



Microcontroller Based Dimension Analysis System by Using Pneumatic Source

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ABSTRACT

In our project "FABRICATION MATERIAL DIMENSION ANALYSING SYSTEM" begins with an introduction to material Inspection, it's various applications. The sensors are used to measure the material dimensions and this signal is given to control Unit. The pneumatic cylinder receives the proper signal from the control unit. The method for gathering items with incorrect dimensions is a pneumatic cylinder. When it comes to material handling in contemporary engineering industries, the inspection conveyor is rather helpful. The conveyor is powered by the motor. Conveyors are used to move items from one location to another. Sensors are utilized to measure the dimensions in this area of the conveyor top. This technique allows the belts to move smoothly and operate as needed to complete the duties on schedule. This is a very effective tool for measuring the length, width, height, and other dimensions that are needed in the contemporary engineering industry. Using this contemporary equipment fully eliminates the need for physical labor additionally; it cuts down on manual inspection errors and inspection time. The pneumatic cylinder next to the sensor will activate to remove the faulty work item if it is found to be defective.

Keywords: IR-Sensor, Microelectronics, Conveyor, Automation

1. Introduction of Automation

The field of robotics and programmable automation are most closely related. An industrial robot is a programmable, all-purpose machine with certain anthropomorphic, or human-like, traits. The most defining human-like feature of modern robots is their moving limbs. It is possible to train the robot to do a useful task by moving its arm through a series of motions. Until it is reprogrammed to carry out a different task, it will repeatedly repeat that motion pattern. Because of this programming characteristic, robots can be used for a wide range of industrial tasks, many of which need the robot to collaborate with other automated or semi-automated pieces of equipment. Spot welding, spray painting, and machine loading and unloading are some of these processes. The principle mentioned below are called the three laws of robotics by Asimov, and they are,

1. A robot is not allowed to intentionally harm people or to allow others to harm them.
2. A robot must comply with human commands, unless they go against the first law.
3. A robot is required to defend its own existence, unless doing so would violate the first or second laws.

2. Robot Anatomy

The physical design of the machine's body, arm, and wrist is the subject of robot anatomy. The majority of robots used in plants nowadays are fixed to a base that is secured to the ground. The wrist is located at the end of the arm, which is linked to both the body and the base. The wrist can be positioned in multiple ways due to the various parts that make it up. A number of joints provide the relative movements between the major body parts, the arm, and the wrist. As we will discuss later in this section, these joint movements typically entail either rotational or sliding motions. The manipulator's body and arm joints are utilized for positioning the end effectors, while the wrist joints are employed for orienting them.

3. Robot Motion

The purpose of industrial robots is to carry out productive tasks. By giving the robot the ability to move its arm, wrist, and body in a variety of ways, the task is completed. The robot's end effector, which it uses to carry out a particular work task, is attached to the wrist. Wrist motions and arm-body motions are the two broad categories into which the robot's movements can be separated.

A typical industrial robot has four to six degrees of freedom, which are the specific joint motions associated with these two categories. The term "degrees of freedom" is sometimes used to describe these motions.

Powered joints enable the robot to perform its movements. Two of the three joints are typically utilized to actuate the wrist, while the other three joints are typically connected to the action of the arm and body. The stiff components known as links are used to join the numerous manipulator joints. The link closest to the base of the chain is referred to as the input link in any link-joint-link chain. The link that moves in relation to the input link is the output link.

3.1 Robot programming:

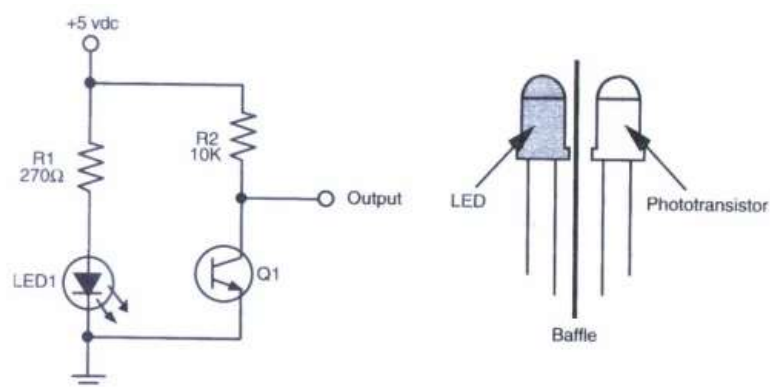
Robot programming is accomplished in several ways. The two basic types of robot programming are

1. Lead through methods
2. Textual robot languages

4. Major Components of Pneumatic Rejection

1. IR sensor
2. Micro controller assembly
3. D.C Motor
4. Power supply
5. Pneumatic assembly
6. Direction control valve
7. Roller
8. Flat belt
9. Plummer block
10. Bearing

1. IR sensor



The basic design of the infrared proximity sensor.

By either producing or detecting infrared light, an infrared sensor is an electronic device that is used to perceive specific properties of its environment. In addition to detecting motion, infrared sensors can measure the heat that an item emits. There are two pairs of IR sensors (331,333) that are used for signal transmission and reception.

2. Micro Controller (89C51)



The AT89C51 is a CMOS 8-bit microcomputer that is low-power and highly performant. It features 4Kbytes of programmable and erasable Flash read-only memory (PEROM). The device is compatible with the industry-standard MCS-51 instruction set and pinout and is made utilizing Atmel's high-density nonvolatile memory technology. Program memory can be reprogrammed in-system or by a traditional nonvolatile memory programmer thanks to the on-chip flash. An extremely flexible and affordable alternative is offered by the Atmel AT89C51, a powerful microcomputer that combines a versatile 8-bit CPU with Flash on a monolithic chip.

3. D.C motor

Electrical energy is transformed into mechanical motion by an electric motor. A generator or dynamo does the opposite job of transforming mechanical motion into electrical energy. Many applications use a single device to fulfill both jobs, and in many cases the only differences between the two devices are in their applications and small manufacturing details. For instance, traction motors on locomotives frequently carry out both functions when the train has dynamic brakes.

4. Regulated Power Supply

You can continually change the output voltage of a variable regulated power supply, also known as a variable bench power supply, to suit your needs. It is advised to test a project by varying the power supply's output after double-checking part placement against circuit drawings and the parts placement guidance.

5. Pneumatic Assembly

The tools used to transform air pressure into linear mechanical force and motions are known as pneumatic cylinders. Basically, they are employed for single-purpose tasks including clamping, tilting, bending, twisting, and numerous other tasks.

Pneumatic cylinders transform pneumatic power into straight-line reciprocating motion. Duty-wise, the several industrial uses for air cylinders can be separated into the following divisions. Although they are classified as light, medium, and heavy duty, air cylinders can also be separated into two categories based on their mode of operation: 1. single-acting cylinders and 2. double-acting cylinders. We will investigate more because the single functioning cylinder is the foundation of our project.

Because compressed air can only be fed into a single side of a single-acting cylinder, it can only operate in that direction. The spring, which is intended to return the piston to its starting position at a high enough speed, is either integrated into the cylinder or is activated by an external force.

6. Direction Control Valve

The number of fluid ports and the number of directional states, or positions, that the valve can reach, are the two main factors to consider when choosing a directional-control valve. Fluid (air or hydraulic fluid) can go to and from other components through valve ports. The amount of unique flow routes that a valve can offer is referred to as its number of positions.

7. Roller

There are two wooden rollers utilized. To achieve the same speed ratio, the rollers are wooden, the same diameter, angled, and positioned along the same axis.

8. Flat Belt

An old-fashioned but efficient method of power transmission is the flat belt. When there were large pulleys and wide belts, it could produce 500 horsepower at 10,000 feet per minute, which was a lot of power at high speeds. Because these drives are hefty and demand high tension, which results in high loads—unless great speed is required over and above power—vee belts have mostly replaced flat belts.

9. Plummer Block with Bearing

A pillow block is a mounted plain or roller bearing with the mounting surface on a parallel line with the shaft axis that is used to give support for a rotating shaft. It is also referred to as a plumber block or bearing housing.

10. Bearings

A bearing is a stationary machine component that limits the motion of a rotating shaft or axle while supporting it. It goes without saying that a bearing must provide the least amount of frictional resistance to moving elements in order to minimize power loss. There may be a fluid layer present to lessen frictional resistance.

5. Working Principle

In accordance with the programming, this system automatically determines and executes the accurate path. The sensor detects the signal in accordance with the job movement, transmitting it to the control unit. • An IR sensor set detects an item with extreme precision. Detect the unusual series first, and then only communicate with the microcontroller. In the event that the object size is aberrant or insignificant, the direction control valve should be activated in accordance with the programming. It provides the necessary volume of air to enable pneumatic actuation. • The D.C. motor helps the belt move continually. • The D.C. valve will operate in accordance with the control unit's instruction, and the specific dissimilar work will automatically reject.

6. Advantages and Disadvantages

Advantages

- ✓ The Inspection Conveyor is more efficient in the technical field
- ✓ Quick response is achieved
- ✓ Simple in construction
- ✓ Easy to maintain and repair
- ✓ Cost of the unit is less when compared to other
- ✓ No fire hazard problem due to over loading
- ✓ Comparatively the operation cost is less
- ✓ Continuous operation is possible without stopping

Limitations

A suppressor may be employed since the compressed air (for punching operations) makes noise when operating.

Applications

1. Discharge of work piece:

Conveyor feeds are widely used in low-cost automation sectors. It can be utilized in automated assembly lines to move completed goods from workstations into bins. Additionally, it can be utilized to select raw materials and arrange them on conveyor belts.

2. Improper Material Removing operation:

Additionally, incorrect material gathered in a collecting box might be utilized with this equipment. This system makes use of a pneumatic cylinder that is solenoid driven.

7. Result & Conclusion

In our project we have successfully implemented the **MATERIAL DIMENSION ANALYSIS SYSTEM** through pneumatic based quality control operation for the rejection process. It maintains high accuracy and precision. The prototype model designed by us with an application of is checked whether this system is suitable or not and analyzed by us.

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