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Automated Guided Vehicle as an office boy

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ABSTRACT

Office and its environment finds very effective and important place in many organizations and one required an efficient and cost effective technique for fast, reliable and efficient work. Many times some unskilled tasks are repeated like transferring files from one table to another and for such task need an office boy. Such simple and repeated task invests skilled human mind and efforts. These skilled efforts instead may be used in complex and important tasks. In this regard the paper has made to give theoretical model of Robot who works as an office boy. The robot also called as Automated Guided Vehicle (AGV) as that Semi- Autonomously Navigates in the office environment.

Keywords: AGV, Office boy, Office environment, Robot, Sensors

I. INTRODUCTION

AGV is a Computer-Controlled, Non-manned, Electric Powered Vehicle Capable of Handling Material The first AGV was brought to market in the 1950s, by Barrett Electronics of Northbrook, Illinois, and at the time it was simply a tow truck that followed a wire in the floor instead of a rail. Out of this technology came a new type of AGV, which follows invisible UV markers on the floor instead of being towed by a chain. The first such system was deployed at the Willis Tower (formerly Sears Tower) in Chicago, Illinois to deliver mail throughout its offices.[1] Over the years the technology has become more sophisticated and today automated vehicles are mainly Laser navigated e.g. LGV (Laser Guided Vehicle). Today, the AGV plays an important role in the design of new factories and warehouses, safely moving goods to their rightful destination.

An Automated Guided Vehicle is a Robot that follows black line on the floor or uses vision or lasers. AGV uses several sensors suits to characterize its behaviors. They are mostly used in industrial application to move material around a manufacturing facility or a warehouse. Automated Guided Vehicle increases efficiency and reduce costs by helping to automate a manufacturing facility or a warehouse. AGVs are available in a variety of models and can be used to move products on assembly line, transport goods throughout a plant or warehouse and deliver loads to and from stretch wrappers and roller conveyors. The block diagram of AGV Robot is showing in figure 1.

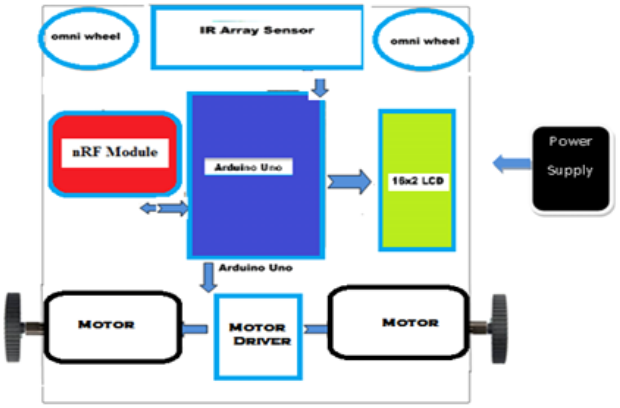

Figure 1. Block diagram of AGV Robot

An automatic guided vehicle is a programmable mobile vehicle. The automatic guided vehicle (AGV) is a mobile robot used in industrial applications to move materials around a manufacturing facility or a warehouse. Many research and development have been made for upgrading, controlling and monitoring the AGV.[2-5] . With due all respect the same mobile robot may be use as an office boy to transfer files from one table to other and also for many other unskilled work. Now a day's human mind is used an office boy for such unskilled work but if instead an AGV is used then human mind may be utilizes for other skilled work required in an office. By taking this concept the present paper gives an idea about theoretical model of Robot who works as an office boy. The block diagram for office set up and complete system of AGV+ office setup are shown in figure 2 and figure 3 respectively.

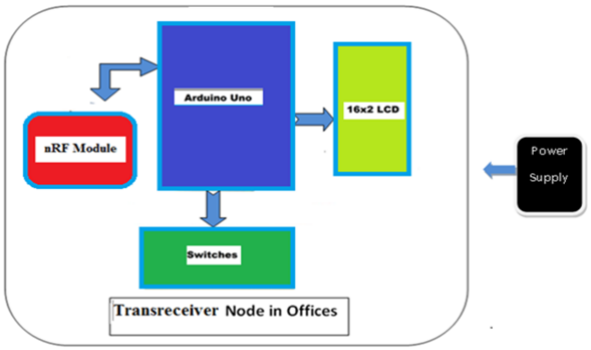

Figure 2. Block diagram of Office Setup

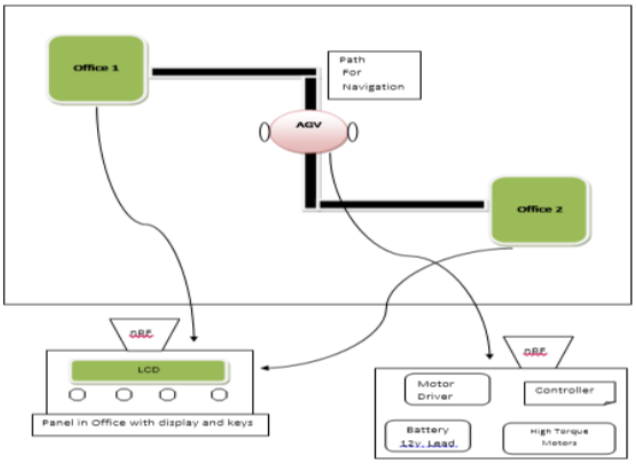

Figure 3. Block diagram of complete system of AGV+ Office setup

II. MATERIALS AND METHODS

2.1 Materials

The components used for manufacturing AGV Robots are:

i) 1x Aluminum Chassis
ii) 2x Geared Motor
iii) 1x Motor Driver 10A
iv) 2x Wheels
v) 2x Omni Wheel
vi) 1x Battery 12V 7.4 Ah
vii) 2xArduino Uno
viii) 1xArduino Mega
ix) 3x nRF Module
x) 3x LCD 16x2
xi) 3x Keypad
xii) 1xLine Array Sensor
xiii) 2x 9V Adapter(for office setup)
xiv) 1x Buzzer
xv) 1x Pick and Place Mechanism on robot
xvi) 1x Docking Mechanism on robot
xvii) 1x Proximity Sensor
xviii) 2x Limit switch

2.2 Methods and Working

i) For Autonomous Navigation predefined markers will be put on the floor in the form of black line so that AGV can navigate accurately throughout the office space.

ii) Every desk will have a panel with a display and key panel having following switches to provides different commands to the Robot:

a) Request Robot.

b) Send to office

iii) On placing the request, it will plans its direction to the office and move using the concept of line following.

iv) If request is placed while AGV is busy doing the some other task then it will give priority according to the predefined priority table or first come first serve after completing the first task.

v) AGV will compromise of high torque Geared Motor to accommodate the large payloads.

vi) AGV will have an on- board pick and place mechanism to automatically pick the files and objects. So user has to just place the file in predefined space and push the request button. Everything will be done by AGV.

vii) AGV will be independent system consisting of the on-board battery, controllers and all required accessories.

The flow chart for working of complete system of AGV + office is

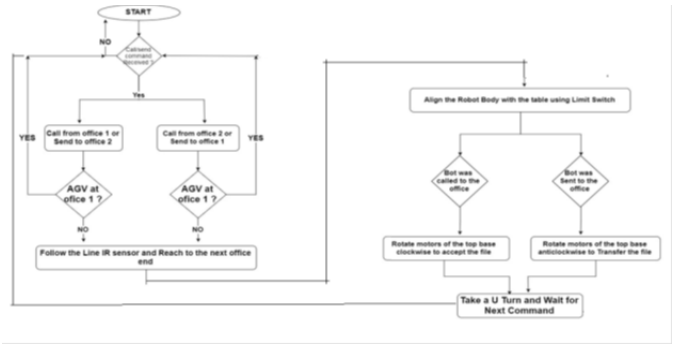

Figure 4. Flow chart for working of complete system of AGV + office

III. OBJECTIVES

The working of AGV is very efficient and cost effective. The complete system of AGV is reliable too. There are following objectives which are the outcomes after developing AGV:

i) It will help to reduce the efforts required in the office.

ii) Autonomously navigate from one desk to another depending on the Input provided.

iii) Securely transmit the files from one desk to another.

iv) Provide an easy interface to control the actions of the AGV.

v) Priority based transfer of documents.

vi) Large payload.

vii) Completely mobile and wireless system.

viii) On board pick and place system on Robot.

IV. RESULT AND DISCUSSION

The automation of transportation is a key point in the optimization of logistics. Automated Guided Vehicle Systems (AGVS) provide several benefits to fulfill this task.[6] Material handling [7-8] involves the movement of materials from one place to another for the purpose of processing or storing. According to American Material Handling society,' Material Handling is an art and science of involving the movement, packing and storing of subsystems in any form. Along with material handling Path planning is one of the key aspects of designing and implementing intelligent robots.[9]An Automated guided vehicles normally mean mobile robots (or unmanned vehicles) used in transporting objects. They were traditionally employed in manufacturing systems, but have recently extended their popularity to many other industrial applications. In this paper, An Automated Guided Vehicle (AGV) is presented as an Office boy. The flow chart gives the systematic procedure for robot as an office boy. The basic function of AGV is divided into two systems namely navigation and load transfer. In this work, the tasks of the robot office boy are assigned in a purely random manner. We predict a room for performance improvement. Although we have seen only a moderate tardiness for a typical number of operational AGVs with our current strategy,

improvement will be done in future if a sophisticated task dispatching strategy could be incorporated. Such a dispatching strategy is desired to work collaboratively with the routing algorithm. It can still run safely and smoothly with unexpected disturbances, such as abrupt changes of container delivery schedule and the appearance of obstacles in the workspace, or even with some failures.

V. CONCLUSION

From the above discussion it was found that the AGV is very efficient and cost effective and reliable as well. We conclude that the vehicle can reach from the initial position moved along with generated path with accurate location.

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