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Wireless Charging Systems & Auto Nerf Gun on Drones

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ABSTRACT: The integration of Auto Nerf guns with drones has gained significant popularity in recent years, offering a unique and exciting way to engage in aerial battles and competitions. However, the limited battery life of both drones and Nerf guns has hindered the overall user experience. To address this challenge, a Wireless Charging System for Auto Nerf Guns in Drones has been developed, revolutionizing the way these devices are powered and extending their operation time.

This innovative system harnesses the power of wireless charging technology, eliminating the need for manual battery replacements or tethered power sources. The Auto Nerf Gun mounted on a drone can now be recharged wirelessly while the drone is in flight, ensuring a continuous and uninterrupted gaming experience. This technology is not only convenient but also environmentally friendly by reducing the consumption of disposable batteries.

Key components of this system include a specialized wireless charging module integrated into the drone's design, and a corresponding receiver module within the Auto Nerf Gun. When the drone is within a specified range, the charging process is initiated automatically, ensuring that the Nerf gun is ready for action when needed. The system leverages advanced electromagnetic resonance technology for efficient power transfer, making it a practical and efficient solution for drone enthusiasts and gamers.

This wireless charging system enhances the gameplay experience by providing extended battery life for Auto Nerf Guns on drones, making them ideal for both recreational and competitive use. As drone technology continues to evolve, the integration of wireless charging systems paves the way for more innovative and exciting applications, further expanding the possibilities of autonomous, wireless-powered devices.

KEYWORDS: electromagnetic, wireless-powered devices

NOTE: Instant for using nerf gun we can use original gun

I. INTRODUCTION

In the ever-evolving landscape of modern warfare, technological advancements have become indispensable assets for soldiers in the field. Among the most transformative innovations is the integration of smart drones into military operations. These unmanned aerial vehicles (UAVs) have revolutionized the way armed forces gather intelligence, conduct reconnaissance, and execute tactical missions on the battlefield. The marriage of cutting-edge technology and military strategy has given rise to a new era of warfare, one where smart drone are the vanguard of situational awareness and precision execution.

Wireless power transmission technology can be broadly divided into four categories according to the transmission distance.

a. The contact-based charging technique
b. The wireless power transmission-based charging technique
c. Non-radiated transmission
d. Long distance transmission

A drone is a colloquial term for Unmanned Aerial Vehicle (UAV), commonly referred to a commercial quadcopter. Initially, drones were developed as camera operated remotely piloted bomb carriers in 1944 US military missions. In the past decade, drone technology caught up to civilian applications; Owing to its high maneuverability, compact design and lightweight, the technology has boundless potential for several applications such as Inspections.

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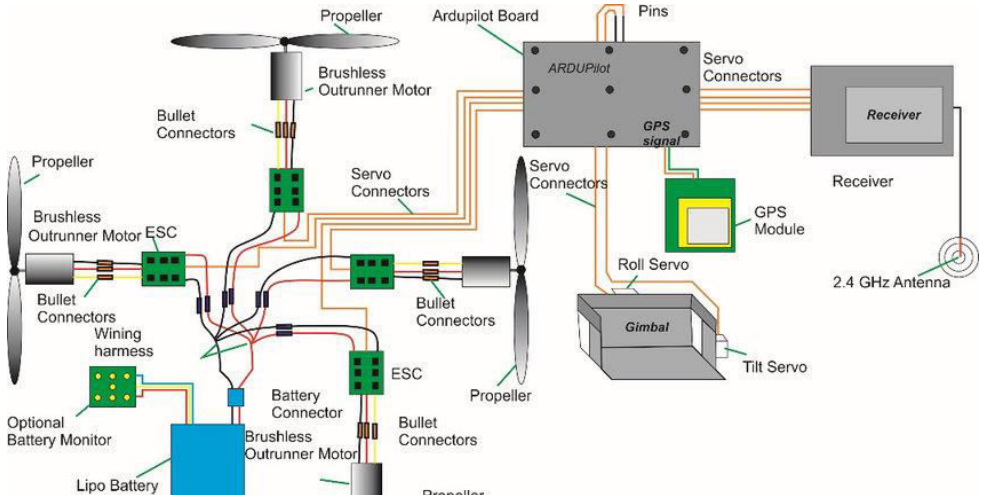
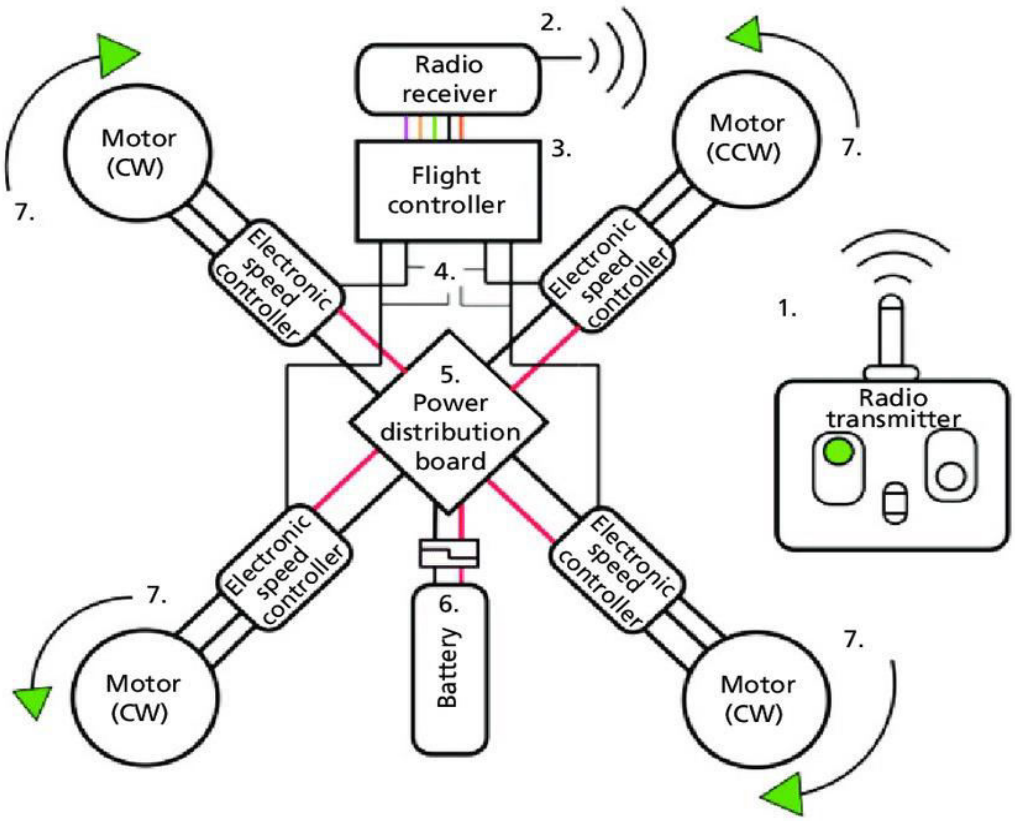
II. RELATED WORK

Connection for drone





We designed the receiver antenna inside the drone, the battery charger, and the transmitter antenna of the charging system, and experimented with the ideal shape and position by measuring the structure and interval to minimize the power loss according to the spacing of the antenna. The structure of the drone is designed as follows considering the size of the antenna and the frequency charging time

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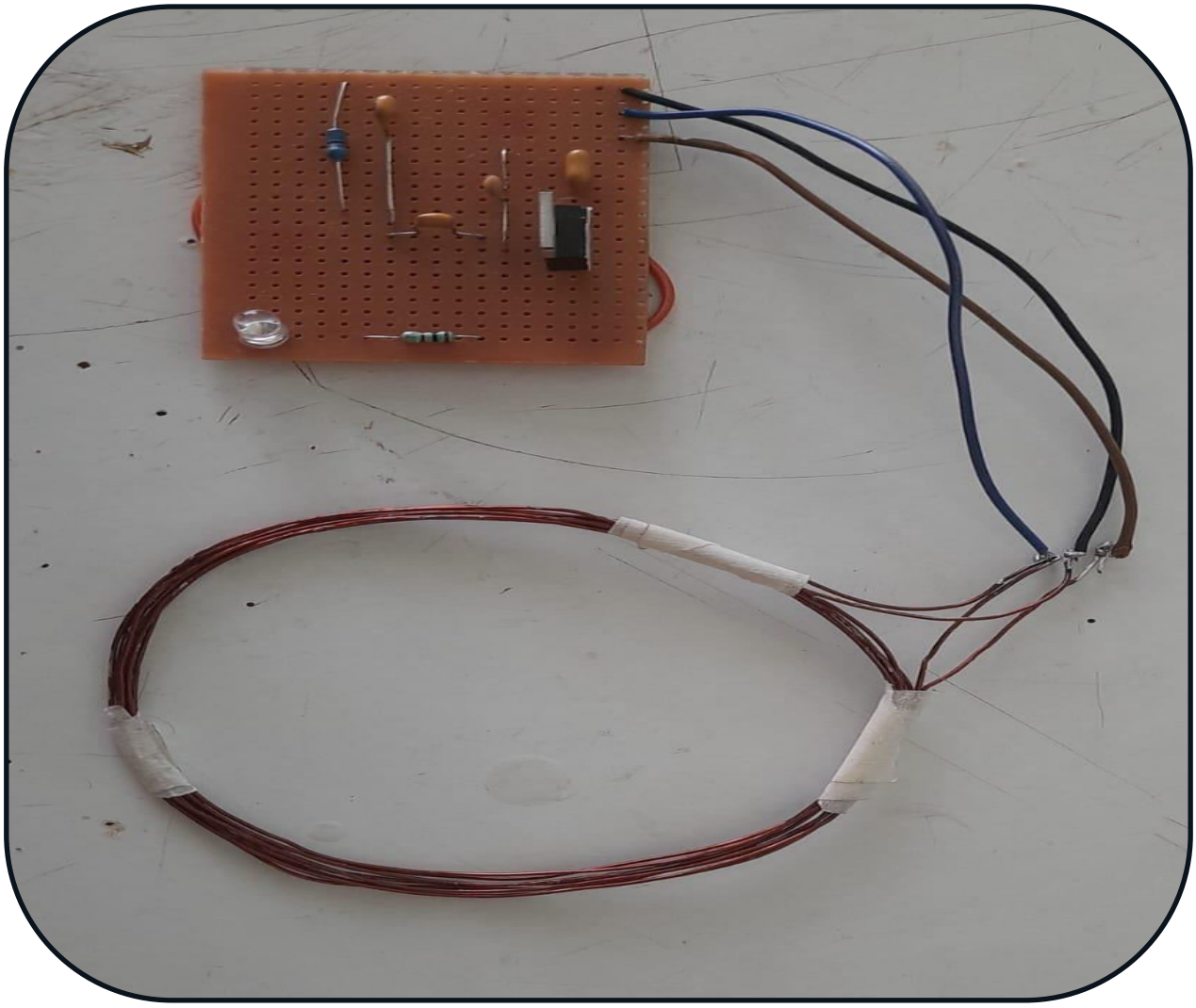
Transmitter:



1. Transmitter Components: The transmitter in a wireless charging system typically consists of a coil (or coils) of wire, a power source, and control circuitry. The coil is used to generate an alternating magnetic field, which is the medium for transferring power wirelessly. The power source can be a standard electrical outlet or a specific charger designed for the purpose.
2. Working Principle: When electric current is supplied to the transmitter coil, it generates an oscillating magnetic field. This magnetic field then induces a voltage in a corresponding coil (receiver coil) in the device to be charged. This induced voltage is used to charge the device's battery.
3. Resonance or Inductive Charging: Wireless charging can be based on magnetic induction or magnetic resonance. Magnetic induction charging requires the transmitter and receiver coils to be very close to each other. In contrast, magnetic resonance allows for greater distance between the coils, making it more flexible and suitable for various applications.
4. Standards: Several wireless charging standards exist, including Qi (pronounced "Chee"), which is widely used for charging smartphones and other small devices. Other standards like Air Fuel, used in some larger devices and electric vehicles, provide different specifications for wireless power transfer.
5. Efficiency: Wireless charging systems have improved over the years in terms of efficiency, but they are still slightly less efficient compared to wired charging. This means that some power is lost during the transfer process, primarily as heat.

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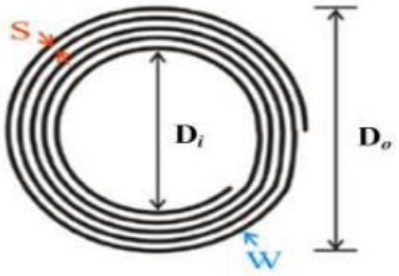
The following equations and variables are used in designing the coil.

$$L(mH) = \frac{N^2 A^2}{30A - 11D_i}$$

$$A = \frac{D_i + N(W + S)}{2}$$



Receiver:

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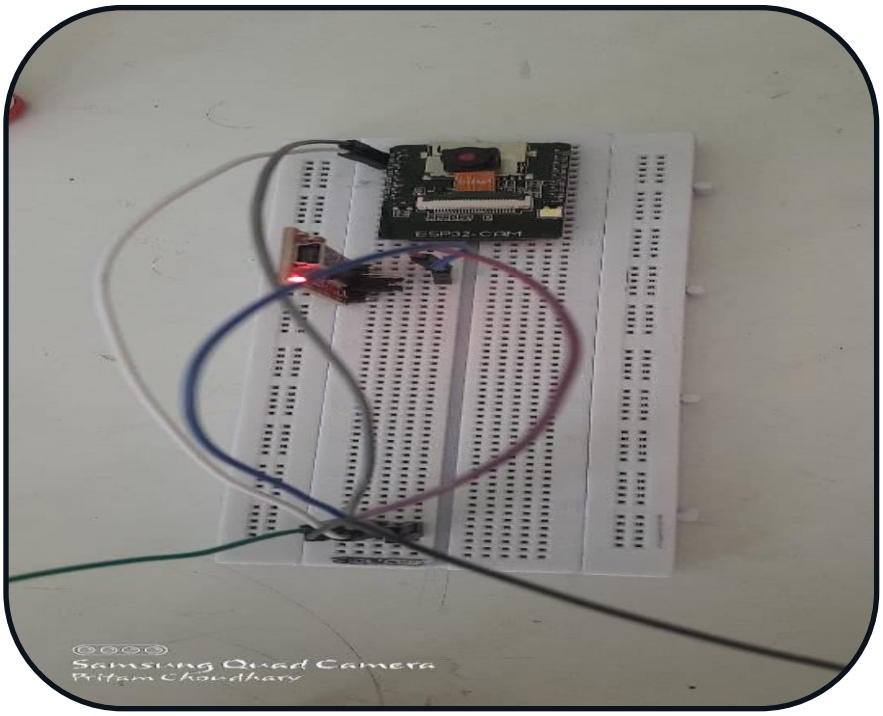
1. Receiver Coil: The receiver in a wireless charging system typically contains a coil of wire. This coil is often referred to as the "receiver coil" or "receiving coil." When an alternating current (AC) is passed through the transmitter coil (located in the charging pad or base station), it generates an electromagnetic field. This electromagnetic field induces a current in the receiver coil through electromagnetic induction.
2. Receiver Circuitry: The receiver also includes circuitry that manages the power transfer and converts the received alternating current into direct current (DC) to charge the device's battery. This circuitry is responsible for regulating the charging process, monitoring battery status, and ensuring safe and efficient power transfer.
3. Compatibility: Wireless charging receivers are designed to be compatible with specific wireless charging standards. The most common wireless charging standards include Qi (pronounced "Chee") and various proprietary standards used by specific device manufacturers. Qi is a widely adopted standard that is compatible with a broad range of smartphones, smartwatches, and other devices.
4. Positioning: Proper alignment and positioning of the receiver with respect to the transmitter coil are essential for efficient charging. Many wireless chargers include alignment guides or magnets to ensure that the receiving coil on the device lines up correctly with the transmitting coil on the charging pad.
5. Charging Speed: The charging speed of a wireless receiver depends on various factors, including the power output of the charger, the efficiency of the system, and the device's battery capacity and charging capabilities. Faster wireless charging is becoming more common, with some devices supporting technologies like "fast wireless charging" or "quick wireless charging."

V. AUTO NERF GUN



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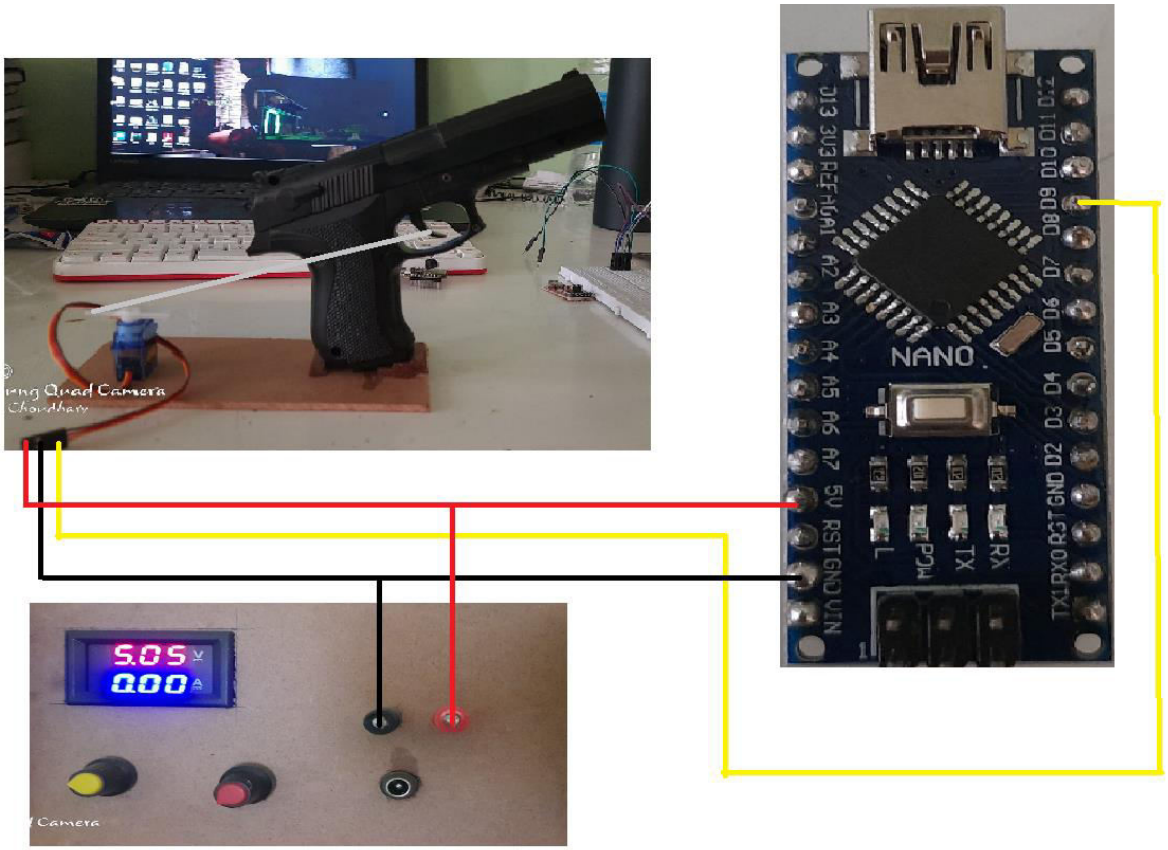

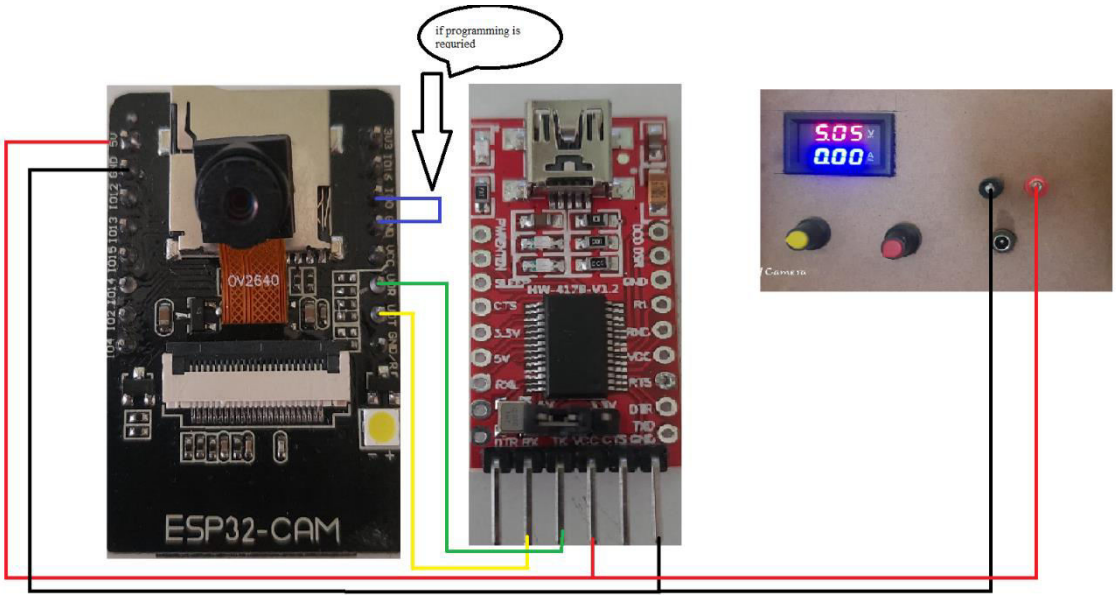

1. Facial Recognition: The heart of the system is a facial recognition algorithm that uses a camera to capture images of individuals within its field of view. The algorithm can be trained to recognize specific faces, and it can identify them even as they move around.

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2. Camera and Image Processing: A camera or webcam is mounted on the system, and the captured images are processed in real-time to detect and identify faces. OpenCV or other computer vision libraries can be used for this purpose.
3. Nerf Gun Integration: A Nerf gun is attached to a controllable mechanism that can aim and fire Nerf darts. This mechanism can be controlled programmatically based on the facial recognition results.
4. Targeting and Engagement: When a recognized face is detected within the camera's field of view, the system will track the face's movement and aim the Nerf gun in its direction. Once the target is locked, it can fire Nerf darts at the recognized individual.
5. User Interaction: For added fun, the system can be designed with user interaction in mind. Users can define specific targets or individuals they want to engage, and the system can provide various modes, such as "friendly fire" for play among friends.
6. Safety Measures: Safety is paramount. The Nerf gun should be modified to ensure that it fires safely, with reduced velocity and impact. Protective eyewear is advisable when interacting with the system.

Applications:

This project is designed for recreational purposes and can be set up in various settings, including homes, gaming spaces, or parties. It adds a unique and engaging dimension to social events and showcases the creative possibilities of merging facial recognition and automation technologies in a playful manner.

VI. CONCLUSION AND FUTURE WORK

In the conclusion, as a result of this study, it is found that the efficiency is the highest even if the spacing of 25 mm is maintained between the end short type transmission antenna and the # 1 configuration as shown in the test data, the output voltage transmitted at a distance of 25 mm from the primary and the secondary coil is transmitted by about 60% or more at 100 W, thus enabling the efficient transmission. In addition to, the measured result of the charger system is charging the received voltage to the battery is measured, and the proposed technique is based on the measurement of the output power of the charger, when the charger module is installed in the commercially available drones, and it can be applied to the marine sector that can be applied by applying the charging system is as follows: in the case of the intermittent and surveillance field, it is impossible to take off and land the helicopter below 1000 tons in the Korea. Hence, the testing results of the drone charging system has satisfied.

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