Design and Development of Bluetooth Operated Machine for Lifting, Cleaning and Painting Operations

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Abstract: The application of Bluetooth device to operate a machine is an improved and advance technology that brings in a new revolution in the machine manufacturing industries. So far the machines available in market that can lift the dustbins, clean roads, and paint road lanes are suitable for performing individual operation. Whereas a multi-operational machine is a combination of various functions that performs lifting, cleaning, and painting thereby reducing operational cost, time. The current work is focused on design and development of multi-operational machine. A prototype model is constructed with in-built blue tooth technology to perform three operations: (i) lifting the dust bin from place to place; (ii) road cleaning; (iii) painting the road lanes. The developed model can also be operated by an unskilled worker as well. The main purpose of this project is to decrease the human efforts to lift heavy dust bins and clean the roads.

KEY WORDS: Painting, Forklift, Screw Rod Mechanism, Multi-operational

1. INTRODUCTION

Mechanical Fabrication of battery operated Multi operation Forklift, Floor Cleaning and painting machine using Blue Tooth is an improved and advance technology that helps brought about revolution in the mechanical industries today all heavy engineering company uses it. Widespread use of the forklift truck had revolutionized warehouse practices from mid 20th century. A material handling systems is in use, exact from that entirely physical to the ones that are semi-automatic remote technology. Forklifts have revolutionized warehouse work. They made it possible for one person to move thousands of kg at once. Well-maintained and safely operated forklifts make lifting and transporting materials infinitely easier. This is the general description of a normal forklift truck. This prototype module is constructed with blue tooth technology, it has three operation, first one is for collecting the dust bin from one place to another place, second one is cleaning the road and third function is painting the wall or for road white line purpose. This one we can control from the distance of 50 feet area. Here we have proposed the design and fabrication of a remote-controlled battery operated Multi operation Forklift, Floor Cleaning and painting machine using Blue Tooth. The mini fork lifter defines the concepts of using forklifts for weights lifting as well as placement using forklift uses screw rod arrangement in order to lift loads. It is connected to a powerful screw rod mechanism. Our system allows for efficient implementation of this concept. The mini 12V motor in order to lift weights and also consists of a counter weight in the back to maintain proper balance while lifting weights. The lifting mechanism is attached onto a 4-wheel drive frame chassis strong to support the frame as well as counterweight. It consists of 4 motors needed to control vehicle movement in all 4 directions. The system uses 2 supporting rods with bearing setup in order to achieve smooth vertical movement of the forklift. Working device is an important part of the forklift. When the forklift is loading and unloading handling, it is directly under all the material weight and finished the goods fork, handling, lifting, etc. It is mainly composed of the door frame, outrigger and cargo, guide wheel, etc.

As a kind of industrial handling vehicles, forklift plays an indispensable role in people's life. Nowadays, in order to meet the needs of the people, the types of forklift are more and more. In this project, based on already the basic parameters of the push forward forklift in the market, the working device of the forklift has been introduced.To build this project work more realistic, more importance is given for practical application, so a prototype module is build for the demonstration. This project shows the real working system and based on this technology with little changes in the design and motor ratings, the system can be converted into real applications. The method of converting rotary motion to linear motion is applied in this mechanism [1].The mechanical system is considered as motion converter, this can be carried by implementing electro-mechanical techniques. The concept is to convert the motion from one form to other form by using suitable mechanical & electrical components .In this research work the technique of transform the rotational motion in to linear motion is implemented. For this purpose six DC motors are used to create motion in the mechanism that functions as forklift. These motors are constructed with gear mechanism and inbuilt motor .As this multi-operation machine is designed as prototype module, lowest rating motors are used to drive the mechanism[2]. The multipurpose road cleaning machine has a wide range of applications. It can be used on all kind of roads in villages as well as the cities. Working on the basic principle of science, the project is a collaboration of electronic ,mechanical and electrical devices. To sort the issues of cleanliness in our country the multipurpose road cleaner can play a vital role. The cleaner solves the problem of dusty roads, removal of metal particles from road and also obstacles. The machine is an assembly of various components like a

chassis, micro controllers ,some motors and various electro-mechanical devices whose working takes place on the various laws of physics and simple science. In this paper, our motive is to present a detailed study of cleaning system using the cleaner, the main focus being cleanliness with minimum use of resources available with us [3]. The main advantage of using this robot will reduce time, it will be very useful for society with mobility issues to clean the house without any difficulties. It is a simple and cost effective robot[4]. Lead-screw drives are generally used in linear motion systems because they transmit with high stiffness and an inherent drive reduction and they are readily preloaded to have no backlash. One drawback of a lead-screw is that the rotary inertia of the screw makes it difficult to achieve high accelerations using a motor of a given size. A second, and still poorly understood, limitation on the dynamic performance of a lead-screw drive arises from a resonance in which the carriage oscillates in the direction of motion as the screw undergoes longitudinal and tensional deformation[5].The basic requirements at household is cleaning which is an iterative process and required on daily basis which consumes both time and energy.This robot is an approach to make cleaning very easy and more time efficient task also to give comfort to the human by doing the domestic works[6].The main objectives of cleaning robots is to remove the waste and to clean the floor, to remove the dirty water and leave the floor as dry as possible and to suck the dust particles by vacuum cleaning method. To fulfill all the objectives, various equipment like - wide suction port, cleaner, transmitter and receiver circuit, motors with gear box, wheels, battery set, blower fan, etc. have been designed or selected as per our requirement[7].

2. RESEARCH METHODOLOGY

The working of the model here is very simple, the signal from the remote is received by the Bluetooth receiver, the Bluetooth send signals to the controlled Arduino unit, the Arduino unit is a microcontroller which controls the whole setup,The following 3(Figure 1) shows the flow chart of the working model.

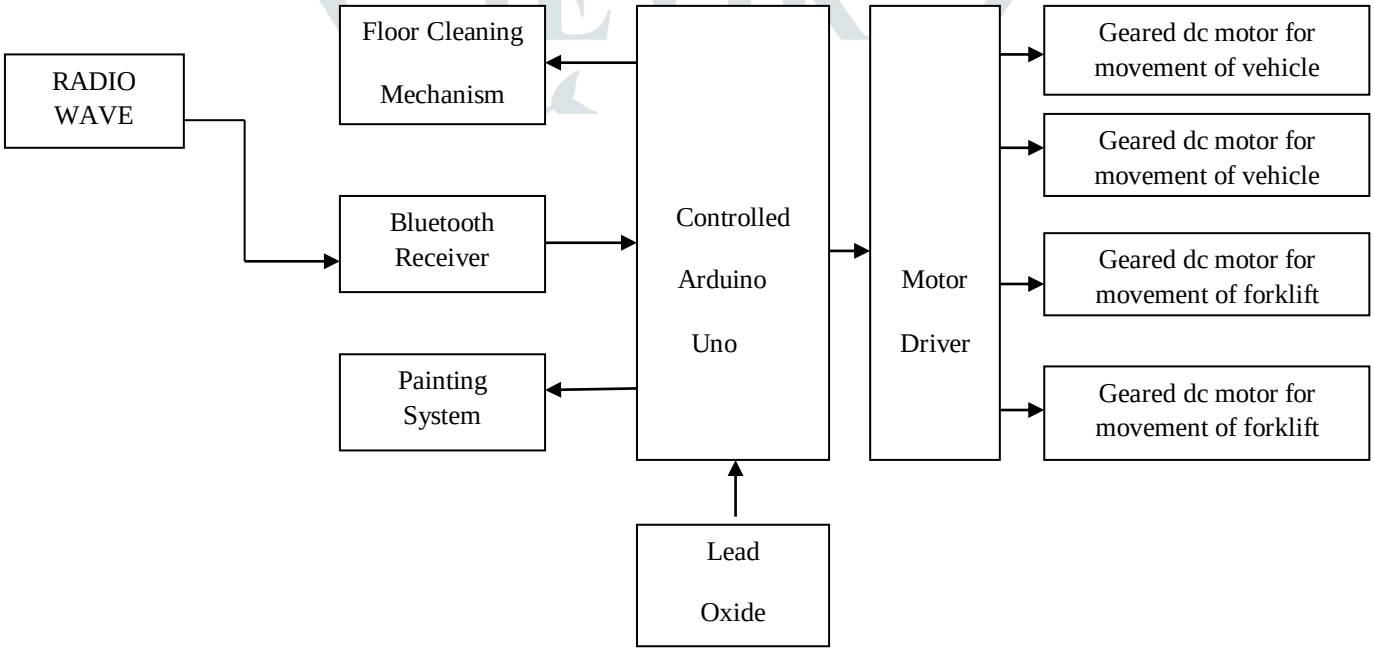

FIGURE 1:Flow chart of the working model.

2.1 Bluetooth receiver and Arduino uno

The Bluetooth receiver acts as a bridge between your phone and multi operational machine. Arduino Uno is programmed using arduino software which is a cross-platform application called IDE written in Java. The controller used is at mega 328p which consists of 32 bits of flash memory. The signal goes to motor driver which is used in movement of vehicle and controlling of fork lift operation the other signal goes to painting which is used for lane painting in the road and the other one goes to cleaning system which is used to suck the dust inside and the setup is powered by lead oxide battery we use lead oxide battery for cost effective purpose.

2.2 Motor and Battery unit

Six 12v DC motor is used in this multi operational machine. 12v lead oxide battery is used supply electricity.

2.3 Components used

In this mechanism the following components are used-

- Supporting Rods
- Bearings
- screw rod mechanism
- Mounts & Fixtures
- Supporting Frame
- Controller Circuitry
- Blue tooth apps
- Wheels
- Screws & Bolts
- Dc geared motor 100 rpm 12 volt 10 watts

The fork lift will move up and down, and also it will move forward and backward movement through the dc motor. A roller is used for painting system, and a high speed fan sucker is used for road cleaning purpose.

2.5 Fabrication Work

The instalment of motors, high speed fan, screw rods, wires are connected to each of the motors and cardboards are placed on the framework. Final finishing including paint work, welding and grinding is done (Figure-2).

FIGURE 2- Fabrication work carried out.

This involves the working process to build up the model which includes cutting, filing and welding.The following (Figure3) show welding done for the frame , cutting the metal pieces and filing the extra parts.

FIGURE 3- Welding, cutting, filing.

3. RESULT

This model is built with MS square pipe and it weighs 16Kgs. It is Bluetooth operated and its range is around 30feet.Power source is through 12v lead oxide battery. It can lift 3 to 4 Kgs. And it can paint a straight line for few meter without any break. The machine is obtained in the desired dimensions.

4. CONCLUSION

The components required to build Multi-operation machine for Forklift, floor cleaning and painting machine are easily available in the market separately. Our aim is to combine all of the three mechanism in a single machine to perform various tasks together with the help of improved technology. With the help of this multi operation road cleaning machine human effort will reduced and it will be less time consuming. Their is no requirement of all three different machine . Even the unskilled labour can use this machine. With the help of smart phone it feasible it can be used without any internet connection. A single person can operate this machine.It is eco friendly . It can be easily handle by a person.

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