DESIGN AND DEVELOPMENT OF AGV FOR HANDLING BEARING USING BARCODE AND MICROCONTROLLER

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ABSTRACT

Automated Guided Vehicles (AGV's) are used in industrial applications to move materials around manufacturing facility or warehouse. They are available in variety of models, have various navigation modes and control mechanisms. The paper deals with an AGV designed and developed for handling bearings of various types using barcode and microcontroller .This enables handling of bearings with less damage, easy storage, & retrieval and reduced human errors. The AGV will follow painted strip, use of microcontroller helps in less wiring and Bluetooth module helps in wireless communication.

Keywords: AGV, Storage & Retrieval, Microcontroller, wireless communication, painted strip.

I. INTRODUCTION

Material handling is movement, protection, storage and control of materials and products throughout manufacturing, warehousing, distribution, consumption and disposal. As a process, material handling incorporates a wide range of manual, semi – automated and automated equipment and systems that support logistics and make the supply chain work.

An Automated Guided Vehicle is a robot that follows markers, wires in the floor, uses vision, magnets, lasers or navigation. They are often used in industrial applications to move materials around a manufacturing facility or warehouse. [1]

The proposed Automated Guided Vehicle will follow an Painted strip. The handling rod will be mounted on AGV for storage of different bearings namely of series 6001, 6002.The barcode sorting system will make the storage and retrieval of the bearings easy and will not cause any damage to the bearings while handling.

II. NEED OF PROPOSED SYSTEM

- Today in the company the main problem of material handling system is that material is being handled manually   by the operators.
- The operators don't handle the job properly and the jobs get damaged during the storage.
- The tiredness of doing the same job continuously whole day results in fatigue and this in turn results in improper material handling.
- Due to conventional material handling system the time consume on storage is more.
- During the separation of job the jobs get damaged.

- Due to manual storage the retrieval of a particular type of job is quite difficult.
- Electric overhead travelling crane or jib cranes are not effective.
- Raw material is required to transmit to the machine manually.

III. COMPONENTS OF AUTOMATED GUIDED VEHICLE:-

The components of an AGV can be widely classified into:

- Driving Mechanism.
- Navigation Mechanism.
- Control Mechanism.

The above mentioned mechanisms are discussed in details below.

3.1 Driving Mechanism

An AGV driving Mechanism consists of following components. They are:

➤ **Chassis**

Fig 1:-AGV chassis

The above fig shows the chassis designed for the proposed AGV. The material used is Mild steel. The dimensions are as follows

- ➤ Length=300mm,
- ➤ Breadth =150mm,
- ➤ Thickness = 2mm.
- ➤ Motor holes=14mm

➤ **DC Motor:-**

FIG 2:- DC Motor

The above fig. shows DC motor for the proposed AGV. Following are specifications of dc motor:

Features of 45 RPM Side Shaft Gear DC Motor:-

- ➢ 6mm shaft diameter with internal hole.
- ➢ 125gm weight.
- ➢ 5 kg cm torque.
- ➢ No-load current = 60 mA(Max),
- ➢ Load current = 300 mA(Max).

3.2 Navigation Mechanism

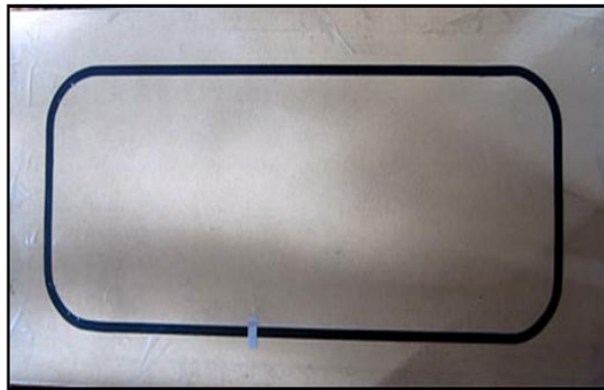- ➢ **Paint strip Layout**

FIG 3:- Paint strip layout

The above fig represents the painted layout for the proposed layout. An on board sensor detects the reflected light in the strip and controls the steering mechanism to follow it. The paint guidance system is useful in environments where electrical noise would render the guide wire system unreliable or when the installation of guide wires in the floor surface would not be appropriate. One problem with the paint strip guidance method is that the paint strip must be maintained (kept clean and unscratched).[2]
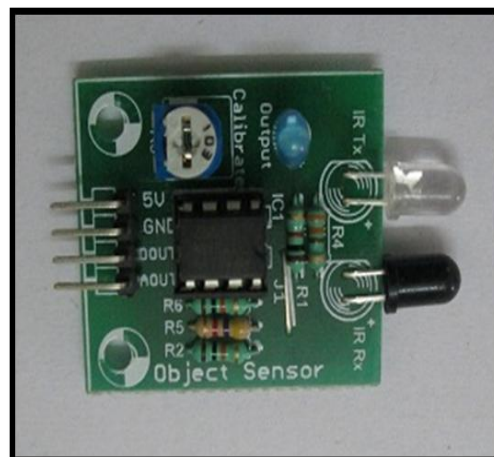
➢ **Infrared Sensors:-**

FIG 4:- IR Sensor

IR Sensors can be used for obstacle sensing, color detection (between basic contrasting colors), fire detection, line sensing, etc. and also as an encoder sensor.

- ➢ Range of around 25 cm
- ➢ Input Voltage: 5V DC
- ➢ Comes with an easy to use digital output
- ➢ Can be used for wireless communication and sensing IR remote signals
- ➢ Sensor comes with ambient light protection
- ➢ The sensor a hole of 3mm diameter for easy mounting.

3.3 Control Mechanism

This mechanism consists of the components which control the movements of AGV.

FIG 4:-AT-89S52 Microcontroller

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry.[3]

➢ **Barcode system for sorting:-**

Fig 5:- Simple Barcode

A barcode is an optical machine-readable representation of data relating to the object to which it is attached. Bar code can be 2D or 1D. Barcodes originally were scanned by special optical scanners called barcode readers. Later, scanners and interpretive software became available on devices including desktop printers and Smartphone's.[4]

IV. ADVANTAGES

- • The proposed AGV helps in storage & retrieval of components easy.

- Less complexity.
- The proposed system is economical.
- The proposed system is easy and doesn't have complex mechanisms.
- The wireless communication helps in less wiring & less Damage to the components to be handled.

V. RESULTS

After taking number of tests on the proposed system and mounting the job handling rod on the AGV, it was seen that the AGV successfully follows and detects the paint strip and the barcode sorting system easily. Different bearings are sorted without much damage to them efficiently. This makes storage and retrieval of bearings easy.
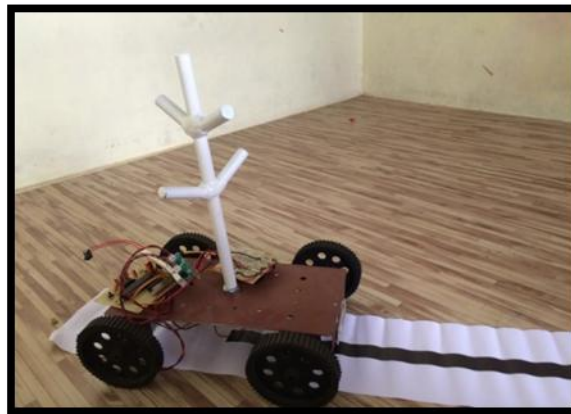

FIG 6:- Proposed AGV

FIG 7:- HANDLING ROD

VI. FUTURE SCOPE:-

- Proposed system can be used into medical field for handling and sorting of medicines.
- Proposed system can be used in various industrial applications like screw and nut assembly.
- A spray painting gun instead of rod and can be used for painting internal surfaces of pipes, tubes, etc. & the system can be used for visual inspections where humans are prohibited.[5]

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