

COLD END COATING MACHINE USING IOT

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ABSTRACT

Internet of Things (IOT) is fast growing technology. IOT connects physical objects to the internet using electronic, electric and mechanical sensors. All the things are connected to internet. We are developing a cold end coating machine which will automatically monitor the industrial applications and generate Alerts or take intelligent decisions using concept of IOT. Powerful industrial systems and applications can be developed by using concept of IOT by using wireless devices, Android, and sensors. The main contribution of this project would be that it combines uses of IOT in industries, sensors with Artificial Intelligence to monitor and control the Industrial application from distant place also using GSM.

Keyword : - *Internet of Things, automatically monitor, Alerts, intelligent decision, wireless device, GSM*

1. INTRODUCTION

Project involves the automation of glass industry, coating glass bottles with proper coating material which will improve the performance of glass containers during the industrial packaging, labelling and transportation without increasing the price. During unpackaging and transportation of glass bottles friction between glass bottles occurs, which damage the glass bottles and per unit cost is increased. Defects and faults in the glass bottles are generated also scratches appear on glass bottles which degrades its quality. Glass manufacturing companies demand good quality of glass bottles and also coat it with a shiny material and makes it smooth for handling. Currently, there are no products in the market completely fulfilling these requirements. The system is also built on IOT which will enable distant monitoring of the plant with the help of GSM module. GSM module gives the facility of sending an alert message. In conditions of an error or false coating or system failure the alert will be generated and a message will be sent to the registered number and the system will be closed. Wi-fi is required for sending the system data on cloud from which the whole system will be monitored. The project is built on a powerful Raspberry PI 3 board which will give extra flexibility to the system. Raspberry PI has inbuilt wi-fi module.

Project is built on Raspberry PI. Raspberry PI is operated by rasbian operating system. Sensors at the plant sense the parameters and give the output to Raspberry PI, Raspberry PI processes the data and gives the required output. It sends the data to the cloud with the help of network operator and inbuilt wi-fi module. The data is properly represented using GUI (Graphical User Interface). It has also GSM module which is used for sending alert message to the registered number in case of any fault or any mal-function. The user can access the data and monitor the system from distant place also.

Defects and faults are generated in the glass bottles and also scratches occur, leading to less efficient product. The aim of this project is industrialisation of coating the glass bottles and during processing of glass bottles monitoring over project is done. It also generates alerts or alarms or takes intelligent decision with the help of

Raspberry PI. It also sends an message to registered mobile numbers in occurrence of any malfunctions. Glass containers are inspected by persons, they carefully check every container for a variety of errors. If bottles are not properly coated some faults occurs which include cracks in the glass called checks. And also bottles are not smooth due to which friction occurs which can damage the bottle and degrade its quality. These cracks cause rejection of the glass bottles which will result in waste of time and material. Due to variety of different shapes of glass bottles proper coating is not done. The glass will stick to either item and become torn. Cold end coating of glass bottles is done to protect and lubricate the glass bottles so the bottles can be smoothly pushed over the conveyor belt, without causing any damage, with powerful and speedy handling equipment which move glass bottles from group of bottles placed together to single line for inspection during packing of bottles. When it reaches the customer's plant, the glass would be unloaded, cleaned, filled with corresponding liquid, labeled, and again packed. There will be period in which contact between the glass bottles will be occurred, efforts must be taken to avoid damage which may be caused during processes. Glass is actually a very strong material, condition may occur which can damage the glass bottles which exist in the entire manufacturing and transportation processes. Glass bottles cannot be used unless the surface is properly protected. Breakage in the glass bottles can occur. Bottles strength must be increased with coating so as to give expected quality.

2. METHADODOLOGY

The cold-end coating machine is coated with polyethylene. The coating mechanism is monitored by sensors. The Raspberry receives data from these sensors. It sends the data to cloud using wi-fi. The data can be accessed by authorised users through mobiles, laptops, PCs, etc. The system also sends message to registered mobile numbers in case of an error or mal-functions which can be occurred during entire manufacturing of the glass bottles. The project uses IOT (Internet Of things) concept which is efficient and in demand all-over. Using IOT fully automated industry can be built which can be controlled remotely.

3. BLOCK DIAGRAM

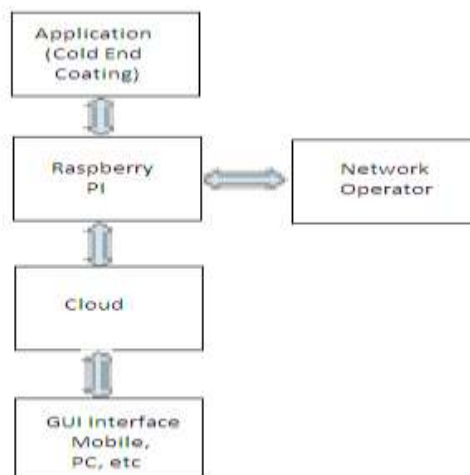
Fig-1: Block Diagram

3.1 Application (Cold-end Coating Machine)

Application is cold end coating machine which is to be monitored. The sensors connected to the system gives the output to Raspberry PI. Proximity sensors are connected to locate the position of bottles. Spray guns is used to coat the bottles with poly-ethylene material. When bottles come to the required position, spray gun starts to coat the bottles. Conveyor belts are used to move the bottles to proper position and takes away the bottles after coating is completed.

3.2 Raspberry PI

Raspberry PI gets the information about the system through sensors connected to cold-end coating machine. Raspberry PI processes data and sends it to cloud using wi-fi. Raspberry PI gets the hotspot through network operator.



3.3 Network operator

Network operator provides internet facility to system. It provides hotspot to Raspberry PI.

3.4 Cloud (GUI interface)

Clouds are used to store data. Raspberry PI sends information to cloud for storage. Data is made in proper form to display to authorised user using GUI(Graphical User Interface). GUI displays data in graphical form.

3.4 User(mobile, pc)

Authorised user can monitor the system anytime and from anywhere. User is also send an alert through a message in occurrence of any faults and errors.



4. HARDWARE USED

The Cold-end coating machine consists of different types of hardware components, which include- Raspberry-PI 3, GSM module, conveyor belt, spray gun, proximity sensors. Raspberry PI is the centre of monitoring system. It gets inputs from sensors connected to cold-end coating machine. It uses internet from network operator to transmit data to cloud. The user can use this information as and where it requires.

4.1 Conveyor Belt

Conveyor belt is a carrying medium. It carries the object kept upon belt over the belt. It contains two pulleys over which the belt is rotated. The belt is rotated over the wheels, these wheels also give support to the belt. In our project conveyor belt moves the uncoated glass bottles in the forward direction to the coating area, where coating will be done using spray gun. It also takes away the coated bottles from the coating area to the processed bottles place.

4.2 Spray Gun

Spray Gun has an opening at one end from which the material inside the spray gun comes out. Spray Guns are used to spray the glass containers with a dissolved polyethylene wax emulsion which makes the bottles smooth and friction-free.

4.3 Proximity Sensors

Proximity sensors are used to locate the presence of an object. These proximity sensors are used to bring the glass containers in proper required region to coat them with coating material with the help of spray gun.

4.4 GSM Module

SIM900, a completely quad band GSM solution of SMT module. It may be embedded for customer applications. The basic working of GSM module is as under voice calls, GSM data calls, SMS and GPRS. GSM module comes along serial interface from which the modem can be accessed using AT command interface. AT antenna and power adaptor are provided. The SIM900 needs only 3 wires i.e. Tx, Rx and ground. In the project GSM modules are used to transmit an error sms (short message sending) to registered number when an error occurs.

Fig-2: GSM Module

4.3 Raspberry PI

The Raspberry-PI 3, is a credit card sized single-board computer system designed by UK (United Kingdom) by Raspberry PI foundation. Raspberry-PI 3, is a powerful device which gives many functionalities. Raspberry-PI 3 is based on Broadcom BCM2835 system on a chip (SoC) which consist of an ARM1176JZF-S 700 MHz processor, VideoCore 4 GP. Raspberry PI was originally designed with 256 megabytes of RAM and was later upgraded to 512 MB. The system has Secure Digital (SD) or MicroSD socket for storage. The other functions of raspberry-pi 3, include 700 MHz clock speed, four independent USB host ports, 10/100 Base T Ethernet port and HDMI audio and video output.

Fig-3: Raspberry PI

5. SOFTWARE USED

The softwares used in the project is Raspbian operating system, python language. The programming is done in raspbian operating system. Raspberry-PI 3, is booted with raspbian operating system. Python language is used in coding a program.

5.1 Raspbian Operating System

Raspbian is open source operating system customised for the raspberry-pi 3, hardware. Raspbian comes with more than 34,000 packages which is easy to install and work on. It gives good graphical user interface.

5.2 Python Language

Python language is an interpreted, object-oriented, high-level programming language with dynamic semantics. It is a high-level language used for writing codes for many platforms including Raspbian operating system.

6. Advantages

- IOT based system. The coating of bottles is done using emerging concept of IOT.
- High throughput and high quality of coating.
- No need of workers at the work space for monitoring of the system.
- Alert based system. An alarm is generated and a message is sent to the registered mobile number.

7. Applications

- Fully automated system
- Distant monitoring.
- Indication of malfunction.
- Using internet of things.



8. CONCLUSIONS

- System uses fast growing technology of IOT.
- Efficient cold-end coating of glass bottles, which ensures shiny look to the bottle and friction-free bottles.
- Ease of monitoring.

d. Fully automated industrial applications.

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