

FORKLIFT

PROJECT REPORT
ON
“ REMOTE CONTROL FORKLIFT ”





SIGMA INSTITUTE OF TECHNOLOGY AND ENGINEERING
(POLYTECHNIC)

Bakrol, Ajwa Nimeta Road, Vadodara.

TEAM WORK REPORT

SUBJECT : PROJECT-II

SUBJECT CODE :3361910

DISCIPLINE :MECHANICAL ENGINEERING

ENROLLMENT NO :126480319015

NAME OF STUDENT :SINGH ANUP .U

DIVISON / BRANCH :M-6/MECHANICAL

SUBMISSION

SUBMITTED:- VI SEM

DATE:-

CERTIFICATE

THIS IS TO CERTIFY THAT
SHRI / KUM.....SINGH ANUP .U.....
HAS SATISFACTORILY COMPLETED HIS
TERMWORK IN THE SUBJECT
PROJECT – II (3361910)
WITHIN THE PRESCRIBED TIME LIMIT AND PRESCRIBED
BOUNDARY.

DATE :

STUDENT

DATE :

INSTITUTE GUIDE

DATE:

HEAD OF DEPT.

DATE:

PRINCIPAL

ACKNOWLEDGEMENT

We feel in great in presenting the report of our project “**FORKLIFT**” which finds application in much modern equipment and system, this project is done in partial fulfillment of D.M.E (Diploma in mechanical engineering).

We wish to express our sincere gratitude and thanks to our guide guide **Mr. ROSHAN THAKKAR** (Lecturer, Mechanical Engineering Department, (Sigma polytechnic) for his endless support and inputs which led to us successful journey. It was a great experience working under him, helping us to gain some fantastic knowledge. Despite of his busy schedule, he Continuously guided and helped us, which we will never forget in our life.

Last but not the least, our work towards the completion of the Diploma wouldn't have been possible without our unsung supporters. They are the members of our family without them and their support there is no way we would be standing here today and also our friends who always ready to help.

ABSTRACT

The mechanical field is improving day by day. Lots of innovative ideas are entering into the field. This project report is indeed to endow with a comprehensive study of the technical and theoretical aspects of "FORKLIFT" all the topics covered in this report are essential for the complete understanding and survey of the title "FORKLIFT".

In the project we have studied and modified the product called Forklift machine.

The reports engrosses different chapter and each is design in the organized style.

Covering basic introduction, specification, application, and its uses in various industries.

WHY FORKLIFT ?

- The forklifts are generally used for moving heavy goods and supplies from one place to another quickly and with less effort.
- The forklifts are small but compact machines, designed to work in tight and narrow areas.
- The best thing is that you can choose a forklift with the right configuration and capacity depending on your needs.
- One advantage of the forklifts is that they are capable to reach things located on high locations.
- Without these machines, the warehouses would not be able to operate efficiently and with easiness.
- They perform Eco-friendly operation and has Longer life.

IMPORTANCE OF PROJECT

- The process of project work depends on intelligence, skills, creativity, and energy of group of student.
- Project work has been required studies of number of subject project work will provide an opportunity for coordination and integration of theory and practices a wide of cognitive skill and necessary in a technician.
- The purpose of providing project work is to expose to problems and to introduce you to the procedures used to reach e efficient acceptable solution.
- By doing this you gain confidence in taking decision and taking problems project work will integrate and train the skill required by you in study.

CHARACTERISTICS OF PROJECT

- The following are the main characteristics of the project:-

- **OBJECTIVE :-**

A project has fixed set of objective have been achieved, the project cease to exit.

- **LIFE SPAN :-**

A project cannot continue endlessly. It has to come to an end what represents the end would normally be spelt out in the set of objective.

- **SINGLE ENTITY :-**

A project is one entity and is normally entrusted to one responsibility centre while the participants in the project are many.

- **TEAM WORK :-**

A project call for a team work the team is constituted of members belonging to different disciplines and organization.

- **LIFE CYCLE :-**

A project has life cycle, reflected by growth maturing and decay. It definitely has a learning component.

- **UNIQUENEES:-**

No two projects are exactly similar, even if they are duplicated. The location, the infrastructure, the organics and the people make the project unique.

- **CHANGE :-**

A project sees many changes may not have any major impact. The can be some changes which with change the entire character or course of the project.

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- **SUCCESSIVE PRINCIPLE :-**

What is going to happen during the life cycle of project is not fully known at any stage. The detail gets finalized successively with the passage of time.

- **MADE TO ORDER :-**

A project is always made to the order of its customer. The customer states various requirements and puts constraints within which the project must be executed.

- **UNITY OF DIVERSITY :-**

A project is a complex set of thousands of verities. The verities are in terms of technology, equipments and materials, machinery and people, work culture and ethics. But they remain inter related and unless this is so, it is not possible to complete the project successfully.

OBJECTIVES OF PROJECT

- The following are the main objective of project.
- Project work enables a student to work as a group. This is a very mush important in engineering fields.
- A student can developed his mind towards engineering field and they come to know various manufacturing techniques and processes.
- A student can develop good knowledge about various machines and equipments used for manufacturing of various parts.
- Each can develop his ability to plan a work and take appropriate decision.

AIMS OF PROJECT WORK

- The course listed above can be achieved by designing suitable learning exercises in class room, laboratory, following aims could be achieved.
- To develop planning and decision making skills.
- To provide student with an opportunity to develop and demonstrative confident and ability to tackle problem and sprit of achievement.
- To provide with experience and practices to teaching problems, that they are likely to meet in industry.
- To integrate and reinforce skills required the students in separate subject.

PROJECT PLANNING

STEPS OF PROJECT PLANNING

- * Selection of project
- * Market survey
- * Production capacity
- * Investment decision
- * Design and drawing
- * Selection of material
- * Selection machines, tools and equipments required.
- * Resource labor, transportations, loss of manufacturing.
- * Including material required process
- * Inventory planning
- * Process planning
- * Preparation of F.P.C & O.P.C
- * Coasting
- * Testing of project
- * Market response of project.

INTRODUCTION

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.

Forklifts are either powered by gasoline, propane, or electricity. Electric forklifts rely on batteries to operate. Gasoline or propane forklifts are sometimes stronger or faster than electric forklifts, but they are more difficult to maintain, and fuel can be costly. Electric forklifts are great for warehouse use because they do not give off noxious fumes like gas powered machines do.

Forklifts are most often used in warehouses, but some are meant to be used outdoors. The vast majority of rough terrain forklifts operate on gasoline, but some use diesel or natural gas. Rough terrain forklifts have the highest lifting capacity of all forklifts and heavy duty tires (like those found on trucks), making it possible to drive them on uneven surfaces outdoors.

It is important for forklift operators to follow all safety precautions when using a forklift. Drivers should be careful not to exceed the forklift's weight capacity. Forklift operators also need to be able to handle forklift's rear wheel steering. Driving a forklift is similar to driving a car in reverse, meaning that the driver must constantly steer to keep it moving in a straight line. The driver must be aware of the forklift's ever-changing center of gravity and avoid making any quick sharp turns or going too fast. It is advisable that anyone who operates a forklift be fully trained and licensed.

Forklifts have revolutionized warehouse work. They made it possible for one person to move thousands of pounds at once. Well-maintained and safely operated forklifts make lifting and transporting cargo infinitely easier. This is the general description of a normal forklift truck. To enhance the technology further, this prototype module is constructed with remote technology, there

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by the operator can walk along with the forklift for better visibility & the container can be placed accurately (precision position). This increases the safety of the operator.

The mechanical structure of this prototype module is constructed with square metal pipes, this structure looks like a rectangular box & the vertical moving mechanism that contains metal forks is assembled over the structure at front side. Since it operates through a remote, it doesn't contain any steering mechanism. The entire vehicle is designed to drive through four wheels, & four motors are used to drive all the four wheels directly. Two left side motors of front and rear are connected parallel, similarly the other two motors used to drive right side front and rear wheels are also connected parallel. All these four motors are driven through a single 'H' bridge DC motor drive package. All the four wheels are directly coupled to the motor shafts independently. The DC Motors are having reduction gear mechanism internally, there by speed is reduced and torque is increased.

To make the project work more realistic, much importance is given for practical orientation, therefore a prototype module is constructed for the demonstration purpose. This module simulates the real working system & based on this technology with slight changes in the structure & motor ratings, the system can be converted for real applications. The method of converting rotary to linear motion is implemented in the mechanism. The forklift is designed to move in all directions including reverse direction also.

FORK- LIFT TRUCKS

The basic module of forklift truck was built around hundred years ago, at that it was used for simple applications, but today it is found in everywhere at industries, godowns, dock yards, railway yards, warehouses, etc. wide variety of modules are in use for different applications. In fact today there is no such depot that functions without this fork lift truck. Most of the fork lifts world wide, more than 99%, they required human operators, they are suppose to sit in the driving cabin arranged over the fork lift to drive it. Some tomes accidents may take place because of poor visibility (poor visibility conditions may raise when the fork lift raises a huge container). Often poor visibility problems are

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more for the operator, because most of the forklifts are having lifting mechanism at its front side. This leads to human errors. To avoid these problems, here in this project work, remote operated forklift is designed for the demo purpose.

Today the technology of the forklifts expanded broadly & they are used for many applications. In this regard we decided to construct one small prototype module of forklift mechanism as our project work. To create some thing new technology in the field of forklifts & to make it as innovative, this forklift is designed to operate through remote. For this purpose RF remote control technology is implemented. This technology offers many benefits; mainly the operator is protected from all of sudden impacts. These days wireless remote control systems are widely used for many applications ranging from a small toy to heavy machines. Using wireless system for the forklift can increase the operational efficiency of the system and it is ensured 'accident free' operation.

In general in the conventional system, during loading or unloading at depots, the operator is required to be stationed inside the driver's cabin to operate the forklift movements until completion of the task. A second person is required to be on the floor to hold the container that is to be lifted. Since the cabin, which houses all the controls and switches including steering wheel for manually driving the forklift is typically 6 feet above the floor; the person stationed on the ground has to give directions to the operator when moving the load. In such condition the visibility of the operator from the operator's cabin is restricted, because the load is existed in front of him. Most of the time, the operator is completely dependant on the signals from his co-workers. This creates a poor safety condition; accidents can take place as a result of incorrect signaling or interpretation due to human error. The poor visibility reduces the speed of operation and thus lowers productivity. To avoid all these problems, the remote control method is the best, by which the operator him self can judge perfectly, he him self can walk along with the forklift & additional person is not required to pass directions or hold the container.

As this development work falls under the subject of Mechatronics, various fields of technologies must be included to full-fill the target. The purpose of mechatronics is to provide knowledge regarding the Mechanical, Electrical, Electronics, Embedded Software, and Digital components required for the system. To make the project work more realistic, much importance is given for practical orientation,

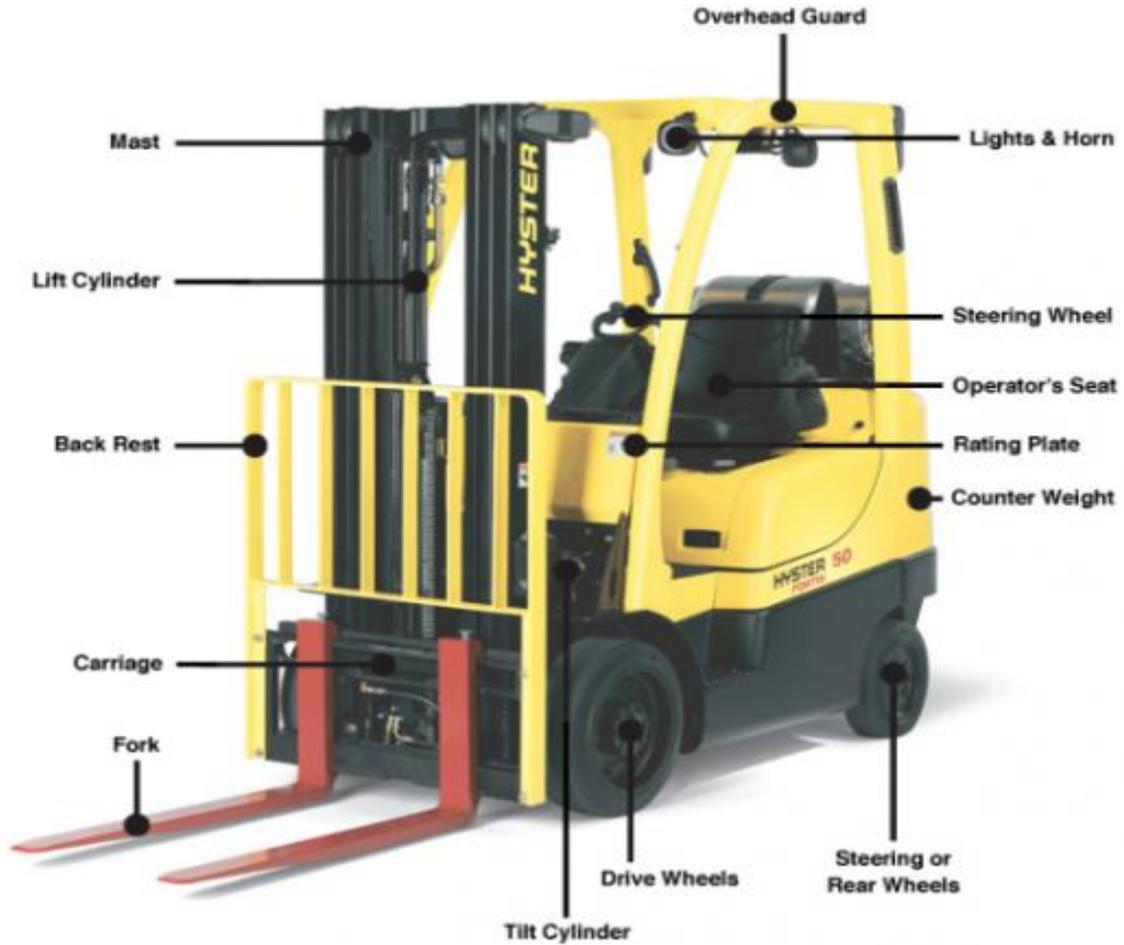
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therefore a prototype module is constructed for the demonstration purpose. This mini module simulates the real working system & based on this technology huge machine can be constructed for real applications. The machine is constructed with electronics, electrical & mechanical components. The mechanical structure is constructed with a variety of devices as they relate to robots. The method of converting rotary to linear motion is implemented in the mechanism, for this reason three DC motors with reduction gear mechanism are used to create motion in the mechanism in three dimensions.

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Forklift Terminology

INTRODUCTION TO BASIC FORKLIFT FEATURES



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- **Mast:** The mast is the vertical support that permits raising and lowering the load.
- **Carriage:** A support structure where the forks are attached or mounted.
- **Back Rest:** Attached to the carriage and prevents the load shifting backwards, it protects the mast cylinders hoses as well as preventing any goods falling through the mast and hitting the operator.
- **Fork (Tynes):** The cantilevered arms attached to the load carriage, that engage the load.
- **Lift Cylinder:** Controls the amount by which the mast structure, forks and carriage may be raised or lowered in the vertical.
- **Overhead Guard:** A framework/roof, providing overhead protection for the operator from falling objects.
- **Tilt Cylinder:** Controls the amount by which the mast structure, forks and carriage may be tilted beyond the vertical position, forward or backward.
- **Rating Plate:** This is used to inform users of the maximum load a forklift can legally carry.
- **Counter Weight:** The weight installed by the manufacturer to give stability to the machine under load.

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FORKLIFT CLASSIFICATIONS

There are seven classes of forklift that describe the fuel option of the forklift and the use. Each forklift operator must be certified to use on each class of forklift that they will operate.

* **Class 1 Electric Motor Rider Trucks:-**

These forklifts can be equipped with either cushion or pneumatic tires. The cushion tired lift trucks are intended for indoor use on smooth floors. The pneumatic tired models can be used in dry outdoor applications. These vehicles are very versatile and are found from the loading dock to the storage facility. They are generally used in applications where air quality factors need to be considered, i.e. non polluted areas.

* **Class 2 – Electric Motor Narrow Aisle Trucks:-**

This forklift is for companies that opt for very narrow aisle (passageway) operation. This allows them to maximize the use of storage space. These vehicles have been developed unique features that are designed to minimize the space occupied by the truck and to improve speed and efficiency.

* **Class – 3 Electrical Motor Hand or Hand Rider Trucks:-**

These are hand controlled where the operator is in from of the truck and controls the lift truck through a steering tiller. All controls are mounted on the top of the tiller and the tiller is moved side to side to steer the truck. These vehicles are battery powered with the smaller capacity units using industrial batteries.

* **Class – 4 – Internal Combustion Engine Trucks – Cushion Tires:-** These forklifts are used inside on smooth dry floors for transporting palletized loads to and from loading dock and the storage area. The cushion tired forklifts are lower to the ground than pneumatic tired forklift truck. This allows cushion tired forklift trucks more useful in low clearance applications.

*

* **Class 5 – International Combustion Engine Trucks – Pneumatic Tires:-**

These trucks are most commonly seen in warehouse. They can be used either inside or outside and used in virtually any type of application. Because of the large capacity range of this series of lift truck, they can be found handling small single pallet loads to loaded 40 foot containers. These lift trucks can

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be powered by internal combustion engines and are available for use with LPG, Gasoline, and Diesel and Compressed Natural Gas fuel systems.

*** Class 6 – Electric and Internal Combustion Engine Tractors:-**

These are multipurpose vehicles & are versatile. They can be used in a variety of applications. They can be equipped with either internal combustion engines for outdoor use or battery powered electric motors for indoor use.

*** Class 7 – Rough Terrain Forklift Trucks:-**

Rough terrain forklifts are fitted with large flotation type tires for outdoor use on difficult surfaces. They are often used at construction sites to transport and lift building materials to various job site locations. They are also common with lumber yards and auto recyclers.

WORK ACTIVITIES

Forklift trucks are vehicles designed to move and stack heavy or bulky goods. They are mainly used in warehouses, stockyards and other storage areas. Forklift trucks are highly mobile with a very small turning circle which allows them to move easily in confined spaces. On the front of the truck are two forks operated by hydraulics. The driver must fit these forks into the pallets on which goods are stored. The operator then uses the hydraulic forks to lift the pallet, takes it to where it is needed and sets it down.

Some goods, such as bricks, can be moved by fork-lift trucks without the need for pallets. They are stacked in bales with spaces for the forks. The operator must work carefully as these goods are not protected by pallets. Some trucks are fitted with small computer display panels that direct the operator where to place goods in the warehouse.

Operators may also have to keep records and follow instructions written on a worksheet. They are also responsible for the basic maintenance of the truck. This includes greasing or oiling parts and

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changing or recharging the battery. Forklift truck operators may have to work in a noisy and dusty environment. Working outdoors in all weather conditions may also be necessary.

Industrial lift trucks are used for handling materials, parts, products, tools, equipment, supplies and maintenance items. Forklifts are efficient for material handling because they are self-propelled, maneuverable and require only one operator to lift, transport, and stack or un-stack the material. Forklifts may be used for indoor or outdoor use depending on their size, tires and load capacities. The major factors that lead to injuries involving the use of forklifts include unsafe driving and material handling practices.

Although the term 'forklift', 'fork lift', or 'fork truck' is instantly recognizable, their full, official title is a Fork Lift Truck, due to the fork shaped tool at the front that traditionally was used to lift pallets. But now, like any other piece of equipment, the forklift has evolved and is available in a wide variety of styles, with varying functions and capacities, depending on where and how they are to be used.

All lift truck operators must be trained prior to operating a lift truck. Training is provided by the concern manufacturer and consists of both formal instruction and practical training. Training is both vehicle- and workplace-specific. The training is a one-time requirement unless the operator is involved in a lift truck accident or is observed operating the truck in an unsafe manner.

Industrial lift trucks must be inspected prior to each day of service. A daily inspection checklist must be completed and any defects should be reported and corrected immediately. A truck may not be placed into service if any defects are found during the inspection.

CAPACITY

Usually forklifts start at around 600 kg load lifting capacity and go up to 52,000 kg, which is a staggering 52 tons. Most forklifts are rated for less than 3 tons. However, weight is not as straightforward as it may seem. The size of the load will also impact the capacity. Weight capacity is

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usually based on a 600 mm (24 inch) load centre, although this can vary. This means that the distance from the centre of the load the edges can be no more than 600 mm. If the load is bigger and/or longer, the truck will not be able to lift as much weight.

HEIGHT

The height that fork lift trucks can lift to varies enormously. Some can lift up to 11 meters or more (some 36 feet) whereas the basic ones will lift less than 3 meters (10 feet). Generally, height requirements are fairly static; depending up on the requirement, lifting height can be adjusted by the manufacturer.

FORK LIFT SAFETY AWARENESS

In every wholesaler-distributor operation, stacks, bundles and rolls of raw material and finished products of various shapes, sizes and weights must be moved. Excessive and inefficient material handling affects the productivity and profits. And manual material handling may be dangerous. Efficient material handling systems and safe operation of material handling equipment such as powered industrial trucks are the solution.

A powered industrial truck is defined as a mobile, power-driven vehicle used to carry, push, pull, lift, stack or tier material. Forklifts are one type of powered industrial truck used by many wholesaler-distributors. Other powered industrial trucks are known as pallet trucks, rider trucks, fork trucks, or lift trucks. There are many types and sizes of powered industrial trucks designed for different jobs. Many are named by the function they perform, such as high lift trucks, counterbalanced trucks, rider trucks and forklift trucks. Powered industrial trucks refer to as “forklifts” are used throughout the wholesale distribution industry to move raw materials and stock and to elevate personnel.

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DETAILS

1)STRUCTURE

2) Motor

3) Wheel

4) Stud

5) Remote

6) OTHER COMPONETS

1. Structure:-

Material: - m.s.steel

Size:-1' x 1' x 1'

Qty: - 1nos.

2. Motor:-

Material: - standard

Size: - 100rpm, 35rpm

Qty: - 1nos.,4nos.

3. wheel:-

Material: - standard

Size: - 2.5"

Qty: - 4nos.

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4. Stud:-

Material: - standard

Size:-8", 4"

Qty: - 1, 1

5. Remote:-

Material: - standard

Size: - 3 axis

Qty: - 1

OTHER COMPONENTS:-

LOTS OF OTHER COMPONENTS LIKE BOLT, NUT, BATTERS , ETC.

ADVANTAGES OF FORKLIFT

Suitable for indoor use.

Longer life.

Minimum noise level.

Eco-friendly operation

It can be used in hazardous areas.

Huge advantage of forklift is that they have no fuel cost.

The best electric forklift is that they have zero emission which causes safe and Healthy environment, That is why they can be called the Green Forklift.

The operation cost is low.

The life of electric forklift is greater than other types.

Maintain better control of material management

Reduce product damages

Reduce manpower

Increase productivity

Suitable to transfer frames

DISADVANTAGES OF FORKLIFT

The speed is low.

The capability of lifting weight is lower than other forklifts.

You can't handle it until you are fully trained.

They are usable only indoor.

The main disadvantage is the area should be properly dry and should have controlled

FORKLIFT**COST OF MATERIAL**

Our Project Construction for rewarded material as cost above local market Fabrication and job work charge extra.

Sr No.	Particular	Cost
1.	Structure	2000
2.	Motor	1500
3.	Wheel	700
4.	Stud	1000
5.	Fabrication Angle	750
6.	Color	450
8.	Nut bolt	50
9.	Transportation	500
	TOTAL	Rs. 6950

REQUIRED EQUIPMENTS

REQUIRED MACHINE TOOL	REQUIRED TOOLS	REQUIRED MEASURING INSTRUMENTS
1. Welding machine	1.Spanner set	1.Measuring tape
2. Cutting machine (hacksaw m/c)	2.Hammer 3.Rough and smooth file	2.Right angle 3.Vernier calliper
3. Hand grinding machine	4.Fasteners 5.Welding electrodes	4.Micro-meter screw gauge
4. Lathe machine		
5.Drilling machine		

CONCLUSION

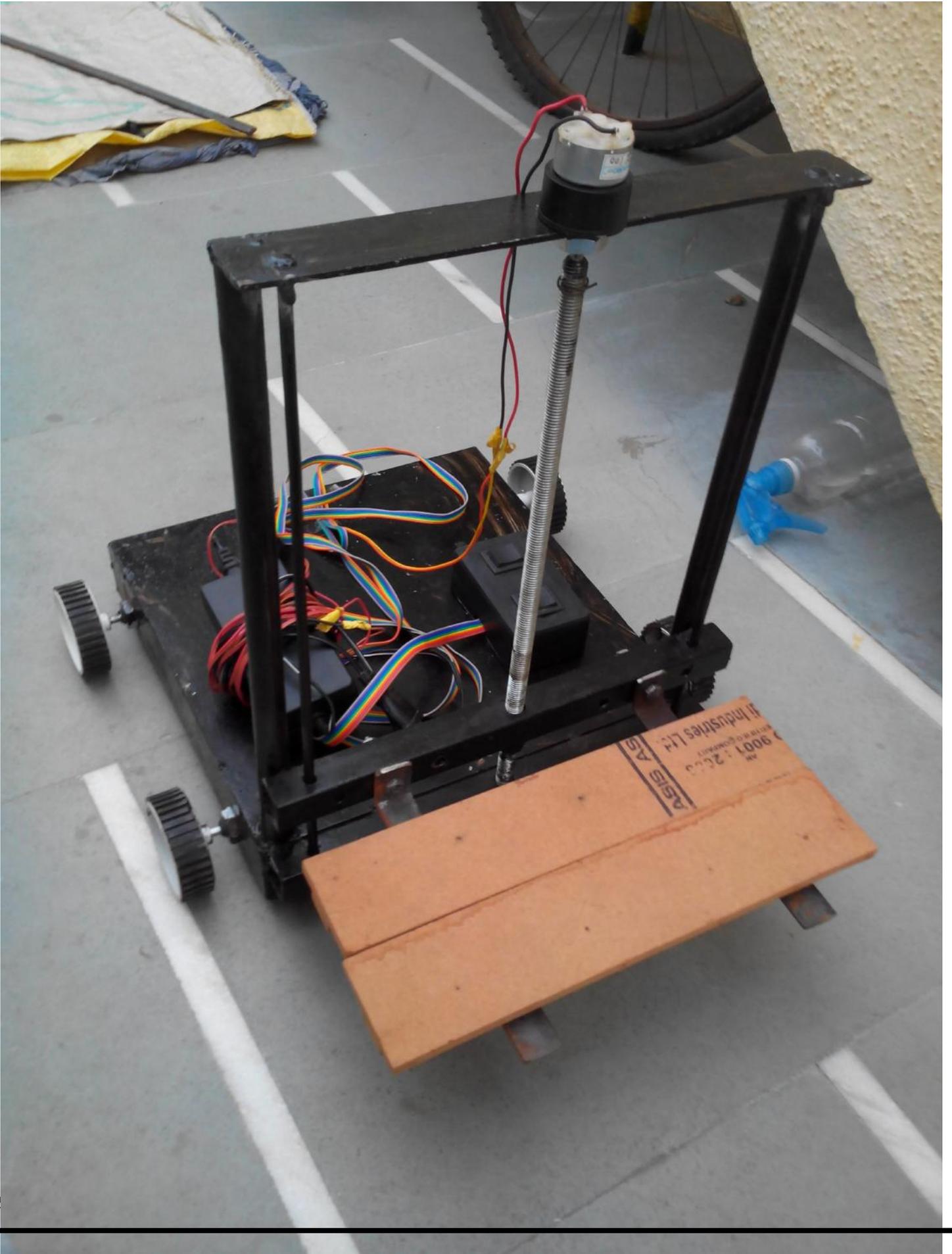
After completing the major project on "Fork lift" we are much happy and would like to thank our professor, guides and the lectures of the concerned department who have guided us.

While making this project we have been able to learn a lot and understand the various aspects of "fork lift" we can use our knowledge, which we get during our study.

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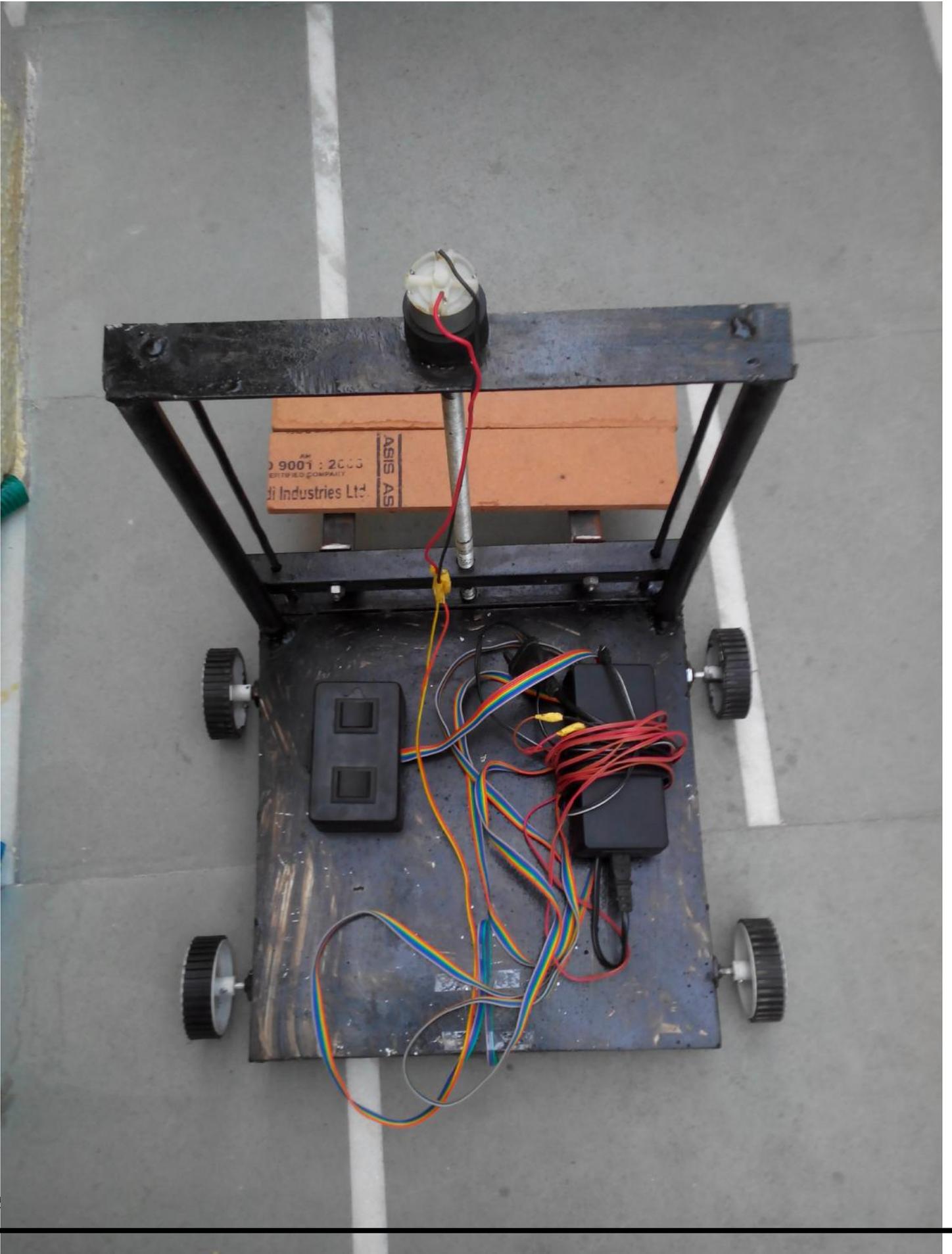
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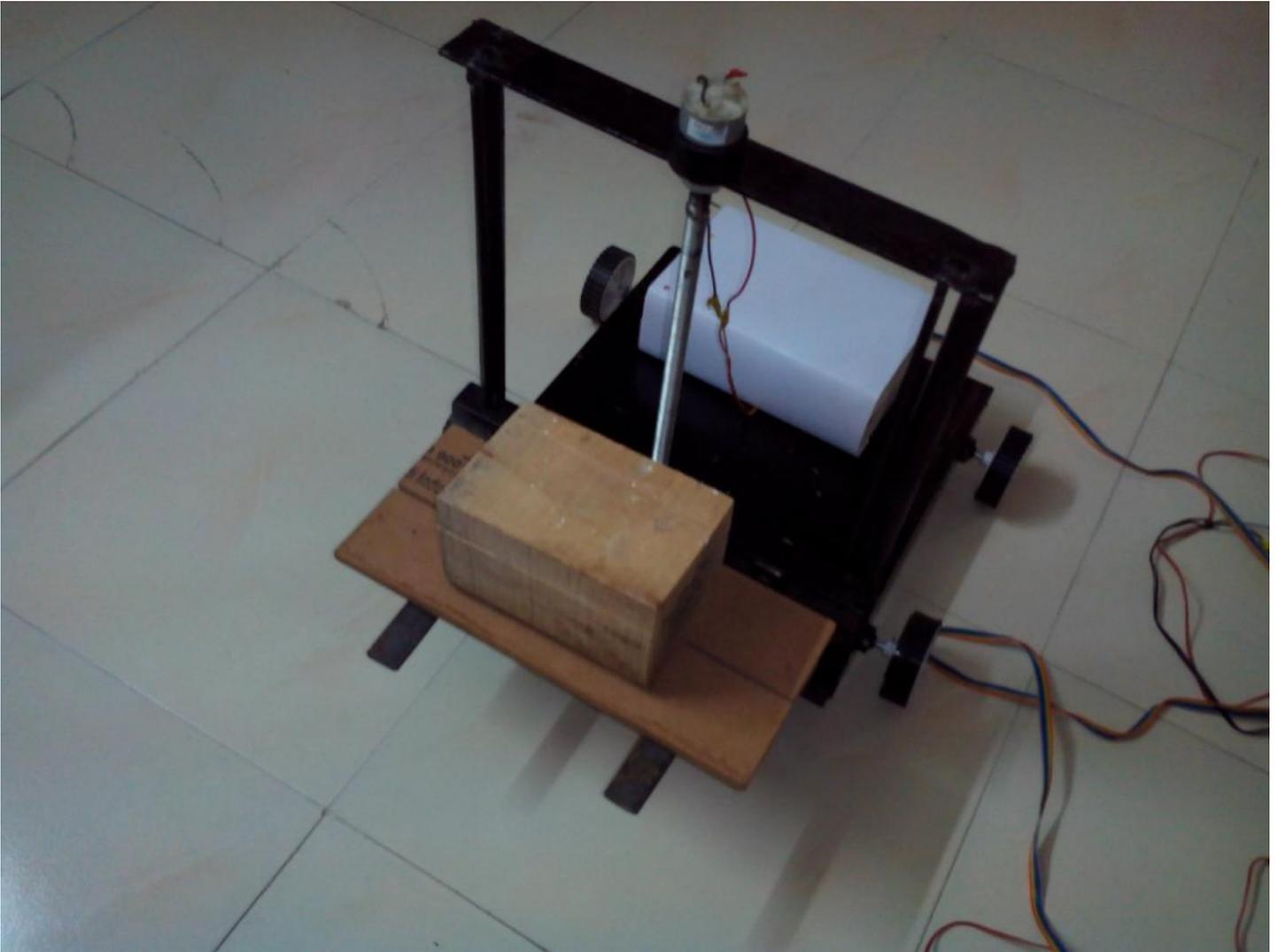
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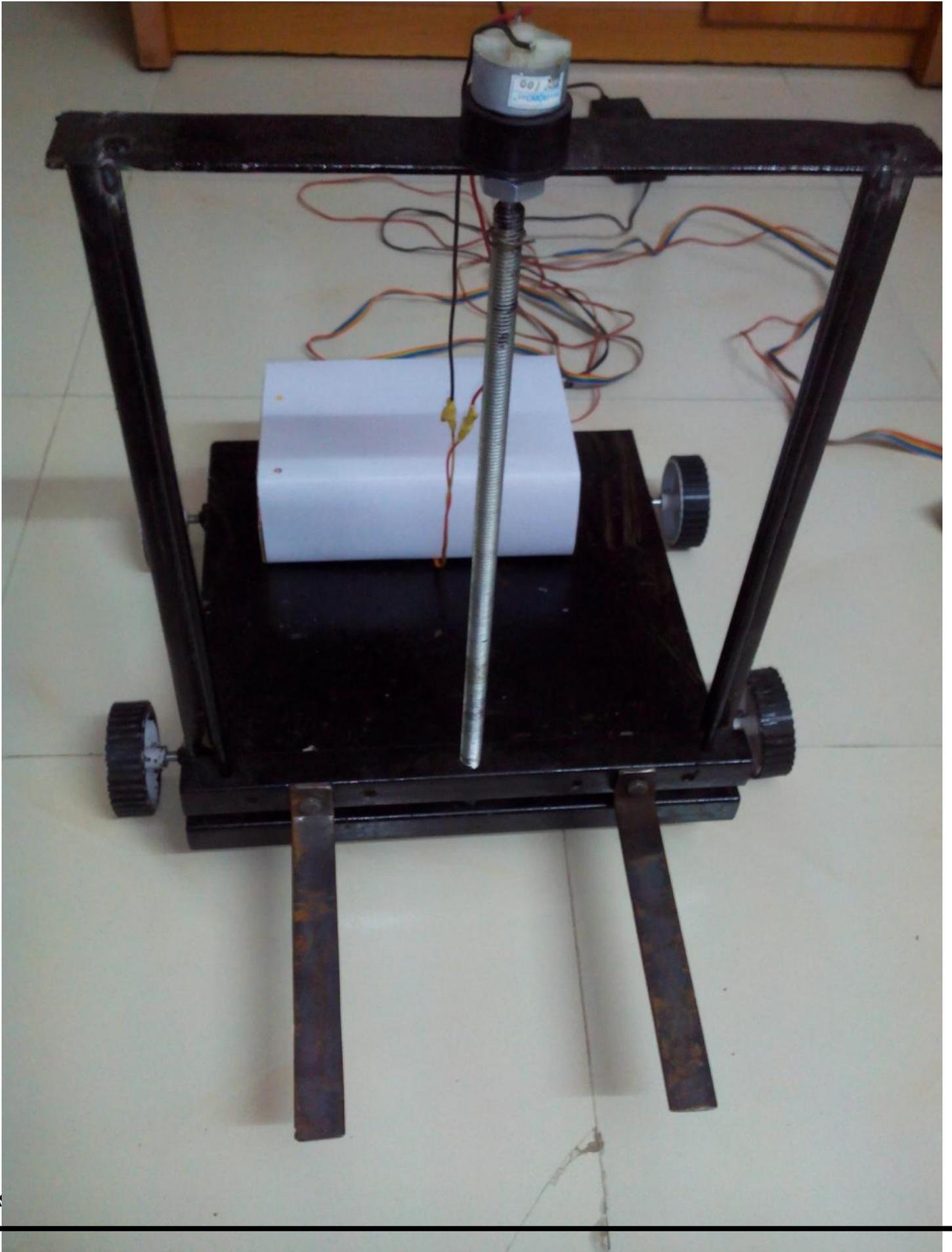
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