# Research plan

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I will list now some main topics of research I am currently interested in, and plan to work in the future.

1. **Value distribution of the Gauss maps of various surfaces**
   We obtained the estimate for the number of exceptional values and totally ramified value number of the Gauss map (resp. hyperbolic Gauss map) for algebraic minimal surfaces (resp. algebraic Bryant surfaces). However, we do not know whether the estimate is sharp or not. Because we do not solve "global period problem". We will investigate examples and obtain the best estimate for this class.

2. **The application of spin structures to surface theory**
   The spinor representation for minimal surfaces was developed and used to investigate minimal surfaces in $\mathbb{R}^3$ with embedded planar ends and give explicit data of genus-one helicoids. Moreover, Bobenko, Pavlyukevich and Springborn present a global representation for constant mean curvature 1 surfaces (CMC-1 surfaces, for short) in hyperbolic 3-space in terms of holomorphic spinors and derive explicit formula for CMC-1 trinoids. I will apply their results to some problems on the shape of surfaces.

3. **Finite extinction time for the Ricci flow**
   I have studied the result of the finite extinction time for the Ricci flow on homotopy 3-spheres by T. H. Colding and W. P. Minicozzi II and investigated the relationship between "Width (the min-max construction)" and "Ricci flow". I will study more and apply the method to others.

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