Smart Loader An Mobile Operated Automated Guided Vehicle

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Abstract- *Automated guided vehicles are widely used for transporting material in manufacturing and warehousing applications. This system offers many advantages over other forms of material transport. However the design of the system is complex due to interrelated decisions that must be made and the large number of system design alternatives that are available. In particular design the design of AGVs can be quiet challenging and it can dramatically increase the cost of the system cost and performance. This paper present a basic classification of automated guided vehicle system developed from a control perspective. the classification is used to understanding the implifications of the AGVs design decision control system it also provides the first step towards the development of a useful AGV design aid that helps the system designer determine the most appropriate AGVs design for a particular application .*

These paper deals with the classification scheme that provides a structured mechanism for organizing the relevant information about the design of the AGVs from a control perspective. It allows the system designer to determine how to design decisions will impact the control complexity and provides the foundation for design aids that helps in determining the most appropriate AGV design for a specific application. This AGV is a mobile system operated path detecting vehicle which takes command from a mobile controller and perform such actions.

Keywords- AGV (automated guided vehicle), scissor lift, etc.)

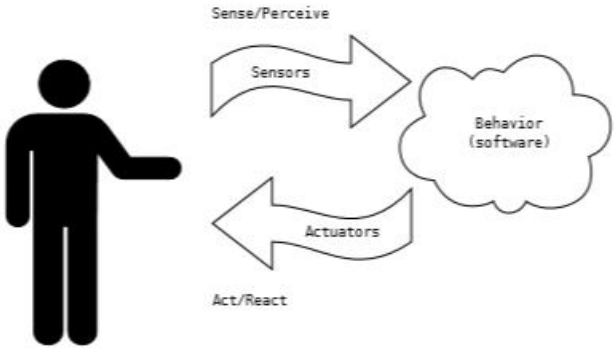
I. INTRODUCTION

.AGVs are one of the most modern method of transporting the material safely and in time.AGVs increases efficiency and reduces costs by helping to automate a manufacturing facility or warehouse . AGVs can carry objects or can tow behind

Them in trailers. The trailers can be used to move raw materials or finished products. The AGVs can also store the objects on a bed. some agv use fork lifts to lift objects for storage . AGVs are employed in nearly every industry including paper, metals, newspaper and general manufacturing.

An AGV can also be called a laser guided vehicle or self guided vehicle .in Germany it is also called as faherlose transport system (FTS) and in Sweden forarlosa trucker .AGVs are available in variety of models and can be used to move products on an assembly line transport goods throughout a plant or a warehouse .

The first AGV was brought to market in the 1950s by barret Electronics of northbook and at the time it was simply a tow truck that followed a wire in the floor instead of rail . Over the years the technology has become more sophisticated And today automated vehicles are mainly laser navigated ex. LGV in an automated process LGVs are programmed to communicate with other robots to ensure the product is moved smoothly through the warehouse whether it is being stored for future use or sent directly of new factories and warehouses.



The arduino will control and command the AGV by sketch installed in the arduino by IDE software. the sensors and actuactors will be also control the AGV by the help of arduino uno

Problem statement

AGV is a material handling system that uses independently operated, self-propelled vehicles guided along

defined pathways .one of the most important factors is the smartloader wil operate via android based mobile which have Bluetooth connectivity which determines the performance level of material handling system is the number of material handling devices operating in the system.

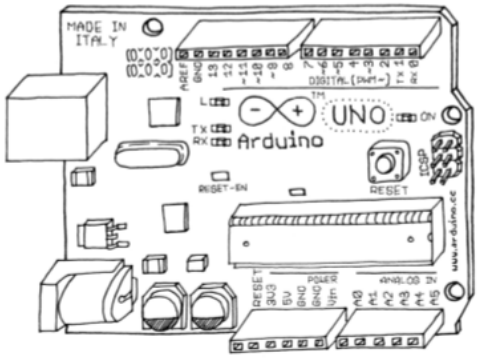
The number of vehicles required to the system can operate efficiently is influenced by the unit load size and the flow path network and the location of P/D stations. The number of required vehicles has to be evaluated considering both economic and operational aspects

II. LITERATURE REVIEW

History of AGVs

In 1953 when first AGV (automatic guided vehicle) have played vital role in moving material and product for more than 50 years. The first AGV system was built and introduced in 1953 it was a modified towing tractor that was used to pull a trailer and follow an overhead wire in a grocery warehouse. By the late 50s and early 60s towing AGVs were in operation in many types of factories and warehouses. AGVs have come a long way to history at AGV . The first big development foe the AGV industry was the introduction of a unit load vehicle in mid 1970s. These unit loads AGvs gained widespread acceptance in the material handling marketplace because of their ability to several functions .A work platform a transportation device and a link in the control and information system for the factory since then.

AGVs using laser and natural target navigation technologies. We will be using an arduino uno board for programming the AGV.



The program will be sketched on the IDE software to perform various operations. Digital IO pins (pins 0–13) these can be inputs or outputs, which is specified by the sketch you create in the IDE.

6 Analogue In pins (pins 0–5) These dedicated analogue input pins take analogue values (i.e., voltage readings from a sensor) and convert them into a number between 0 and 1023.

6 Analogue Out pins (pins 3, 5, 6, 9, 10, and 11) these are actually six of the digital pins that can be reprogrammed for analogue output using the sketch you create in the IDE.

The board can be powered from your computer's USB port, most USB chargers, or an AC adapter (9 volts recommended, 2.1mm barrel tip, and center positive). If there is no power supply plugged into the power socket, the power will come from the USB board, but as soon as you plug a power supply, the board will automatically use it.

III. DISCUSSION

The SmartLoader is a mobile operated Automated Guided Vehicle which will be completely operable by mobile app which will give instructions to the arduino to run the AGV.

We will upload sketch to the arduino to perform the desired Work. First we will write a program (sketch) for the arduino then the sketch will be uploaded to the arduino . The actuators used are motors; it will set an o/p for all the motors and the sequence for all the motors. The arduino will also control speed of each motor and will operate scissor trolley as well.

When the lift is at rest position the load deriving on the body is less when we load the material on the lift. the

smartloader will carry the material upto its destination then the lift will expand and reach upto its desired height at the moment the lift will at its maximum position . When the desired height is obtained AGV will unload the material to its destination.

This entire operation will be performed manually by operating it on a mobile phone. The mobile will connect to the system by using Bluetooth module and it will pair the mobile phone Bluetooth by addressing it in the sketch of the arduino .

Using the same circuit that you have seen in the previous section, you can connect a lot of other resistive sensors that work in more or less the same way. For example, you could connect a thermistor, which is a simple device whose resistance changes with temperature. In the circuit, I have shown you how changes in resistance become changes in voltage that can be measured by Arduino.

If you do work with a thermistor, be aware that there isn't a direct connection between the value you read and the actual temperature measured. If you need an exact reading, you should read the numbers that come out of the analogue pin while measuring with a real thermometer. You could put these numbers side by side in a table and work out a way to calibrate the analogue results to real-world temperatures.

Until now, we have just used an LED as an output device, but how do we read the actual values that Arduino is reading from the sensor? We can't make the board blink the values in Morse code (well, we could, but there is an easier way for humans to read the values). For this, we can have Arduino talk to a computer over a serial port, which is described in the next section.

IV. PRACTICETHEORYAND METHODOLOGY

The automated vehicle will start by taking power from 12v dc supply .the mobile phone device will be paired with the help of bluetooth module and then the AGV is directly paired with the mobile phone with the help of an app locomotive motors will start moving when command is givenby mobile operator .

Smartloader will can lift any kind of goods including paper rolls, aluminium, heavy steel plates and other palletized goods It is optimize for any company and for any kind of goods.

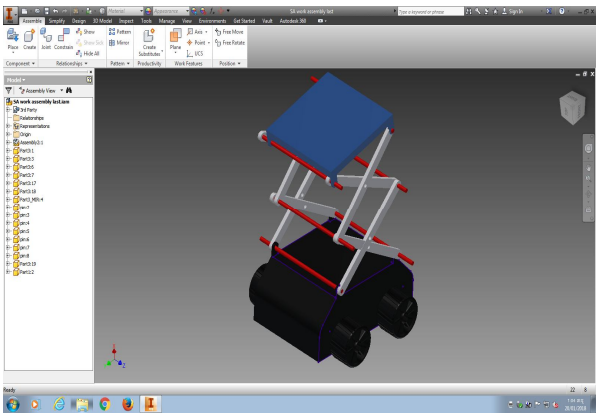
V. CONSTRUCTION AND WORKING

In the construction of AGV aluminium sheets and strips are use GCI material will be most suitable for this frame structure.The frame at the base is made of 2 x 30 and 2x 40 cm of aluminum strips. These pieces joined together by nut & bolts and then four strips of 17 cm will be attached to create a base frame of AGV.

The lift scissors are made up of aluminum to reduce the weight of the top and the trolley is fabricated of 30x30cm frame which fixed to the top of the scissors.

The wheels of 10 cm diameter is attached to the base frame .Each wheel is attached to the 300 rpm motors which will run on 12v dc supply. The ground clearance for the AGV is 5cm due to automatic handling and operation at plane surfaces.

The lift motor is capable to lift 30 kg load with the torque of 5000 N/m.



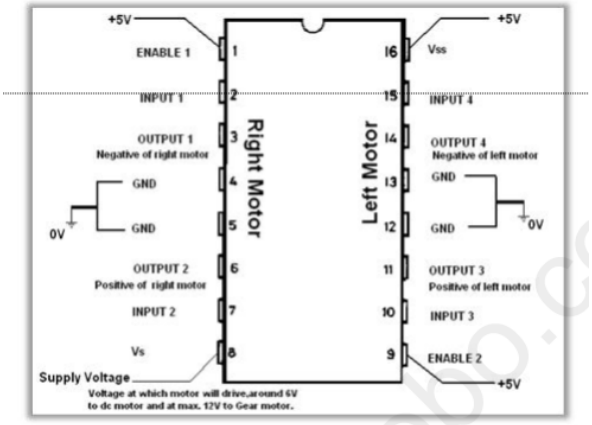
Automatic trailer loading vehicle smart loader:-

Smart loader is an automatic storage and retrieval vehicle that can move loads to and from palltizers automated storage & retrieval systems, staging areas as well as any conventional over the road trailer If automatic trailer unloading is your objective ,smart loader can also remove loads from a trailers and deliver them to anywhere in your warehouse.

Equipped with ladder technology, this automatic trailer so you don't have to worry about making trailer modifications. The revolutionary technology allows you to pick up pallets and stack them with pinpoint accuracy loads at the end of the trailer.

The arduino will be attached with L293D motor driver .which can operate the motors and also give equal supply to all the motors.

The sketch made for motors is feeded to the arduino the dealy timing between the each action also specified perfectly.



Block diagram of L293D

Points regarding L293D ™ Supply voltage (Vss) is the Voltage at which we wish to drive the motor. Generally we prefer 6V for dc motor and 6 to 12V for gear motor, depending upon the rating of the motor. ™ Logical Supply Voltage will decide what value of input voltage should be considered as high or low .So if we set Logical Supply Voltage equals to +5V, then -0.3V to 1.5V will be considered as Input Low Voltage and 2.3 V to 5V will be considered as Input High Voltage.

L293D has 2 Channels .One channel is used for one motor.

- Channel 1 - Pin 1 to 8
- Channel 2 - Pin 9 to 16

™ Enable Pin is use to enable or to make a channel active .Enable pin is also called as Chip Inhibit Pin.

™

All Input (Pin No. 2, 7,10and 15) of L293D IC is the output from microcontroller (ATmega8).

E.g.-We connected (Pin No. 2, 7, 10 and 15) of L293D IC to (Pin No. 14, 15,16and 17) of ATmega8 respectively in our robots, because on pin 15 and 16 of ATmega8 we can generate PWM. ™

All Output (Pin No. 3, 6,11and 14) of L293D IC goes to the input of Right and Left motor.

Output Connections •

OUTPUT 1 (Pin No 3) Negative Terminal of Right Motor
OUTPUT 2 (Pin No 6) Positive Terminal of Right Motor
OUTPUT 3 (Pin No 10) Positive Terminal of Left Motor
OUTPUT 4 (Pin No 14) Negative Terminal of Left Motor

One channel corresponds to one motor.

Enable pin should be high for activating the corresponding channel.

Input 1 corresponds to Output 1.

If Enable

1=High (1)
Input1 =High (1),
Output1=Vss
Input1 =Low (0),
Output1=0

If Enable

1=Low (0)
Input1 =High (1),
Output1=0
Input1 =Low (0),
Output1=0

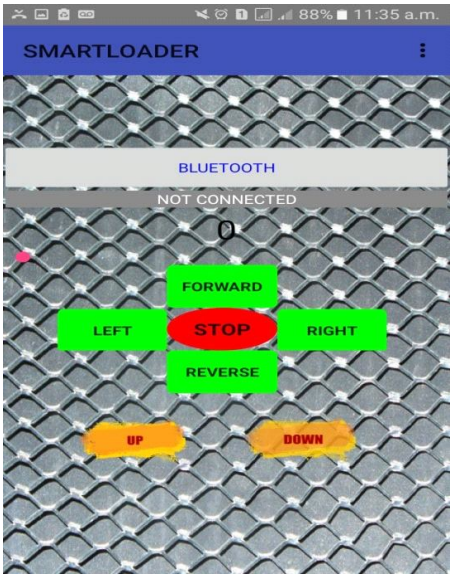
Means if Enable pin low, the output will be at 0 always. If its high output depend on input

The sketch program for an AGV is developed in IDE software and also feeded to the Arduino :

```
#include <SoftwareSerial.h>
SoftwareSerial BT (0,1);

String readdata;

void setup() {
  BT.begin(9600);
  Serial.begin(9600);
  pinMode(12,OUTPUT);
  pinMode(9,OUTPUT);
  pinMode(11,OUTPUT);
  pinMode(10,OUTPUT);
}

  void loop() {
  while (BT.available()){
```

```
 delay(10);
 char c + BT.read();
 readdata += c;
 }
  if (readdata.length()>0){
    Serial.println(readdata);

   if(readdata =="forward")
   {
     digitalWrite(12,HIGH);
     digitalWrite(9,HIGH);
     digitalWrite(11,LOW);
     digitalWrite(10,LOW);
     delay(100);
   }

   else if(readdata == "backward")
   {
     digitalWrite(12,LOW);
     digitalWrite(9,LOW);
     digitalWrite(11,HIGH);
     digitalWrite(10,HIGH);
     delay (100);
   }

   else if (readdata == "right")
   {
      digitalWrite(12,HIGH);
      digitalWrite(9,LOW);
      digitalWrite(11,LOW);
      digitalWrite(10,LOW);
      delay (100);
   }
   else if (readdata =="left")
   {
      digitalWrite(12,LOW);
      digitalWrite(9,HIGH);
      digitalWrite(11,LOW);
      digitalWrite(10,LOW);
      delay (100);
   }
        else if (readdata =="stop")
   {
      digitalWrite(12,LOW);
      digitalWrite(9,LOW);
      digitalWrite(11,LOW);
      digitalWrite(10,LOW);
      delay (100);
    }

readdata="";
  }
}
```

Mobile app



This app is created on MIT APP INVENTOR

And compiledonline from server.
This app contains operation command keys.
the app can be connected via Bluetooth .the app is design specifically for AGV.

MODEL DESIGN

VI. CONCLUSIONS

The AGV will carry the material only if it is loaded on the carrier. The smartloader basically can operate on the mobile phone .The lifting mechanism ratio is depend upon load carrier and drive mechanism. And load carrying capacity is depending on motor and battery. It is mobile operated load carrier so reduce human efforts or human work.

Whole mechanism is totally base on mechanical and electronics phenomenon. The mechanism having very less space because of its compact construction in very less space with nut and bolt mechanism.

VII. FUTURE SCOPE

1. The advancement in the field of the automated vehicles is improving day by day.
2. The possibilities for new vehicles are limitless and also by using arguing board as a processing unit will make it most easy to develop and improve.
3. It can be also used for automatic loading and unloading of pallets by means so rollers
4. Especially these vehicles are designed to move small But agile loads with care.

These are the best option for the unmanned vehicle in the future use of automotives

VIII. ACKNOWLEDGMENT

We would like to express our special thanks of gratitude to Mr .**D B NIGADE** Sir and our head of the department prof. **S.V.VANJARI** who gave us the golden opportunity to do this wonderful project on the topic Design and Fabrication of SmartLoader **an AGV**, which also helped us in doing a lot of Research and we came to know about lot of things we really thankful to them.

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