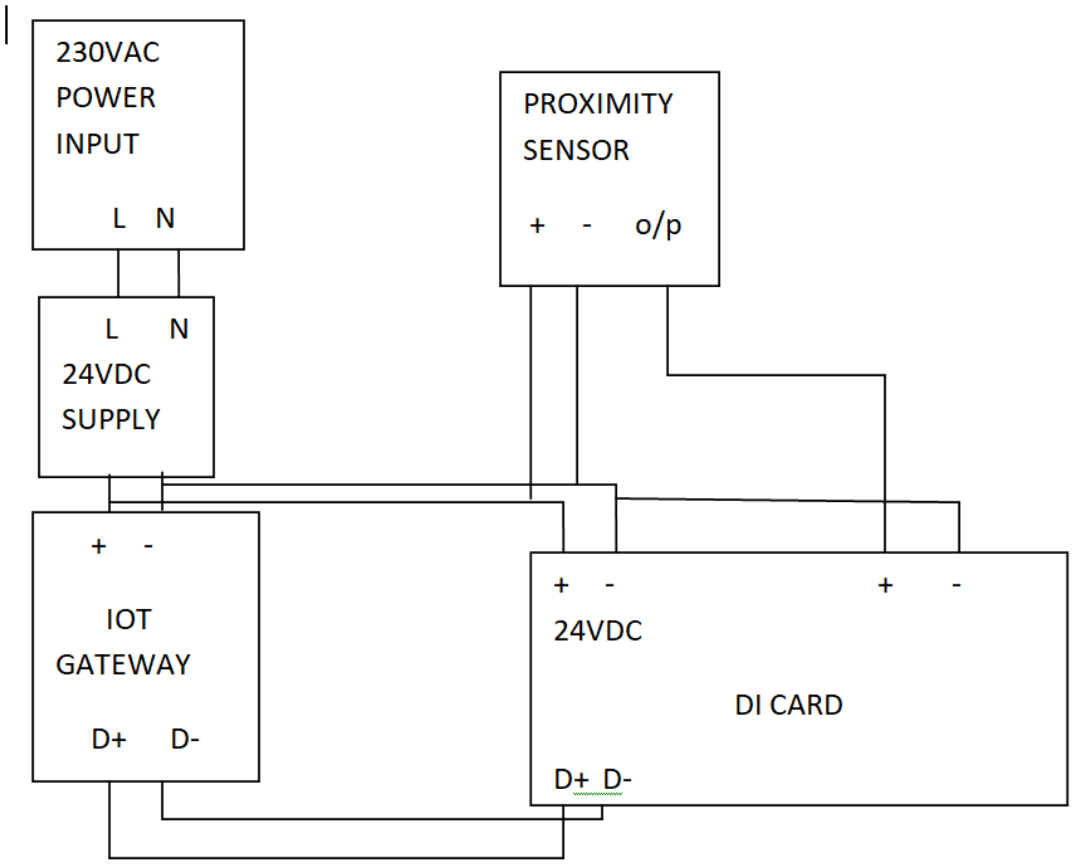
PROJECT ARCHITECTURE:



FLOW EXPLANATION:



WIRING DIAGRAM:



NOTE:

D+, D- : RS485 Modbus RTU Physical Connection

L, N : Line and Neutral for AC Power Supply

+, - : 24VDC Power Terminals

COMPONENTS WORKING PRINCIPLES:

- DIGITIZER: A digitizer is an electronic device that converts an analogue signal into a digital format and provides the corresponding output in terms of display or on its communication port. Inputs to digitizer will be analogne signal from sensors like temperature, pressure, flow etc. > IOT

- GATEWAY: The IoT Gateway follows the same principle of bridging communications for different technologies. It creates a bridge between the sensors actuators and the Internet The loT gateway aggregates all data obtained from communication port of digitizers and pre proces les the data along with security packets and converts to internet compatibility protocols like GPRS or Ethernet or Wi-Fi and sends to database servers available either on cloud or locally

- IOT PLATFORM: All the data collected from the above parameters are integrated to an IoT platform deployed on local or a cloud server The lo plattorm translates the data to information like graph, trends, alerts and other business intelligence reports

- DIGITAL INPUT CARD: Digital Isipot Card is an 8 Channel digital input module The irats are isolated from the input signal, by Opto-couplers. Each input channel can be connected to independent+and(GND) terminal. Digital Card i best suited for digital signal monitoring, for example nuachine's downtimuptime, cycle time (ON OFF), counts and digital filters for signal optimisation.

- PROXIMITY SENSOR: A proximity sensor is a non-contact sensor that detects the presence of an object (often referred to as the “target”) when the target enters the sensor’s field. Depending on the type of proximity sensor, sound, light, infrared radiation (IR), or electromagnetic fields may be utilized by the sensor to detect a target. Proximity sensors are used in phones, recycling plants, self-driving cars, anti-aircraft systems, and assembly lines. There are many types of proximity sensors, and they each sense targets in distinct ways. The two most commonly used proximity sensors are the inductive proximity sensor and the capacitive proximity sensor.

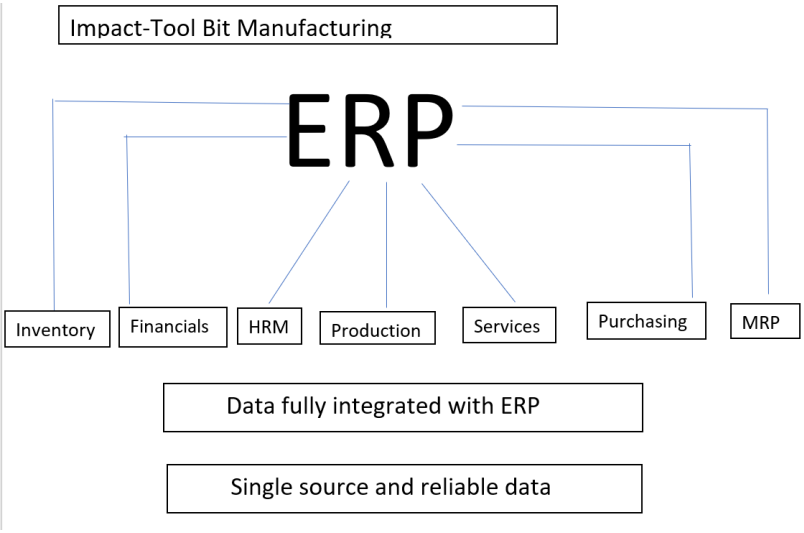
- ELECTRONIC ENERGY METERS(EEM): EEM’s accurate functioning is controlled by ASIC (Application Specified Integrated Circuit). In addition to ASIC, analog circuits, Voltage transformer etc. are also present in EEM to Sample current and voltage. This output is then converted into ‘Digital Data’ by the A to D Converters present in the ASIC . The Digital Data is then converted into an Average value.

BILL OF MATERIALS:

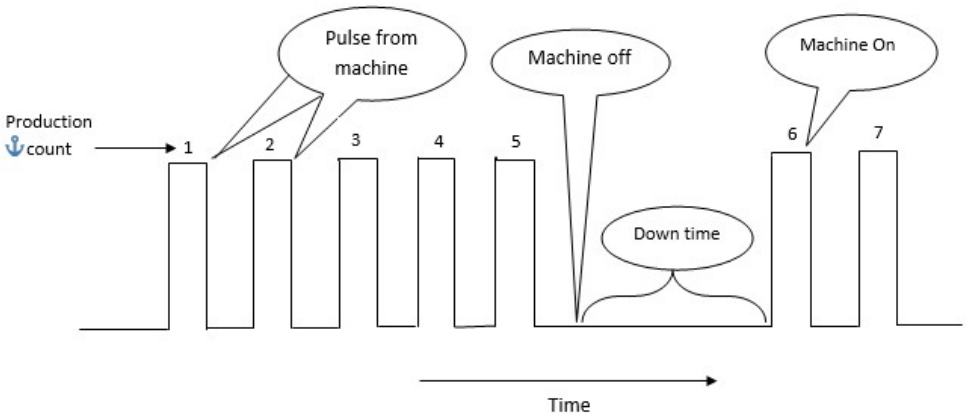
S. No	DEVICE	MODEL	QUANTITY	EST PRICE (Rs.)	TOTAL (Rs.)
1	Digitizer	8208	1	6500	6500
2	IoT Gateway	Quick IoT	1	25000	25000
3	DI Card	8-channel	1	5000	5000
4	Panel box	300*300	1	5000	5000
5	Server & IoT Platform	LIVE	1	50000	50000
6	Proximity sensor	Autonics	1	800	800
7	Miscellaneous		1	3000	3000
	Total				95300

PROJECT OUTCOME:

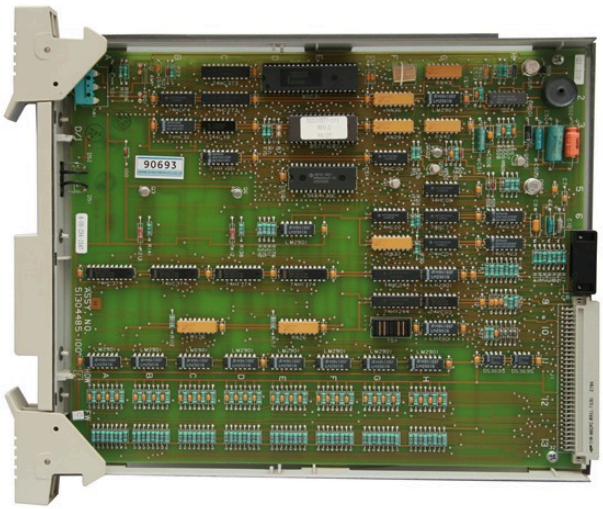
- Understanding the problem statement in Tool Bit Manufacturing.
- Finding the best solutions.
- Wire connections and Verification.
- Components Exploration.
- IoT communications working



PRODUCTION COUNT



DI CARD



PROXIMITY SENSOR

TOOL BITS