

ARMY MISSILE LAUNCHER

INTRODUCTION:

Having been a mainstay of modern militaries for so long, will the tank continue to play a role on tomorrow's battlefields? And if it does, how will tanks and armored fighting vehicles (AFVs) need to change to meet the challenges of future warfare?

Looking out beyond Challenger 2 all the 'future' studies indicate that there will be an enduring need for mobile and survivable fighting vehicles," says William Suttie from the UK's Dstl. "Whatever we do, the chances are other nations will continue to field heavy main battle tanks, hence we will continue to need something that can do what current MBTs can do, even if it looks different from current vehicles.



Fig.1.1 Arcane fighting vehicles [1]



Fig.1.2 leopard 2A6 main battle tanks [2]

1. INFORMATION SOURCES TO BE SEARCHED:

- i. Automated missile launcher (YouTube)
- ii. Wikipedia for mechanisms of different machines

2. EXISTING SOLUTIONS:

i. REAL TANKS:

Caterpillar tracks work on the same principle as a conveyer belt. The tank engine rotates one or more steel sprockets, which move a track made up of hundreds of metal links. Tracked vehicles can move easily over rough terrain because the track makes contact with a wide area of the ground. A car grips the ground with only the bottom portion of four tires, but a tank grips it with dozens of feet of track. A spur gear in the hull (called the traverse gear) engages an internal gear lining the inside of the turret. Turning the traverse gear rotates the turret on the hull, allowing the tank crew to aim the main gun without turning the entire tank. The crew can also pivot the main gun up and down.



Fig.2.1 Arjun MBT [3]

ii. PROTOTYPES:

1) <https://www.youtube.com/watch?v=JQrP7MDZdio&t=96s>

2) https://www.youtube.com/watch?v=7bkcNDK_yNU&list=LL_ulqNUFVbcHsH-Ub_DZppw&pbjreload=10

3) <https://www.youtube.com/watch?v=eqMEbxcnRuw>

4) <https://www.youtube.com/watch?v=kMD8BT2-jFY>

5) <https://www.youtube.com/watch?v=UztyZoW2ADk>

3. DIY PROJECTS WHICH WE HAVE GONE THROUGH:

i. Vacuum cleaner

<https://www.youtube.com/watch?v=jkQsBD5WtDo>



Fig 3.1 vacuum cleaner [7]

ii. Charging and discharging of capacitor

https://www.youtube.com/watch?v=R_rwCiEAwwg

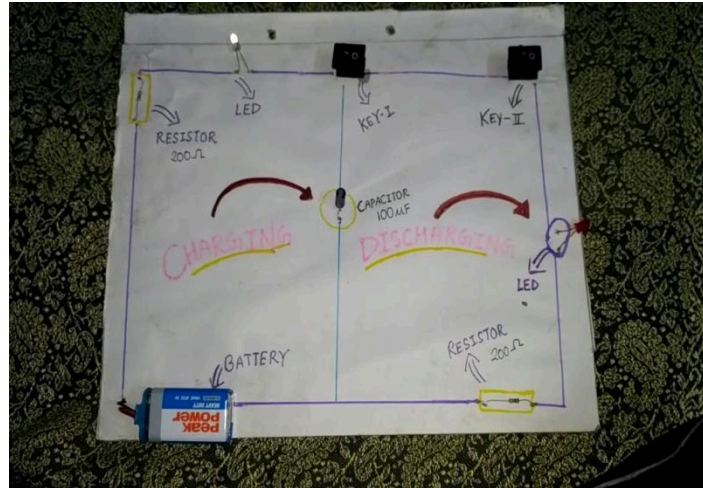


Fig.3.2 charging and discharging of capacitor [8]

4. COMPONENTS:

Sl. No.	Components or Parts used		Mechanism/working Identified	Principle
	Electronics	Mechanical		

1	Arduino		Required for programming and controlling.
2	Adapter		Used to supply required amount of electricity.
3		Motor Driver	Used for mechanical rotations
4		Joystick	Used to control our tank automatically.
5		Tank Chassis	Used to support the base of the tank.
6	Breadboard		Used to connect all the electronic components.
7	Jumper/Wires		Wires to connect various components.
8	Battery Plug		Plug is used to get the electricity
9	Battery 9V		Used as a source of electricity.
10	Switches		Used to connect and disconnect the circuits
11		capillary track	Used for the movement of vehicle by chain mech.

5. DIRECT SOLUTIONS AVAILABLE FOR THE NEED STATEMENT:

i. <https://www.youtube.com/watch?v=JQrP7MDZdIo&t=96s>

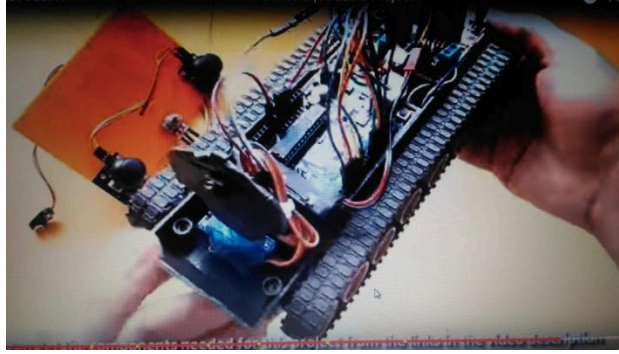


Fig.5.1 Remote control tank [9]

In this tutorial they have shown how to build a remote controlled car / tank. They have added a Wi-Fi camera to make the Tank more equipped. They have used the nRF24L+ module for remote control. With this tutorial, you can learn motor control with the joystick, remote motor control and motor control with the nRF24L01. Arduino software is used to control the model automatically. Capillary track is used which is made up of rubber to increase the friction and stability of the tank.

ii. https://www.youtube.com/watch?v=7bkcNDK_yNU&list=LL_ulqNUFVbcHsH-Ub_DZppw&pbjreload=10



Fig.5.2 Missile launching truck [10]

In this video they have taught how to make Missile Launcher Truck From Cardboard - DIY Truck. It launches missiles by rotating the launcher by 360 degrees. Here we use cardboard to create our model. Ice-cream stick has been used as a base for missile gun. Motor has been attached to the launching gun so that our missile gun can rotate to 360-degrees.

iii. <https://www.youtube.com/watch?v=eqMEbxcnRuw>

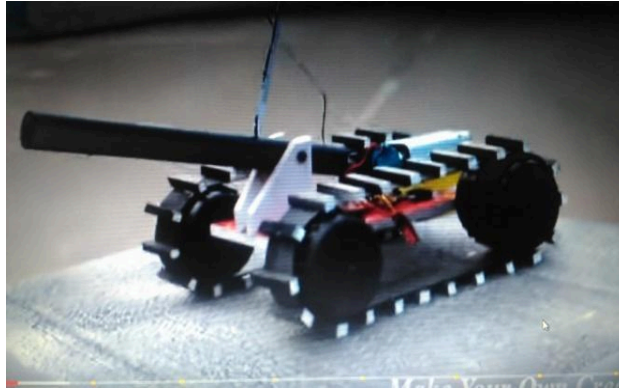


Fig.5.3 powerful cannon car [11]

In this video they have taught how to make a Cannon - Powerful shoot Cannon. They have used elastic rubber sheet to make capillary track to increase the friction between model and surface. This capillary track is supported to the wheels which is in turn connected to the motor which is powered by battery. This cannon is not rotatable up to 360-degrees. It is fixed and the tank is allowed to move only in forward and backward directions.

iv. <https://www.youtube.com/watch?v=kMD8BT2-jFY>



Fig.5.4 ping pong launcher [12]

DC Electric motor 3v 6v DIY ping pong ball launcher robot wheel car b24. In this video they have powered the launchers with rolling friction. Two motors are fixed with the wheels and they are rotated in opposite direction so that our target launches in forward direction. When we place ping pong balls in between two rotating wheels, the friction which is produced in between the ball and wheels helps in projectile motion.

[v.https://www.youtube.com/watch?v=UztyZoW2ADk](https://www.youtube.com/watch?v=UztyZoW2ADk)



Fig.5.5 ping pong launcher [13]

New ping-pong launcher, which uses two XL motors geared to speed to fire up to 5 balls. The mechanism is very simple, yet it managed to fire very quickly and quite far. The cannon is made up of plastic to give good support for launching ping pong balls. Here also two motors are fixed with the wheels and they are rotated in opposite direction so that our target launches in forward direction. When we place ping pong balls in between two rotating wheels, the friction which is produced in between the ball and wheels helps in projectile motion.

6. OBSERVATIONS:

i. Earth moving vehicles:



Fig.6.1 Backhoe loaders [14]



Fig.6.2 Excavators [15]

Earthmoving mechanisms in motor graders are critical components for earthwork, compaction and re-handling, and yet they have not received much attention by mechanical engineering research in recent times. In this paper, a comprehensive analysis, from mechanism identification and innovative design to kinematic analysis, is presented. First, the mechanism analysis and synthesis method based on multi body system dynamics is carried out through the analysis of the system topology and connectivity.

ii.Cycle chain mechanisms(sprocket):



Fig.6.3 Tread drive sprocket [16]

A sprocket or sprocket-wheel is a profiled wheel with teeth, or cogs, that mesh with a chain, track or other perforated or indented material. The name 'sprocket' applies generally to any wheel upon which radial projections engage a chain passing over it. Tread drive sprocket of the Leclerc main battle tank (2006). In the case of vehicles with caterpillar tracks the engine-driven toothed-wheel transmitting motion to the tracks is known as the drive sprocket and may be positioned at the front or back of the vehicle, or in some cases both. There may also be a third sprocket, elevated, driving the track.

iii.Robotic machines:



Fig.6.4 Pick and place robots [17]

The ASME Mechanisms and Robotics Committee operate under the auspices of the ASME Design Engineering Division. The mission of the Mechanisms and Robotics Committee is to promote advances in research and education in the theory, design and applications of mechanisms, machines, robots and mechatronic systems.

iv. Remote control:

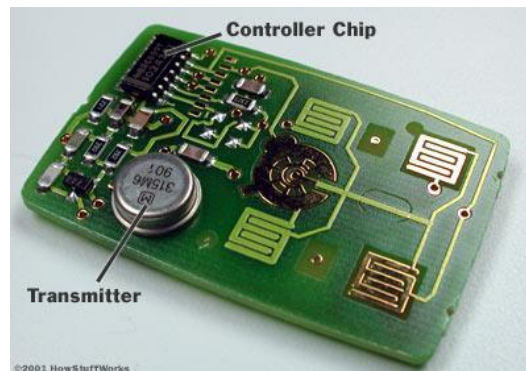


Fig.6.5 controller [18]

Remote controls in military usage employ jamming and countermeasures against jamming. Jammers are used to disable or sabotage the enemy's use of remote controls. The distances for military remote controls also tend to be much longer, up to intercontinental distance satellite linked remote controls used by the U.S. for their unmanned airplanes(drones) in Afghanistan, Iraq and Pakistan. Remote controls are used by insurgents in Iraq and Afghanistan to attack coalition and government troops with roadside improvised explosive devices, and terrorists in Iraq are reported in the media to use modified TV remote controls to detonate bombs.

v.Mechanical machines:



Fig.6.6 cog gear[19]

A gear or cogwheel is a rotating machine part having cut teeth, or cogs, which mesh with another toothed part to transmit torque. Geared devices can change the speed, torque, and direction of a power source. Gears almost always produce a change in torque, creating a mechanical advantage, through their gear ratio, and thus may be considered a simple machine. The teeth on the two meshing gears all have the same shape. Two or more meshing gears, working in a sequence, are called a gear train or a transmission. A gear can mesh with a linear toothed part, called a rack, producing translation instead of rotation.

vi. Train wheels :



Fig.6.7 Locomotive wheel [20]

On a steam locomotive, a driving wheel is a powered wheel which is driven by the locomotive's pistons (or turbine, in the case of a steam turbine locomotive). On a conventional, non-articulated locomotive, the driving wheels are all coupled together with side rods (also known as coupling rods); normally one pair is directly driven by the main rod (or connecting rod) which is connected to the end of the piston rod; power is transmitted to the others through the side rods.

7. COST OF THE PROJECT:

- i. Cost of prototype: Rs 5000
- ii. Cost of real tank: 4-8 million dollars

REFERENCE PAGE:

- 1) https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcSSh7q8y71DjVvMIPJsGVt2zUYVfr_cmaHQ8IwnDkvuLXaWW81o
- 2) <https://i.imgur.com/fioYb4a.jpg>
- 3) https://upload.wikimedia.org/wikipedia/commons/thumb/d/d2/Arjun_MBT_bump_track_test_2.JPG/800px-Arjun_MBT_bump_track_test_2.JPG
- 4) <https://www.youtube.com/watch?v=jkQsBD5WtDo>
- 5) https://www.youtube.com/watch?v=R_rwCiEAwwg
- 6) <https://www.youtube.com/watch?v=JOrP7MDZdIo&t=96s>
- 7) https://www.youtube.com/watch?v=7bkcNDK_yNU&list=LL_ulqNUFVbcHsH-Ub_DZp_pw&pbjreload=10
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- 9) <https://www.youtube.com/watch?v=kMD8BT2-jFY>
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- 11) <https://tatainternational.com/wp-content/uploads/2014/11/excavatorBig1.jpg>
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