P1: Hello everybody and welcome to our presentation. My name is Fabian and I am going to present the first part of our Project: Accuracy of Approximate Circuits

P2: I would like to start with a small introduction about approximate computing and its advantages compared to conventional circuits.
According to multiple papers, it has shown to be one of the most promising energy-efficient paradigms and has therefore reached a lot of research attention.
Another advantage of the approximate circuits is that the hardware uses less space due to the reduced number of logic gates.
For the same reason it has a reduced delay time and produces faster results.

P3.1: Now adding to all the advantages, the question arises How do approximate circuits achieve all of those above mentioned advantages in our design?
As already mentioned, the amount of logic gates is reduced.
For demonstration purposes, we are going to show you two different Full Adder designs. One exact and one approximate.

P3.2: The first design is an exact adder and the second one is an approximate design taken from a paper.
As you can clearly see, the second one is „missing“ some logic gates.
The approximate circuit utilizes only 2 exclusive OR's and one NOT gate. The delay is created by three logic gates although the last one is a NOT and much faster than the other gates.
To see what effect it has on the results, we will take a look at the truth tables.

P4: In this chart the tick marks show a correct result, and the crosses indicate a wrong bit.
As we can see the sum is always calculated correctly.
However, deviations occur, when calculating the carry out.
Therefore in 6 out of 8 cases, we are calculating the correct carry out.

Error can happen in MSB -> Error is more significant.
This design will be implemented on an open-source processor.

And now we will hear about Error analysis and the future of our project from my colleague Martin.