# Popular Science Summary

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Nowadays, compact and high performance devices play an important role in the world of wireless technologies. An important innovation in this area is System in Package (SiP), in which multiple silicon components (chips) are integrated into a single package together with other passive components such as capacitors, inductors, antennas, etc. SiP has a wide range of applications nowadays, it can be used in smartphones, wearables and Internet of Things (IoT) modules and is also used for devices such as power amplifier modules, Wi-Fi and Bluetooth modules.

On the other hand, antennas are the technology that plays a crucial role in today's age of information explosion. Antennas are found in all kinds of wireless devices and can connect millions of users wirelessly every day. Antennas can also be embedded as passive components in SiP. The embedded antennas are usually placed at the edge of the module to receive and transmit the electromagnetic waves and are connected to an AC source inside the SiP module. When the antenna acts as a receiver, it converts the electromagnetic waves into an electrical signal and when it acts as a transmitter, it converts the electrical signal into electromagnetic waves. Since the components in the package are very close to each other to form a small module, the embedded antenna is exposed to the proximity of other components, which can affect the performance of the antenna. There are other factors that need to be considered when designing the antenna, such as the position of the antenna in the SiP module and its location in relation to the ground plane, as well as the way the module is placed on the carrier board can be mentioned as factors that can influence the performance of the antenna and should be considered by the designer.

The aim of this master thesis is to create a simulation model of a SiP with embedded antenna, focusing on performance and size. The main focus is on the Wi-Fi bands 5-7 GHz. The design is simulated to create a feasible antenna design and optimize the design to meet the specifications such as bandwidth, radiation characteristics, efficiency, peak gain, return loss, etc. At the end of the project, the design that fulfils the target data for the simulation model was achieved. It is worth mentioning that the final simulated antennas were manufactured and the measurement of the antenna prototypes was carried out to study the behavior of the antenna in the real world. As a final result of the project, two different antennas were achieved that were able to fulfill most of the simulation targets and also showed acceptable performance for some of the parameters measured in the prototype.