

# Fabrication of Automatic Forklift Vehicle

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**Abstract :** In today life there is wide variety of forklifts from the large heavy loadings trucks to the one that works among narrow aisles forklifts have become one of the basic transportation tools. We use in our lives with all the forklifts in existence we find that there are some improvements in that there were no requirements of a driver to bring transportation operation also we have used ultrasonic sensors to avoid hazardous accidents.

**Keywords:** microcontroller, forks, Counterweight, aesthetics.

## 1. INTRODUCTION

Our paper is based on a microcontroller in which we have used several steps for making our project so here we are giving an introduction to all the components which we have used in our project work. This project is a Bluetooth-controlled forklift car. For this the Android mobile user has to install an application on her/his mobile. Then the user needs to turn on the Bluetooth in the mobile. The wireless communication techniques used to control the robot are Bluetooth technology. The user can use various commands like move forward, reverse, stop, move left, and move right. These commands are sent from the Android mobile to the Bluetooth receiver. The Android-based forklift car has a Bluetooth receiver unit which receives the commands and gives them to the microcontroller circuit to control the motors. The microcontroller then transmits. In general, the forklift can be defined as a tool capable of lifting hundreds of kilograms. A forklift is a vehicle similar to a small truck that has two metal forks on the front used to lift cargo. The forklift operator drives the forklift forward until the forks push under the cargo, and can then lift the cargo several feet in the air by operating the forks. The forks, also known as blades or tines, are usually made out of steel and can lift up to a few tons. [2]

## 2. WHAT IS A FORK LIFTER?

A forklift is one type of power industrial truck that comes in different shapes, sizes, and forms. A forklift can be called a pallet truck, rider truck, fork truck, or lift truck. Yet, the ultimate purpose of a forklift is the same: to safely allow one person to lift and move large heavy loads with little effort. For the purposes of this training, a forklift is a small or large vehicle. A forklift operator should be aware of the multiple parts on a forklift (see diagram below) in order to safely operate the forklift and be able to detect when an unsafe vehicle needs to be removed from service. Industrial trucks with a power-operated pronged platform (commonly known as forks).

## 3. LITERATURE SURVEY

It is clear that the process begins with the remote control unit. This unit is designed with an 89C2051 microcontroller; the output of this controller is fed to the RF transmitter. This transmitter is designed to generate a very high frequency of 433 MHz & it is used as the carrier frequency. As the frequency is increased, the wavelength can be decreased, this is called as shortwave transmission. Generally, shortwave transmitters are used for transmitting the information over long distances. Thereby, this high frequency transmitter & its suitable receiver, available in the form of a matched pair, is used in this project work; these are readymade modules available in the market, which can transmit the information up to 50 feet. The command signals are generated through six keys; these keys are interfaced with the 89C2051 microcontroller. The function of each key differs from one to another; whenever any key is depressed, the controller generates corresponding digital data. Based on the information produced by the activated key, the forklift mechanism performs different functions. For example, if the first key is depressed, the forklift runs in the forward direction, similarly, if the second key is depressed, the same vehicle moves in the reverse direction. Likewise, the remaining functions like movement in the lifting mechanism. [3]

## 4 MATERIAL SELECTIONS

### 4.1 Pedestal Bearing



Fig.4.1 Pedestal Bearing

We are the supplier of Plummer block bearing also known as Pedestal Bearing or bearing housing; is a pedestal used to provide support for a rotating shaft with the help of compatible bearings & venous accessories. Housing material for a pillow block is typically made of cast iron or cast steel. Bearing housings are usually made to grey cast iron However; various grades to metals can be used to manufacture the same, including ductile iron, steel, stainless steel, and various types to thermoplastics and polyethylene-based plastics. To bearing element may be manufactured from 52100 chromium steel alloy (the most common), stainless steel, plastic, or bushing materials such as SAE660 cast bronze, or SAE841 oil impregnated sintered bronze, or synthetic materials. ISO 113 specifies internationally accepted dimensions for Plummer blocks

#### 4.2 Shaft



Fig 20mm shaft 2ft 2nos

A shaft is a rotating machine element, usually circular in cross section, which is used to transmit power from one pan to another, or from a machine which produces power to a machine which absorbs power.]] The various members such as pulleys and gears are mounted on it. Transmission shafts are used to transmit power between the source and the machine absorbing power; e.g. counter shafts and line shaft

#### 4.3 Freewheel



Fig. 4.3 4freewheel (Id 20mm)

Mechanical or automotive engineering, a freewheel or overrunning clutch is a device in a transmission that disengages the driveshaft from the driven shaft when the driven shaft rotates faster than the driveshaft. An overdrive is sometimes mistakenly called as freewheel, but is otherwise unrelated. The condition of a driven shaft spinning faster than its driveshaft exists in most bicycles when the rider stops pedaling. In a fixed-gear bicycle, without a freewheel, the rear wheel drives the pedals around.

#### 4.4 Chain



Fig. 4.4 2 Chain

A bicycle chain is a roller chain that transfers power from the pedals to the drive-wheel of a bicycle, thus propelling it. Most bicycle chains are made from plain carbon or alloy steel, but some are nickel-plated to prevent rust, or simply for aesthetics.

#### 4.5 wiper motor



Fig. 4.5 wiper motor

The motors used in windscreen wipers are also known as Ferrite magnet type motors as permanent magnets are used in them. These motors contain gears to control the speed of the wiper and three brushes to be used according to the speed of the wiper and the motor itself.

#### 4.6 Wheels



Fig. 4.6 2Wheels

In its primitive form, a wheel is a circular block of a hard and durable material at whose center has been bored a circular hole through which is placed an axle bearing about which the wheel rotates when a moment is applied by gravity or torque to the wheel about its axis, thereby making together one of the six simple machines. When placed vertically under a load-bearing platform or case, the wheel turning on the horizontal axle makes it possible to transport heavy loads.

#### 4.7 Cooler wheels



Fig. 4.7 2Cooler wheels

A cooler wheel (also known as castor according to some dictionaries) is a wheeled device typically mounted to a larger object that enables relatively easy rolling movement of the object. Casters are essentially housings that include a wheel and a mounting to install the caster to objects (equipment, apparatus and more). Casters are found virtually everywhere, from office desk chairs to shipyards, and from hospital beds to automotive factories.

#### 4.8 MS Material Mild



Fig. 4.8 Ms Material Mild

Steel is a type of carbon steel with a low amount of carbon – it is actually also known as “low carbon steel.” Although ranges vary depending on the source, the amount of carbon typically found in mild steel is 0.05% to 0.25% by weight, whereas higher carbon steels are typically described as having carbon content from 0.30% to 2.0%. If any more carbon than that is added, the steel would be classified as cast iron. Mild steel is not an alloy steel and therefore does not contain large amounts of other elements besides iron; you will not find vast amounts of chromium, molybdenum, or other alloying elements in mild steel. Since its carbon and alloying element content are relatively low, there are several properties it has that differentiate it from higher carbon and alloy steels.

#### 4.9 Infrared Sensor



Fig. 4.9 infrared sensor

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

#### 4.10 Johnson motor



Fig. 4.10 Johnson motor 10rpm

A Johnson motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of Johnson motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor.

#### 4.11 Battery



Fig. 4.11 Battery 12v

A battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, smart phones, and electric cars. [1] When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode the terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal.

#### 4.12 Bluetooth circuit

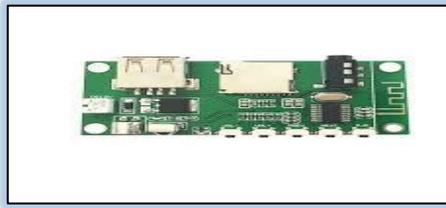


Fig 4.12

#### Bluetooth circuit

Bluetooth is a wireless technology standard for exchanging data between fixed and mobile devices over short distances using short-wavelength UHF radio waves in the industrial, scientific and medical radio bands, from 2.400 to 2.485 GHz, and building personal area networks (PANs). It was originally conceived as a wireless alternative to RS-232 data cables.

#### 4.13 On/off switch



Fig. 4.13 On/off switch

In mechanical engineering, a switch is an electrical component that can "make" or "break" an electrical circuit, interrupting the current or diverting it from one conductor to another. The mechanism of a switch removes or restores the conducting path in a circuit when it is operated. It may be operated manually, for example, a light switch or a keyboard button, may be operated by a moving object such as a door, or may be operated by some sensing element for pressure, temperature or flow.

#### 4.14 Relay



Fig. 4.14 Relay spdt 5v (single pole double throw)

The SPDT Relay (30A) is a high quality Single Pole Double Throw Relay (SPDT). The Relay consists of a coil, 1 common terminal, 1 normally closed terminal, and one normally open terminal. When the coil of the relay is at rest (not energized), the common terminal and the normally closed terminal have continuity. When the coil is energized, the common terminal and the normally open terminal have continuity. This relay's coil is rated up to 5V and the contact is rated up to 30A (@250VAC, 30VDC). You can use it to control high current devices.

#### 4.15 Wires



Fig. 4.15 Wires

A wire is a single, usually cylindrical, flexible strand or rod of metal. Wires are used to bear mechanical loads or electricity and telecommunications signals. Wire is commonly formed by drawing the metal through a hole in a die or draw plate. Wire gauges come in various standard sizes, as expressed in terms of a gauge number. The term wire is also used more loosely to refer to a bundle of such strands, as in "multistranded wire", which is more correctly termed a wire rope in mechanics, or a cable in electricity. [1]

#### 5. ASSEMBLY

This paper is for the lifting of heavy material in workshops and factories this because the men require less for it and it can lift heavy material and carry it the assembly for the forklift system is as follow

1. The MS material is cutter and from it the base is made of the project is made.
2. The metal two bars are welded at two corners of base parallel to each other.
3. At the top of the metal bars the pedestal bearing are welded at both bars.
4. The shaft it throw the pedestal bearing and on the shaft two gears are mounted and the gear are installed my chains.
5. The shaft gear mounted on it and chain installed it.
6. Chain connects the upper shaft and lower shaft.
7. The chain works as a pulley to get material lift and on the chain there is a holder welded for the lifting of material.
8. The motor is there for the mechanism to work the motor rotates the gear and gear rotates the chain and it
9. Battery supplies the current to the motor.



Fig. 5.1 Assembly of forklift system

## **6. WORKING**

The wheel shaft is connected with arrangement of a motor. This motor is used to run the vehicle. Battery is connected to the motor. The motor is connected to the worm gear to increase the torque and is directly coupled to the wheel by means of a bearing block which runs the vehicle. Motor is controlled by the control unit. This vehicle causes no pollution. In front of the Segway the forklift arrangement is mounted. The lead screw is used lift the fork and used to move up and down. The most important consideration of designing a forklifts is the safety, while the forklifts is during the loading and moving stability system consists of 3 point of contacts ,2 front wheel drives and supporting the real wheel contact axle arranged on safely mounted.

- Counterweight - is a mass attached to the rear of the forklift truck frame. The purpose of the counterweight is to counterbalance the load being lifted. In an electric forklift the large lead-acid battery itself may serve as part of the counterweight
- Power Source: Electric forklifts are powered by either a battery or fuel cells that provide power to the electric motors. The electric motors used on a forklift may be either DC or AC types.
- Slider - is the vertical assembly that does the work of raising and lowering the load. It is made up of interlocking rails that also provide lateral stability. The interlocking rails may either have rollers or bushings as guides. It may be mounted to the front axle or the frame of the forklift.
- Switch: - 2 way switch this switch is used in our project for selecting direction of fork lift.

## **7. ADVANTAGES AND APPLICATION**

### **7.1 Advantages:**

- Electric forklift is that they have zero emission which causes safe that is why they can be called as green fork lift.
- The operation cost is low.
- The life of electric forklift is greater than other type.
- Maintain better control of material management.
- Reduce product damages.
- Reduce manpower.

### **7.2 Application:**

- Block Stacking
- Loading & Unloading
- Loading dock
- Rack storage truck loading
- Cargo loading at airports.

## **8. FUTURE SCOPE**

In the future, the system could be able to operate multiple forklifts at any given time by adding to the software algorithms. Laser navigation could be incorporated to eliminate the need of lines on the warehouse floor. To implement these enhancements, a microprocessor with

capabilities greater than the PIC18F452 would be needed for higher order applications. The Automatic Forklift System (AFS) is designed to make the process of stocking efficient while

Decreasing unnecessary work related spending one-sixth scale model forklift is being used to demonstrate the feasibility of the project. An operator will control the system at a safe distance away from

The forklift, such as in a separate control room, decreasing the risk of work related injuries with a handheld user interface. [5]

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