Future Research Plan

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After finishing graduate school in Japan, I started studying topological graph theory and continued learning graph theory in the rest of my working career. I have realized that the concept of topology has been foreign to the most graph theorists. Graph Minors are popular in topological graph theory such as Robertson-Seymour graph minor publications; however, Graph Immersions are studied by a few groups of researchers. Since I am one of them, I feel responsible to explain the concept of graph immersion to more people. I have submitted a paper titled "Splitter theorems for 4-regular planar graphs," but it was returned because the length of the paper did not match the journal. Without publishing this paper, my job is not complete.

In Knot Theory, I am working with colleagues on Kauffman's bracket polynomials; for a given link diagram D, Kauffman defined a unique 3-variable polynomial $<D>(A, B, d) \in Q[A, B. d]$ by using inductive rules. To make them be a link invariant, we have to normalize with self writhe of D; let $S(D)$ be the normalized 3-variable polynomial. However, the polynomial $S(D)$ itself is not a link invariant yet. We want to make it be a link invariant by adding some relations among A, B, and d. Let I be an ideal of $Q[A, B, d]$ and consider the quotient ring $Q[A, B, d]/I$. We are looking for a special ideal I such that the quotient map from $Q[A, B, d]$ carries $S(D)$ to a class $[S(D)] \in Q[A, B, d]/I$, which is a link invariant.