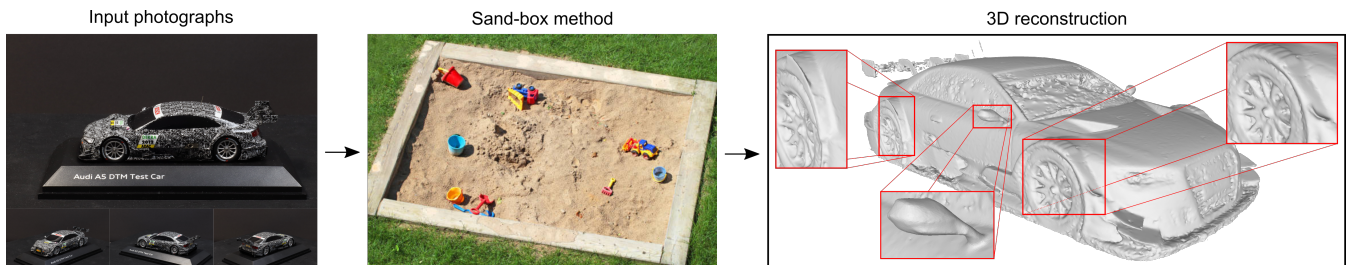


# A Free Computer Vision Lesson for Car Manufacturers or It is Time to Retire the Erbkönig

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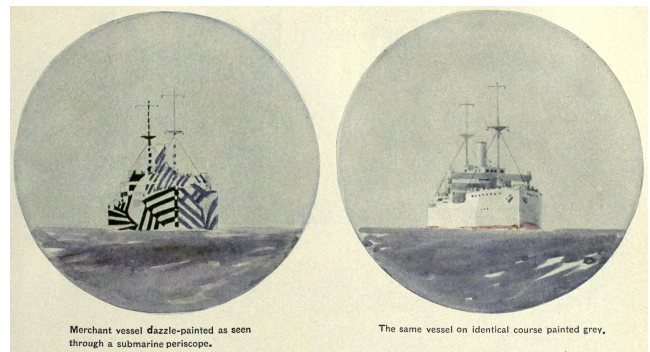
Oh no – we can recover very detailed 3D shape from Erbkönig photographs. How could this have happened? And even worse, the reconstruction is best in the parts where there is a pattern. Well, we guess someone didn't know about the basics of computer vision.

## Abstract

In award winning prior work [1], we identified the inability of autonomous cars to honk as the key reason that they are not broadly deployed on our streets. In this work [2], however, we suggest that the core reason is the lack of most basic computer vision knowledge of car manufacturers. To hide their most fancy new cars they put a special camouflage pattern on their so called *Erbkönig* prototypes. The pattern is designed to trick our perception; at the same time it enables computer vision systems to perfectly recover the 3D shape of the prototype – even better than without the pattern as we show in this paper. How could we expect a prototype car that already demonstrates a lack of computer vision knowledge to ever evolve into an autonomous vehicle?

## 1. Introduction

We could now tell you the whole story of the Erbkönig and Dazzle Camouflage patterns, but that is way to much work. The interested reader (if any) is kindly asked to read the relevant literature here: [https://en.wikipedia.org/wiki/Dazzle\\_camouflage](https://en.wikipedia.org/wiki/Dazzle_camouflage). The relevant portion is that the pattern is designed to make it hard to estimate the range, speed and heading of a ship and it might also make it harder to estimate the type of the ship, see Figure 1. And this is all cool and everything, but over 100 years have passed since the pattern was described by Norman Wilkinson during the last pandemic. This does not hold back car manufacturers to paint their dinosaur eating machines (also the sun eating counterparts) with patterns motivated by this idea and brag about it (<https://www.bmw.com/de/automotive-life/erlkoenig-auto.html>). The car manufacturers might try to hide the shape of their cars, and it might work pretty well when it comes to the human eye. It might even hold some cameras back from using their automatic focus. But all of that only holds for a single view! The moment we have multiple



**Figure 1.** Damn hard to estimate the heading of the boat on the left with the Dazzle camouflage pattern, right? Source: Encyclopædia Britannica, 1922 / Wikipedia.

viewpoints – tadaaa – we can use the whole ballpark of computer vision algorithms and even algorithms from the stone-age (all historic works before 2022) of computer vision lead to an almost perfect 3D reconstruction.

To summarize, in this paper, we impressively show that the 3D shape of a car covered with camouflage patterns (i.e., an Erbkönig) can be very well reconstructed just from a set of ordinary photographs, taken from different perspectives. To make the embarrassment for car manufacturers perfect, we demonstrate that the 3D reconstruction of the same car *without* patterns is much worse. That's bitter.

### 1.1 Related Work

Besides a Twitter thread with various researchers almost scooping us, there is no relevant prior work (see Figure 2).

