AGV based stretcher

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Abstract—**Industry 4.0 and huge demands in automation are growing in this era. Every single machine requires automation which is helpful to increase efficiency and also production rate. Considering such demands, an automated stretcher has designed. In the manufacturing industry the machine or device finds it path to move one place to another place with already set commands has immense demand. The automated guided vehicle has the property of following allocated path. Use of automation increase & maintain the quality, overcome the human error while handling & also increase the efficiency of the work, this tends to economic growth. We have designed an automated stretcher which will move on the given commands. This application is useful for multispecialty hospitals, where large buildings are there, RFID tag can be used to label the directions as it contains all information which is required for say stretcher to move. Through Wi-Fi module we can transmit data related to where patient need to move for checkup & testing. This total time to time movement through stretcher, testing report is stored on the portal of hospital. Through which doctor or any authorized person can see the report of patient anytime, anywhere.**

Keywords—Industry 4.0, AGV, Wi-Fi module, controller, RFID.

I. Introduction

Generally, multispecialty hospitals has considerably large infrastructure. When people or patients need to visit doctors in their emergencies they have to ask for location of the particular doctor's room, specific ward number etc. It is fine if a patient is in quite normal condition, but sometimes there is an emergency so in such situations, AGV stretcher is useful to take that patient and reach him or her into requested doctor or say OT for that matter.

To transport manufactured product or raw material from one place to another in large companies or factories automated guided vehicle can be used. Usually AGV can be used only in manufacturing system, however these days AGV is considered for several other applications. Use in industry to hold & transfer the materials from one department to another department without any accident & breakage. The individual safety is also essential phenomenon in the industry. Sometimes while carrying the material in the industry, materials get damage due to handling of worker.

But we can use this concept of transportation in large hospitals to reduce human efforts of finding particular location.

Material handling process in industry can be done using IOT based automated guided vehicle; it consists of various movements such as vertical, horizontal & arrangement of both. Material managing is a concept of science which involves movement, stuffing, transporting. It is a significant activity in the fabrication process. Generally, time required for actual process is 20% out of total required time for manufacturing process and remaining 80% is used only for material handling [1], transfer the material from department to department. The given percentage should be modified according to the necessity of plant.

Similarly, every single machine requires automation which is helpful in increase in efficiency and production rate. Considering such demands, an automated stretcher has designed in this paper. In the manufacturing industry the machine or device finds it path to move one place to another place with already set commands has immense demand. The automated guided vehicle has the property of following allocated path. Use of automation increase & maintain the quality, overcome the human error while handling & also increase the efficiency of the work, this tends to economic growth.

Using radio frequency identification card, we can store all the information of a patient along with the details that the patient has visited to which zone or which doctor in the hospital. With the help of RFID cards we can use all the information in the appliance and these details are transmitted to individual viz. internet using Ethernet shield and arduino

II. System Development

The AGV based stretcher will move the patients from one ward to another ward. It will save all the data regarding the patient health report. Report consisting what type of testing he had, on what time period and in which testing lab or section.

These reports can easily access to doctor or any authorized person at any time & anywhere. This will reduce the human error & there is no chance to loss the report of the particular patients.

As shown in flow chart of a system (Figure 1), the working will be fully automatic since, the designed model is totally independent. AGV is nothing but fully automatic vehicle which will drive the stretcher to desired location and also store the details of all sections of hospital.

System work flow shows that first step of the working will be calling AGV by clicking the button or switch, which is used to transmit the signal to AGV and then it will receive the signal.

AGV is able to follow the allocated path. When the button is pressed, signal will be sent to AGV. According to

received signal, it will follow the path and will stop at destination. Destination commands are provided by the user and path will be followed by AGV accordingly. Patient will be received by the stretcher and then the patient will be dropped to the desired location according to the received commands.

AGV based stretcher consist the different sensor with controller. Controller will control the overall operation/task performed by machine. The machine having the sensors like color sensor, IR sensor, Ultrasonic sensor, for the purpose of the path finding & obstacles detection. It can travel without human force (automatically) so for travel from one place to another place, it consists of the motor on the wheel with the motor driver.

For communication of AGV based stretcher of accepting command, like where to go this happens with the help of Wi-Fi Module or Bluetooth module. This all action and the all sensors are interface with the controller. For this machine we used Arduino or Raspberry-pi.
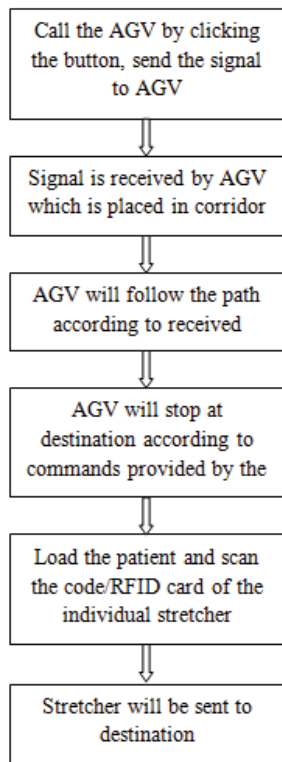

Figure 1: System workflow

III. HARDWARE INTERFACES

Components required for the design implementation are as follows:
1. Controller
2. Wi-Fi module
3. Bluetooth Module
4. RTC Module
5. Ultrasonic Sensor
6. RFID Reader
7. DC Geared Motor
8. Li-Po Battery
9. RFID TAGS
10. Colour sensor
11. Motor driver
12. Relay

IV. SOFTWARE INTERFACES

Software is required for the programming of the controller which is required set the command for the operation of device.

Web page is required for particular hospital which interface with AGV based stretcher for collecting & store the data.

V. CONCLUSION

This AGV based stretcher helps in reducing complications for patients by providing easy access and easy way to find the desired location. This application is useful for multispecialty hospitals, where large buildings are there, RFID tag can be used to label the directions as it contains all information which is required for say stretcher to move. In this total operation of AGV based stretcher we can get total report on the web portal of hospital with the help of Wi-Fi module & radio frequency identification card. These reports can helps to doctor for easy analysis at any time. These reports are also available for the authorized person such as patients or relatives on single click.

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