"Science is a Universal Language"

Gary says,

"Throughout my research journey, Science has been not only a subject but also a universal language that connects me with many researchers from around the world. Via Science, I had the opportunities to use my expertise in mathematics to describe and understand many interesting natural phenomena.

Several years ago, I collaborated with some plant biologists in America on analyzing how the shapes of flowers are related to their genetic architectures. It was fascinating to learn about many types of flowers that I had never seen and how the biologists grew them in the laboratory for the experiments. Moreover, we discussed how mathematics could be used to capture the key geometrical features of the nectar spurs of Aquilegia, which vary dramatically in length and shape among species. Ultimately, we found a beautiful connection between the complex floral morphologies and genetics using differential geometry in mathematics. In another collaboration, I worked with some experimental physicists who observed highly unusual dancing droplet phenomena in their physical experiments. Using a simple polar representation formula, we were able to describe the spontaneous spinning motions of volatile drops on swellable sheets and develop a model to explain their mechanisms. More recently, I had a collaboration with some biologists studying animal behaviors in Africa on a research problem about mimicry in nature. Specifically, we studied an avian brood parasite-host system in which cuckoo finches (parasites) lay mimetic eggs in the nests of prinias (hosts). We first characterized the patterns on the eggs in terms of both their geometry and topology using Minkowski functionals in mathematics. We then analyzed the relationship between the patterns on the

parasitic eggs and the egg rejection by hosts. To test our hypotheses on mimicry, our collaborators even performed experiments by painting scribbles on some eggs and putting them in bird nests in Zambia.

In all these collaborations, I enjoyed not only learning about new problems in research areas that I was not familiar with but also meeting people from different backgrounds and hearing about their stories and journeys. Without Science, all these precious opportunities would not have been possible. ”

Prof. Gary CHOI is a Vice-Chancellor Assistant Professor at the Department of Mathematics at The Chinese University of Hong Kong. He obtained his Ph.D. in Applied Mathematics from Harvard University in 2020. Prior to starting at CUHK, he worked as an NSF Postdoctoral Fellow and Instructor in Applied Mathematics at MIT from 2020-2023. His research interests include applied and computational geometry, interdisciplinary mathematical modelling, metamaterial design, and more.