

## Activity: Make a Foldable Parking Lot Barrier

### Objective:

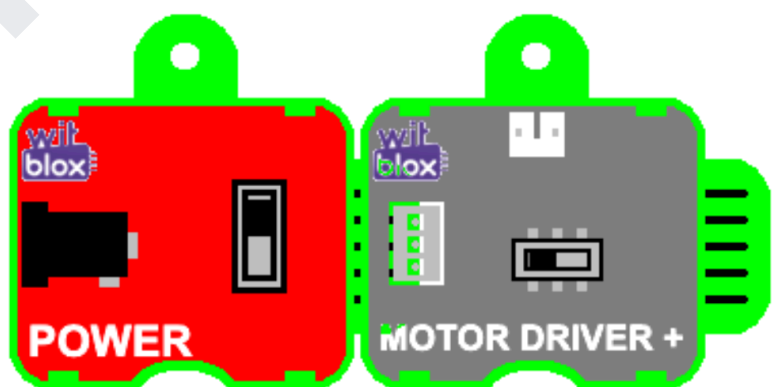
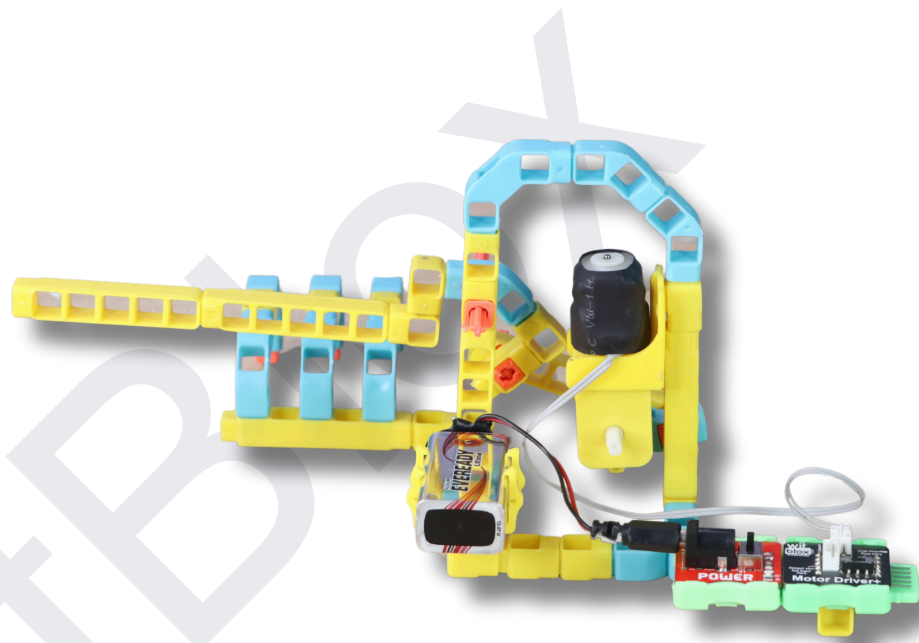
Have you ever wondered how those metal barriers at parking lots and toll booths open and close as cars drive by? They seem to magically fold up and down to control the flow of vehicles. In this activity, we are going to explore the mechanism that makes this possible.

These barriers, known as parking lot barriers or tollgate barriers, consist of a series of connected metal arms that can pivot and fold. When closed, the arms create a barrier blocking cars from passing through. But when opened, the arms swiftly fold up to allow vehicles to proceed.

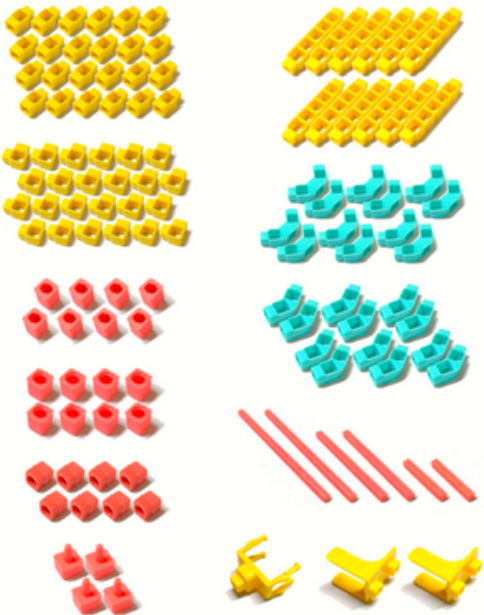
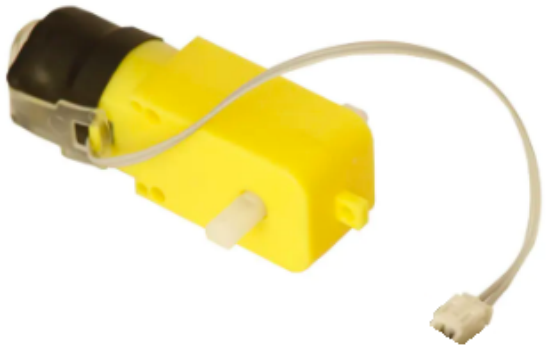
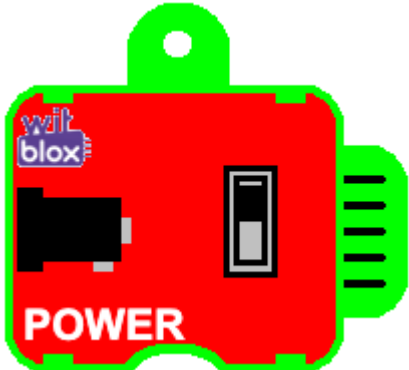
This mechanism helps control traffic and the flow of vehicles in an easy manner, with very little human intervention. To work, it uses a combination of motors, gears, and shafts to function. The gears and shafts connect between the arms and a motor rotates to push or pull the shafts, which then open or close the barrier.

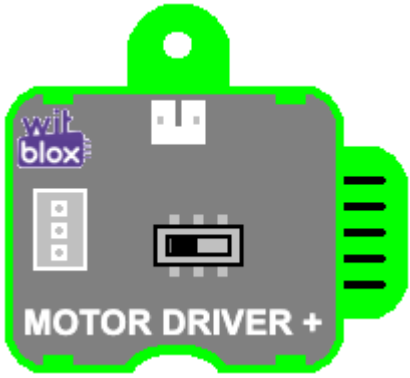
The mechanism also includes a speed barrier mechanism that can restrict the incoming vehicle's speed to an appropriate level for safe operation.

So, in today's activity, our objective is to assemble, operate and understand the working of a Foldable Parking Lot Barrier that controls its opening and closing action using a Gear-based Boom rod driven by a BO Motor.



## Materials Required:

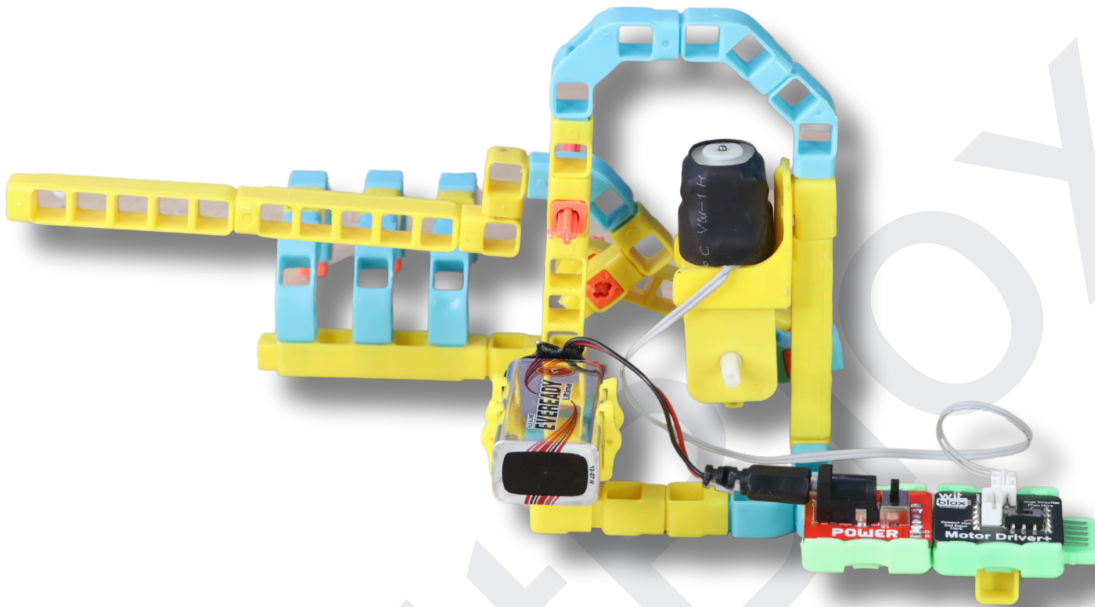
S.no.	Item	Qty	Image
1	Witbricks Parts Set	1	
2	BO Motor	1	
3	Power Blox	1	

4	Motor Driver Blox	1	 The image shows a grey rectangular motor driver module with a red plastic frame. On the left side, there is a 5-pin header. In the center, there is a micro-USB port. On the right side, there is a 3-pin header. The text 'witblox' is printed in the top left corner, and 'MOTOR DRIVER +' is printed in the bottom center. A red circular hole is located at the top center of the module.
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WitBlox

## Procedure:

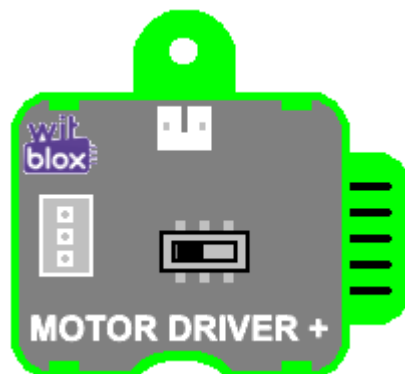
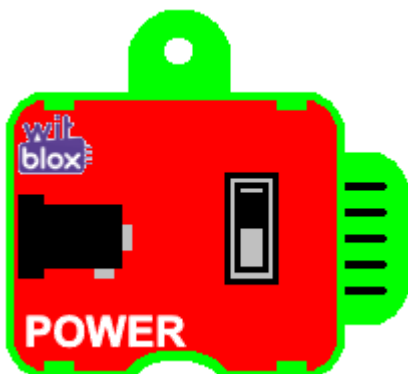
1. Refer to this video for the assembly procedure. Here is the link to it: <https://youtu.be/pRBEkrpsGkg>
2. Once the steps are complete, the structure should look like this



3. Now that the Mechanical Assembly of the structure is complete, the next step is to assemble the associated Electronics and the Logic Circuitry to operate the BO Motor mechanism.

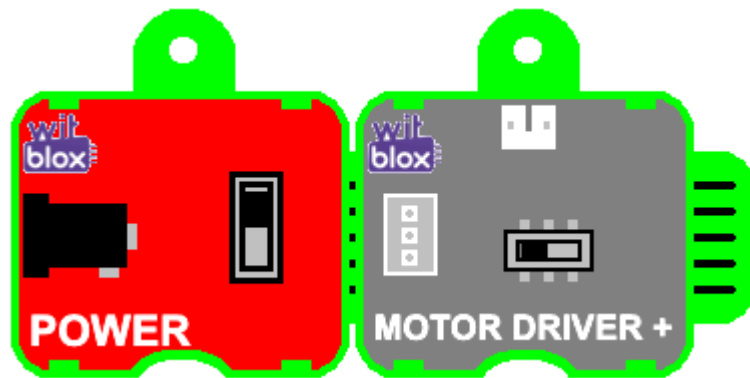
For this, we will need the following blox:

- a. Power Blox
- b. Motor Driver Blox



4. Connect the various Blox in the arrangement as shown in the image below

and connect the Motor wire to the Motor Driver Blox. Connect the Battery to the Power Blox using the Battery connection cable. Now, you are all set.



5. Lastly, flip the Power Switch on the Power Blox to ON and the mechanism should start working. The BO Motor combined with the geared link to lift up and pull down the parking lot barrier as needed.

**Working Explanation:**

A Foldable Parking Lot Barrier mechanism is a device commonly used for controlling access to restricted areas, such as parking lots, toll booths, or secure facilities. It consists of several components that work together to raise and lower a horizontal bar, or boom, to allow or block the passage of vehicles. Here's a working explanation of how a Foldable Parking Lot Barrier mechanism functions:

1. Boom: The boom is the horizontal bar that extends across the entrance or exit point. It is usually made of sturdy material like aluminum or steel and is designed to be visible and durable.

2. Boom Housing: The boom is housed in a casing that provides protection and support. The housing is typically made of metal and is mounted on pillars or posts at the entrance/exit point.

3. Motor: The Foldable Parking Lot Barrier mechanism is powered by an electric motor. The motor provides the necessary force to raise and lower the boom. It is usually housed within the barrier mechanism or positioned nearby.

4. Counterweight System: To assist the motor in raising and lowering the boom, a counterweight system is often employed. It consists of a weight attached to the opposite end of the boom. The counterweight helps balance the weight of the boom, reducing the load on the motor and ensuring smooth operation.

5. Control Unit: The control unit is the brain of the Foldable Parking Lot Barrier mechanism. It receives signals from various input devices and controls the operation of the motor. It may include components such as sensors, switches, and a programmable logic controller (PLC) for automation.

6. Sensors: Sensors play a crucial role in detecting the presence of vehicles and triggering the barrier mechanism accordingly. Typically, there are two types of sensors used:

- Vehicle Presence Sensors: These sensors detect the presence of vehicles approaching the barrier. They can be inductive loops embedded in the ground or infrared sensors that detect changes in the beam interruption.

- Safety Sensors: Safety sensors are designed to prevent accidents and damage to vehicles or the barrier mechanism. They can include photocells that detect

objects in the path of the boom or edge sensors that halt the movement of the boom if it encounters an obstacle.

7. Control Inputs: The control unit receives various inputs to determine the barrier's behavior. These inputs can come from:

- Access Control Devices: Such as keypads, proximity cards, or RFID readers that authorize entry/exit.

- Manual Controls: Physical buttons or switches that allow authorized personnel to manually raise or lower the boom.

- Remote Control: Wireless remotes or communication systems that enable operators to control the barrier from a distance.

8. Barrier Operation: When a vehicle approaches the barrier, the vehicle presence sensor detects its presence and sends a signal to the control unit. The control unit processes the signal and activates the motor to raise the boom, allowing the vehicle to pass. Once the vehicle has passed through, the control unit receives another signal, and the motor lowers the boom back into its original position, blocking further access.

9. Safety Features: Foldable Parking Lot Barrier mechanisms often include safety features to prevent accidents and protect the barrier from damage. These can include emergency stop buttons, warning lights, audible alarms, and integrated safety sensors.

10. Optional Accessories: Depending on the application, Foldable Parking Lot Barrier mechanisms can be equipped with additional features, such as LED lights for increased visibility, intercom systems for communication with drivers, or integrated cameras for surveillance purposes.

Overall, a Foldable Parking Lot Barrier mechanism is a complex system that combines mechanical components, electrical systems, and control logic to provide controlled access to restricted areas. It ensures security, safety, and efficient traffic management at entrances and exits.

## **Applications:**

Foldable Parking Lot Barriers are widely used in various applications to control access and enhance security. Here are ten common applications of Foldable Parking Lot Barriers:

1. **Parking Lots:** Boom barriers are commonly used in parking lots to regulate vehicle entry and exit, ensuring authorized access and preventing unauthorized parking.
2. **Residential Communities:** Many gated residential communities use Foldable Parking Lot Barriers to control access to the premises, ensuring only residents and authorized individuals can enter.
3. **Industrial Facilities:** Industrial complexes and manufacturing plants often employ boom barriers to restrict access to authorized personnel and vehicles, improving security and preventing unauthorized entry.
4. **Toll Booths:** Toll plazas on highways and expressways use boom barriers to control vehicle access and collect toll fees efficiently.
5. **Airports:** Foldable Parking Lot Barriers are employed at airport entrances, parking areas, and restricted zones to manage traffic flow, regulate access, and enhance security.
6. **Government Buildings:** Government offices, embassies, and other sensitive locations utilize boom barriers to control entry, prevent unauthorized access, and protect important assets.
7. **Commercial Complexes:** Shopping malls, office buildings, and commercial complexes employ Foldable Parking Lot Barriers to manage parking areas, control traffic, and ensure a secure environment for visitors and employees.
10. **Military Installations:** Military bases and installations utilize boom barriers at entry and exit points to restrict access, enhance security, and prevent unauthorized entry into sensitive areas.

These are just a few examples of the many applications of Foldable Parking Lot Barriers. They are versatile security tools that can be adapted to various settings where controlled access and enhanced security are essential.

## **Benefits:**



Foldable Parking Lot Barriers, also known as retractable gates or barriers, offer various benefits in terms of security, access control, and traffic management. Here are ten benefits of Foldable Parking Lot Barriers:

1. **Enhanced Security:** Foldable Parking Lot Barriers provide a physical barrier that restricts unauthorized access, making them an effective security measure for both residential and commercial properties.
2. **Controlled Access:** These barriers enable controlled access to designated areas, allowing only authorized individuals or vehicles to pass through, ensuring better security and preventing unauthorized entry.
3. **Traffic Management:** Foldable Parking Lot Barriers help regulate traffic flow by efficiently managing the entry and exit of vehicles, especially in areas with high volumes of traffic, such as parking lots, toll booths, and commercial facilities.
4. **Visual Deterrence:** The mere presence of a Foldable Parking Lot Barrier acts as a visual deterrent to potential intruders or unauthorized individuals, discouraging them from attempting unauthorized access.
5. **Flexibility:** Foldable Parking Lot Barriers can be customized to different sizes, allowing for flexible installation in various locations, such as driveways, parking lots, checkpoints, and residential communities.
6. **Durability:** Most Foldable Parking Lot Barriers are constructed with durable materials like steel or aluminum, making them sturdy and resistant to tampering or forceful entry attempts.
7. **Remote Control and Automation:** Many Foldable Parking Lot Barriers can be controlled remotely, either through access control systems or mobile apps, enabling easy management and operation from a centralized location.
8. **Integration with Access Control Systems:** Foldable Parking Lot Barriers can be integrated with various access control systems like keypads, proximity cards, RFID tags, or biometric devices, providing an efficient and secure means of controlling entry and exit.

9. Safety Features: These barriers often come equipped with safety features such as sensors, alarms, and photoelectric beams, which help detect obstructions and prevent accidents, ensuring the safety of pedestrians and vehicles.

10. Cost-Effective: Foldable Parking Lot Barriers offer a cost-effective solution for access control and security needs compared to more complex systems like gates or security personnel. They require minimal maintenance and can operate reliably for an extended period.

It's important to note that the specific features and benefits of Foldable Parking Lot Barriers can vary depending on the manufacturer and model chosen.

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