

TM

CREATOR'S BOOKLET

CircuitMess Batmobile™



To build your Batmobile™, go to:
circuitmess.com/build



MEET CIRCUITMESS BATMOBILE™

Batmobile™ is a DIY AI-powered smart robot car. It comes disassembled, and you get to build it yourself, just like Batman.

HOW DOES IT WORK?



Follow the online tutorials and assemble your Batmobile™.



Learn about autonomous driving and AI.



Drive around autonomously or take control with the included controller.



Hook it to a computer and code your own apps and functions.

WHAT IS CIRCUITMESS?

CircuitMess started in 2016 when Albert (our CEO) was 17 years old.

Albert loved tinkering with electronics and one of his first projects was a DIY game console.

People really liked the idea so he decided to launch it on **Kickstarter** where it raised \$100,745!

After that, CircuitMess was born. We are a small and fast-growing team of tech lovers who wish to share our love of creating new technology with the rest of the world!

Albert



BEHIND THE NAME

CircuitMess

a reference to
electronic circuits

what best describes
our workplace



All of our kits are designed, manufactured, and packed in Croatia!

OUR MISSION



Everybody knows how important technology is, but less than 1% of the population knows

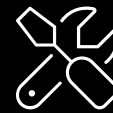
HOW TO MAKE
new technology.



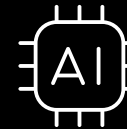
We're here to change that!
With our kits, we want to
inspire people to be

CREATORS
instead of just consumers.

YOU'LL LEARN ABOUT



Hardware
assembly



AI & autonomous
driving



Computer
vision



Machine learning



Electronics
& coding



A BRIEF HISTORY OF AUTONOMOUS CARS

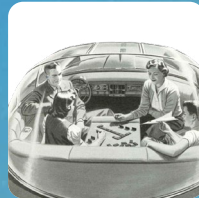


1939

American futurist Norman Bel Geddes exhibited a concept of a self-driving car. It was an electric vehicle guided by radio-controlled electromagnetic fields in the roadway.

1977

Japan-based Tsukuba Mechanical produced an autonomous passenger vehicle with a camera system that could recognize street markings while traveling at 20 miles per hour.



1980–2000

Organizations across the world invest heavily in research and development of electric vehicles and self-driving technologies.

2020

Tesla's Model 3 has become the world's all-time best-selling plug-in electric car, with more than 800 000 vehicles delivered through December 2020.



2021

CircuitMess created Batmobile™ — an educational autonomous car.

HOW DO AUTONOMOUS CARS WORK?

Autonomous cars rely on sensors, actuators, complex algorithms, machine learning systems, and powerful processors to execute software.



Autonomous cars create and maintain a map of their surroundings based on a variety of sensors situated in different parts of the vehicle.



Radar sensors monitor the position of nearby vehicles.



Video cameras detect **traffic lights**, read **road signs**, track other **vehicles**, and look for **pedestrians**.



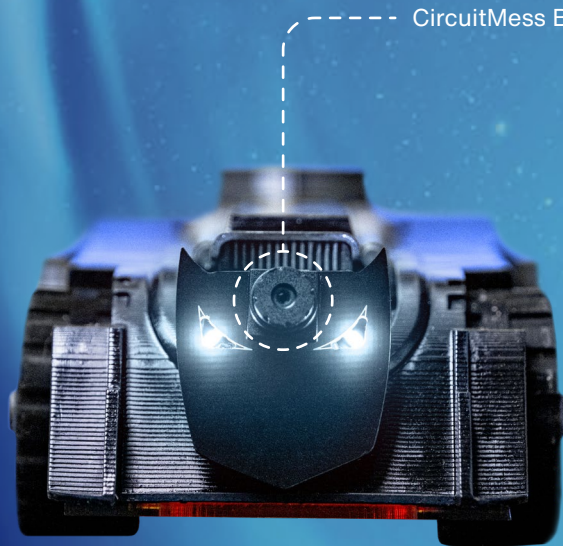
Lidar (light detection and ranging) sensors bounce pulses of light off the car's surroundings to measure distances, detect road edges, and identify lane markings.



Ultrasonic sensors detect curbs and other vehicles when parking.

Sophisticated software then processes all the sensory input, plots a path, and sends instructions to the car's actuators, which control acceleration, braking, and steering.

Hard-coded rules, obstacle avoidance algorithms, predictive modeling, and object recognition help the software follow traffic rules and navigate obstacles.

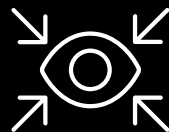


CircuitMess Batmobile's camera

CircuitMess Batmobile™ has a single **video camera** that is used for autonomous driving.

The signal from the camera is processed by the microprocessor on its main board.

This process is also known as computer vision — which is basically a process where a computer needs to use an algorithm to determine a certain action depending on the video feed from a camera.



WHERE DOES CIRCUITMESS BATMOBILE™ GET ITS POWER FROM?

Though it may be small, CircuitMess Batmobile™ is a real electric car.



Electric cars charge by plugging into a charge point and taking electricity from the grid.

They store electricity in rechargeable batteries that power an electric motor, which turns the wheels.

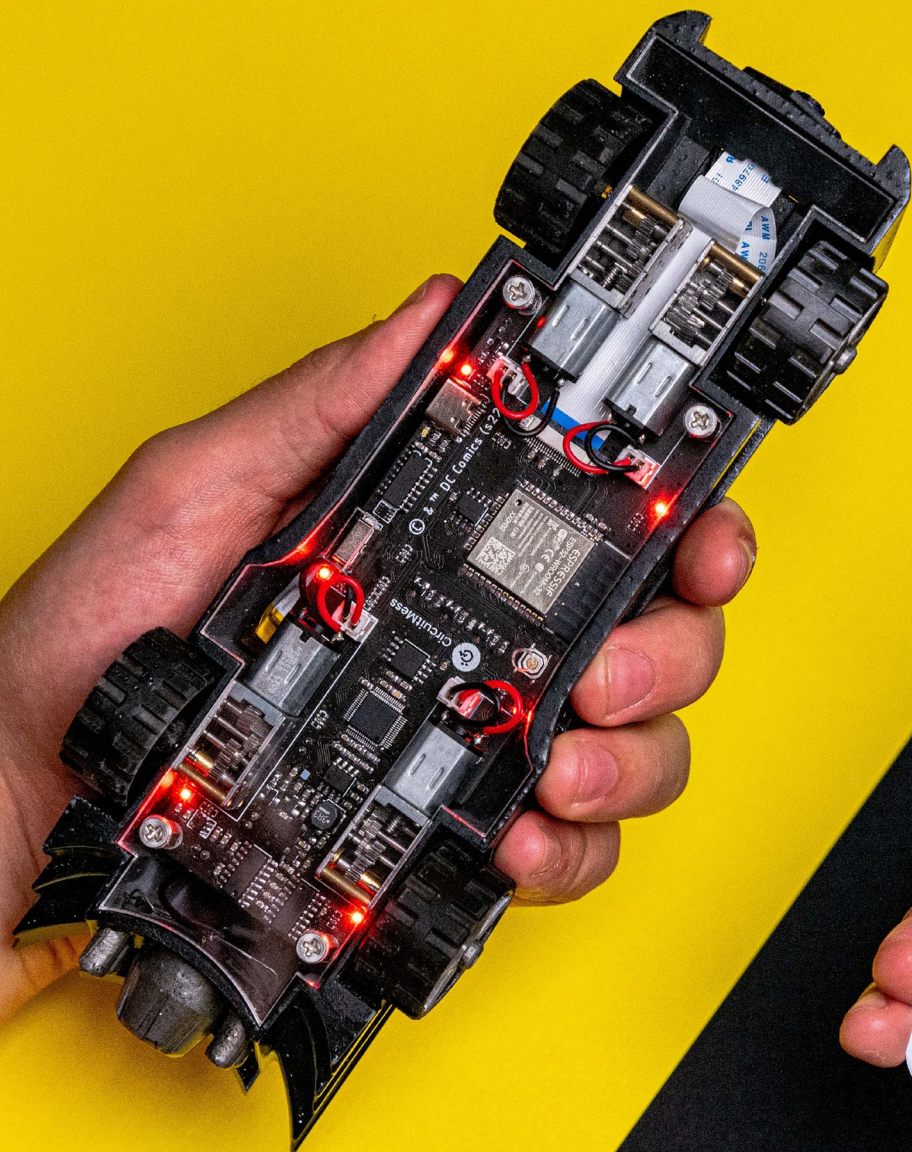
Electric cars accelerate faster than vehicles with traditional fuel engines — so they feel lighter to drive.

CircuitMess Batmobile™ has a single-cell rechargeable Li-Po battery.

Li-Po stands for lithium polymer battery which describes the composition of the battery.

These batteries are one of the most widely used ones nowadays and can be found in your phone, laptop, smartwatch, etc.





FUN FACT – HOW DO AUTONOMOUS CARS SEE IN THE DARK?

Computer Vision-Enabled Low-Light Mode

In order to process low-light images and videos, self-driving vehicles use different algorithms than the ones used for daylight.

The images captured in low light may be blurry and such data may not be accurate enough for autonomous driving.

As soon as a computer vision algorithm detects low-light conditions, it can shift to low-light mode.

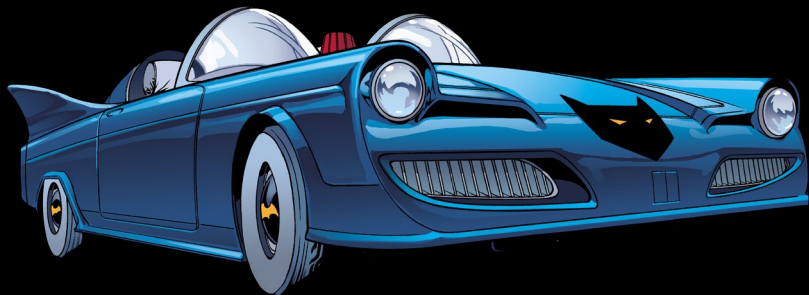
Autonomous cars navigate in low-light conditions using **Lidar sensors**, **thermal cameras**, and **HDR sensors**. These types of equipment can be used to create high-quality images and videos in low-light environments.



BATMOBILE™ TRIVIA

Did you know that the Batmobile™ has two modes, Pursuit and Battle?

The Pursuit mode is used for driving around, and Battle mode to transform Batmobile's appearance into a tank-like form.

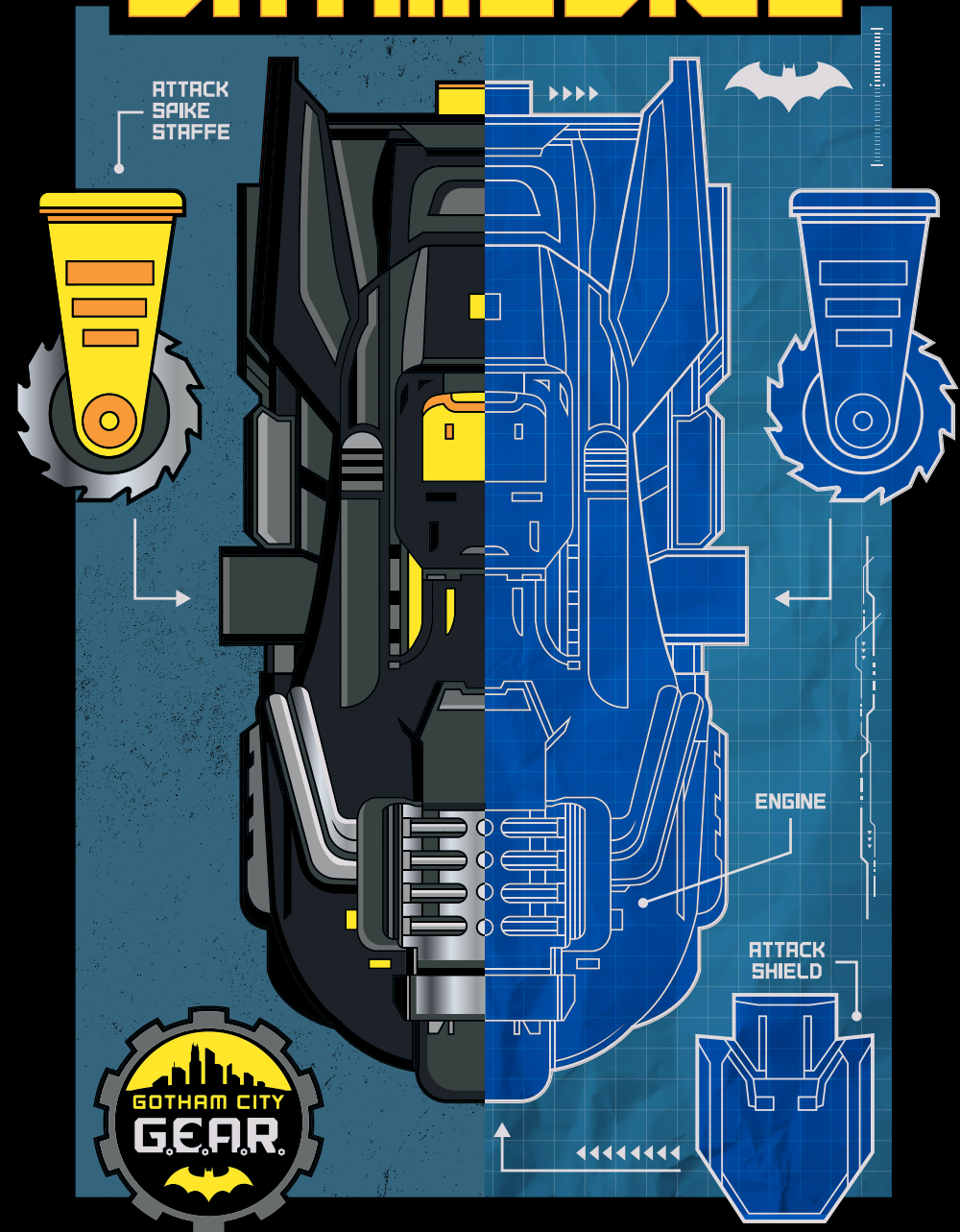


Batman's first stylized mode of transportation was the Bat-Gyro.

Batmobile was debuted in *BATMAN* #5.



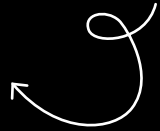
BATMOBILE





To build your CircuitMess
Batmobile™, go to:

circuitmess.com/build



Thank you for purchasing CircuitMess Batmobile™

For more information and detailed instructions on assembling and using your device, visit our official website: circuitmess.com/resources/guides.

Important safety information for CircuitMess Batmobile™

Read all safety information before using the device.

WARNING: Failure to follow these safety instructions could result in fire, electric shock, injury, and damage to your device or other objects. Read all safety information before assembling and using this device.

This product is a do-it-yourself device, and for it to work properly, you must assemble it according to the instructions you'll find on our website.

If you are a minor, assemble it only under an adult's supervision to avoid potential risks.

Improper handling can result in burns, injuries, and property damage, so handle the screwdriver or any other supplied tools and electronic components that are an integral part of this do-it-yourself kit very carefully.

CircuitMess Batmobile contains sensitive electronic components. CircuitMess Batmobile™ or its components may be damaged if dropped, burned, punctured, crushed, or in contact with liquid. If you suspect that any part of your CircuitMess Batmobile™ kit (especially the battery) is damaged, stop using the device. Using a damaged device may cause injury.

Use only authorized accessories compatible with your device and/or the supplied tools.

The device's operating temperature ranges from 32F ~ 104F. Using this device in conditions outside this temperature range may damage the device.

Please turn off CircuitMess Batmobile™ after using it and store it in a safe and dry location.

The included battery must be recycled appropriately and/or disposed of separately from household waste. Improper handling of the battery can cause a fire or explosion. Dispose of or recycle your device, batteries, and accessories according to local regulations.

— The included battery is rechargeable.

- Do not short-circuit the battery
- Improper use of the battery can cause overheating, burns, or other injuries.
- Do not leave the batteries directly exposed to intense sunlight.
- Do not use the device or the battery in high-temperature conditions. Overheating may cause an explosion.
- Do not disassemble or damage the battery to avoid battery leakage, overheating, or explosion.
- In the case of deformation, stop using the battery immediately and dispose of them properly.

If you are not sure whether your device or the included battery is safe to use, turn off the device, put it in a safe place, and contact our customer support via email at contact@circuitmess.com.

Keep the device dry.

Do not attempt to repair the device by yourself.

If any part of the device does not work correctly, contact our customer support (contact@circuitmess.com) or take your device to a certified repair shop.

Connect other devices according to their operating instructions. Do not connect incompatible devices to this device.

Precautions

During prolonged use, Batmobile™ may rarely overheat.

Keep CircuitMess Batmobile™ in a ventilated room during the use and assembly. Pay special attention to this if you suffer from a physical condition that affects your ability to detect heat on your body.

Assembling or using CircuitMess Batmobile™ in an area with a potentially explosive

atmosphere, such as areas where the air contains high levels of flammable chemicals, vapors, or particles (such as dust or metal powder), can be dangerous.

Exposure of CircuitMess Batmobile™ to environments with high concentrations of industrial chemicals, including liquefied gasses that evaporate, such as helium, can damage the functionality of CircuitMess Batmobile™.

Do not use CircuitMess Batmobile™ in hospital operating rooms or intensive care units.

Contact your doctor or our customer support (contact@circuitmess.com) to determine if the device's operation may compromise the work of medical devices.

To avoid possible interference with a pacemaker, maintain a minimum distance of 15 cm between the CircuitMess Batmobile™ and the pacemaker.

To achieve this, do not carry the included device in your pockets.

Do not use CircuitMess Batmobile™ near hearing aids or similar medical aids and equipment to avoid interference with medical equipment.

Check aircraft safety regulations and turn off CircuitMess Batmobile™ on the aircraft if necessary.

Do not use CircuitMess Batmobile™ while driving.

To avoid lightning strikes, do not use CircuitMess Batmobile™ outdoors during storms.

Do not use the CircuitMess Batmobile™ in high-humidity environments such as bathrooms. Failure to do so may result in electric shock, injury, fire, and damage to the product, electronic components, power adapter, or other parts of this electronic educational kit.

Follow all the rules that limit the use of portable electronic devices in some situations and conditions.

The individual parts and components in the CircuitMess Batmobile™ can pose a choking risk to children under 36 months. Keep all components, tools, and parts of this product away from small children before and after assembling the device.

Additional Recommendations and Precautions for Parents, Guardians, and Teachers Buying CircuitMess Batmobile™ for Children

1. Carefully follow the instructions for adequately assembling CircuitMess Batmobile™. Keep these and all other instructions that came with the products in a safe place.
2. Supervise your child while assembling and using the CircuitMess Batmobile™. Your responsibility is to ensure that the child uses the CircuitMess Batmobile™ correctly and that the CircuitMess Batmobile™ is suitable for the child's age and abilities.
3. Check from time to time if CircuitMess Batmobile™ is damaged or worn out in any way to prevent possible injuries and risks to the child's health and safety. If CircuitMess Batmobile™ is damaged, remove it immediately.
4. Remove any unnecessary packaging, but keep the instructions. Take care that children do not play with any plastic packaging as there are suffocation risks.
5. Teach children to always store CircuitMess Batmobile™ and other parts of the CircuitMess Batmobile™ educational kit appropriately to prevent accidents. Do not leave CircuitMess Batmobile™ on stairs or on the floor in your home or classroom where someone can step on them.
6. Always report a product security issue to our customer support (contact@circuitmess.com)

Proper disposals of this product

WEEE markings on the product indicate that this product may not be disposed of with the rest of your household waste. To prevent possible damage to the environment or human health from uncontrolled waste disposal, recycle the product responsibly. Recycling promotes the sustainable reuse of resources. For more information on the disposal of electrical and electronic equipment, don't hesitate to contact your local household waste disposal service, the store where you purchased the kit, or our customer support (contact@circuitmess.com).



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