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A Decentralized Biometric Authentication Protocol based on Blockchain

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Introduction

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- Requirements include *template protection* and *authentication portability*
- Single sign-on system allows to transfer authentication across various services, but relies on a *single device* -> security and scalability issues

Aim

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- The proposal leverages the *blockchain technology*

- To provide privacy and security guarantees we use *fuzzy commitment scheme*

Initial setup phase

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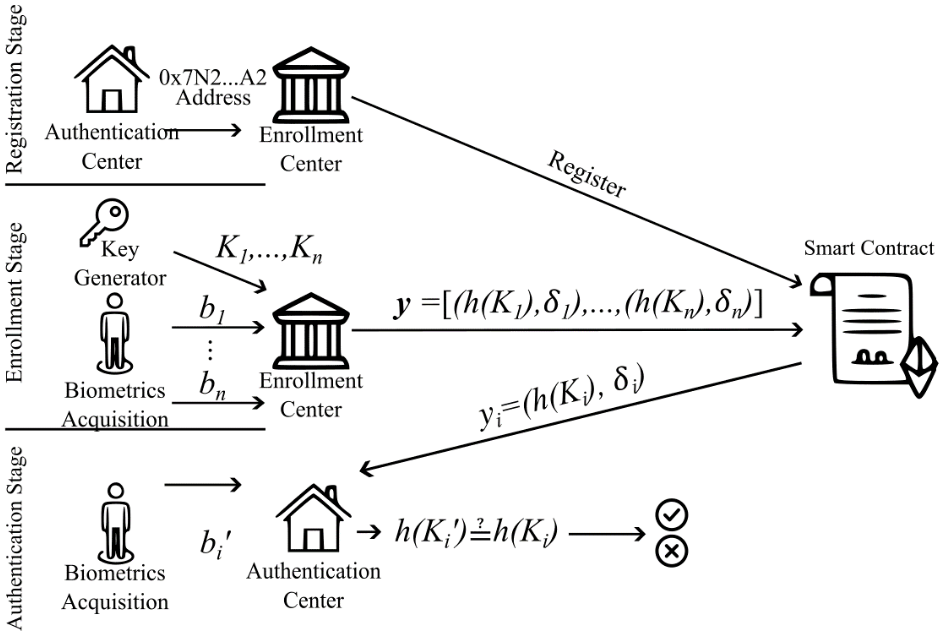
- ECs can enroll end users and authentication centers (ACs)
- The *smart contract* collects and maintains the data of users
- *ECs* can write and retrieve data
- *ACs* can only retrieve data, i.e., perform user authentication

Protocol stages

- Registration stage
- Enrollment stage
- Authentication stage



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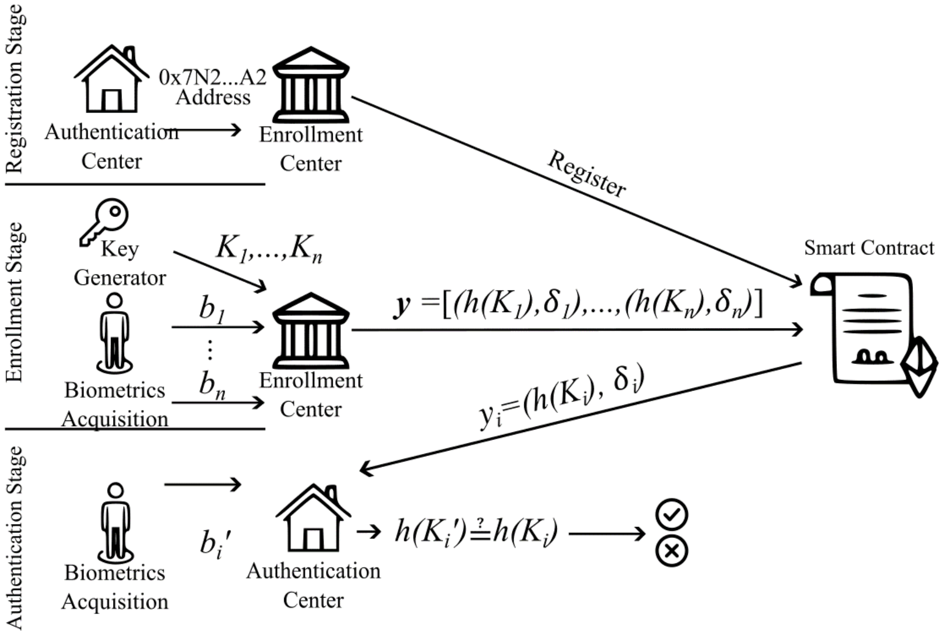
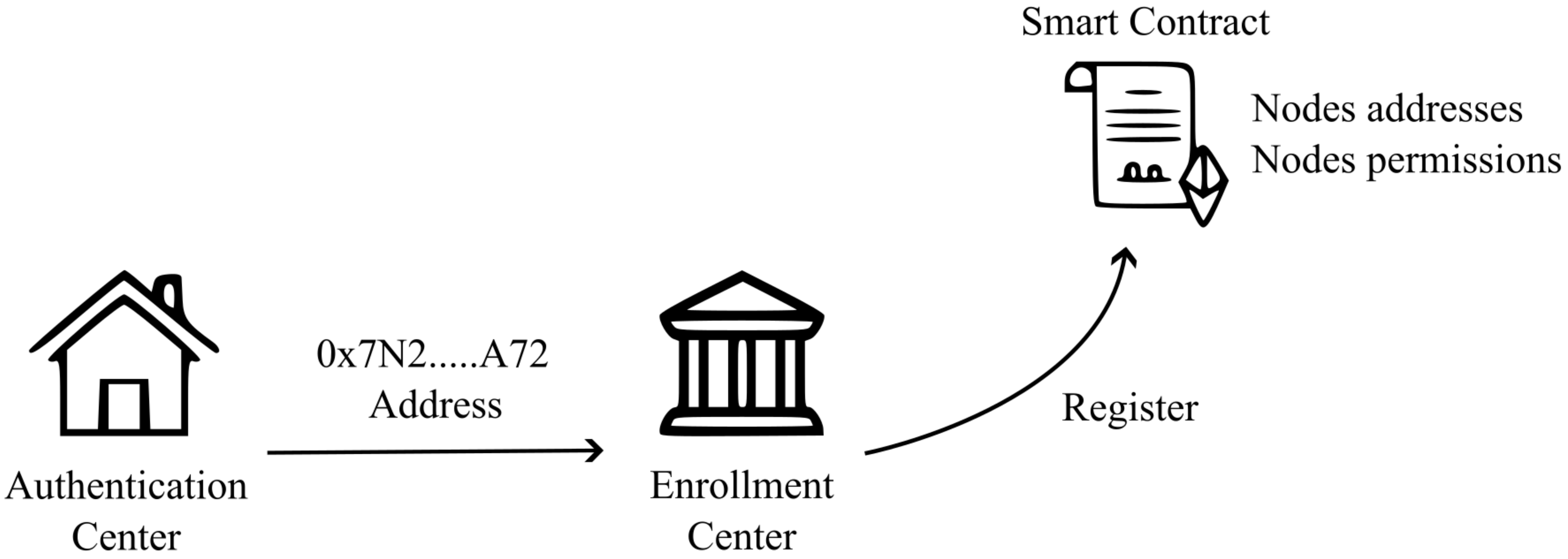


Registration stage



Smart Contract

Nodes addresses
Nodes permissions

0x7N2.....A72
Address

Register

Authentication Center

Enrollment Center

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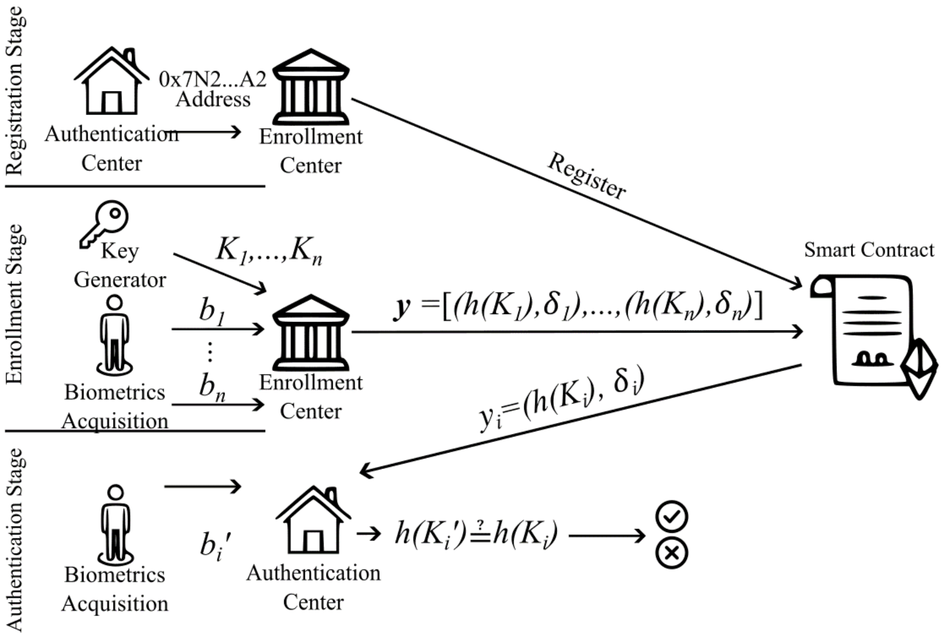
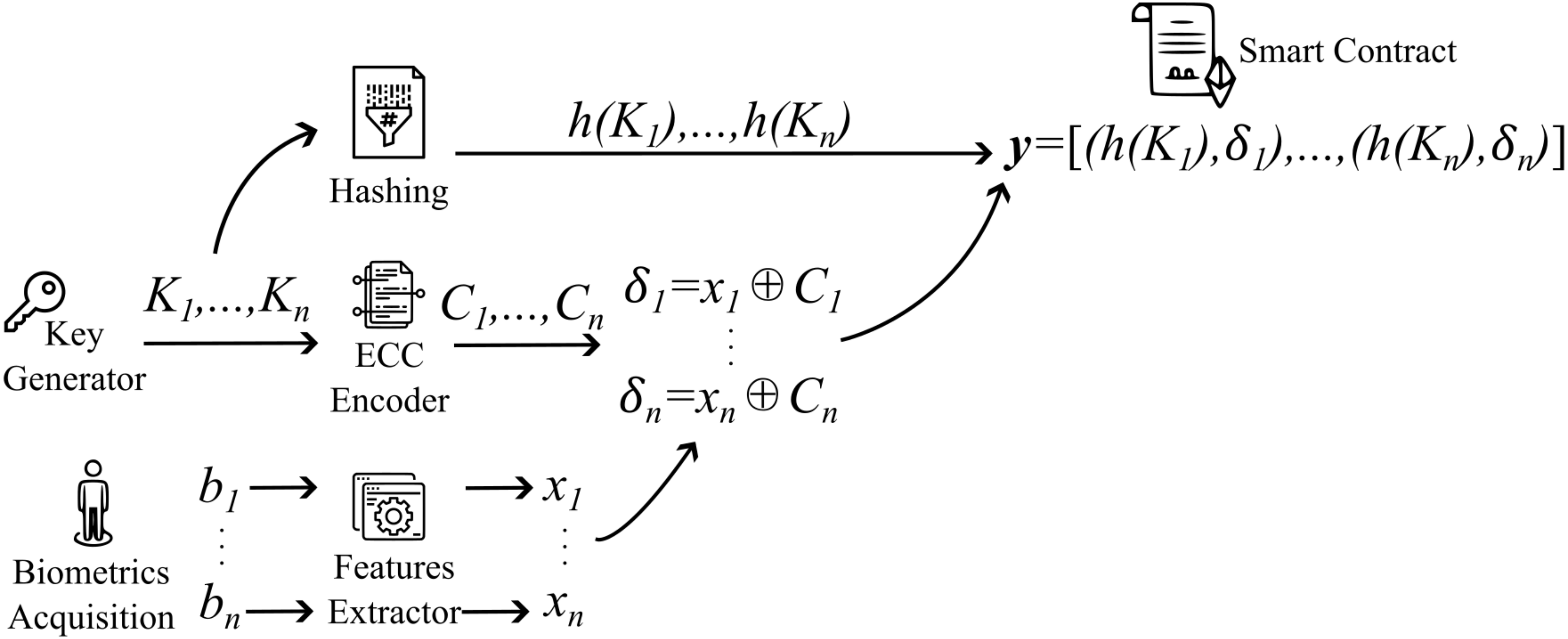


Enrollment stage



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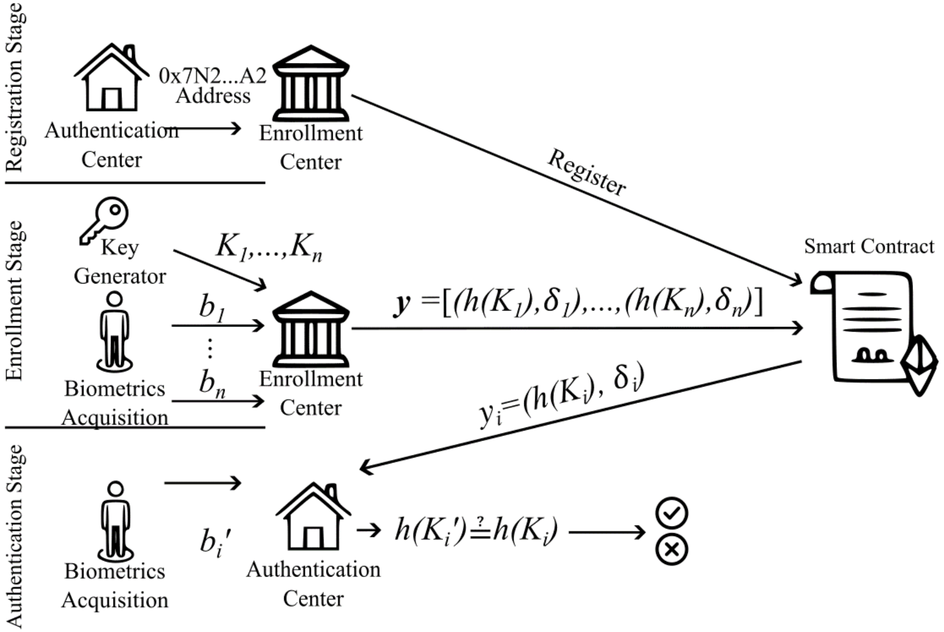
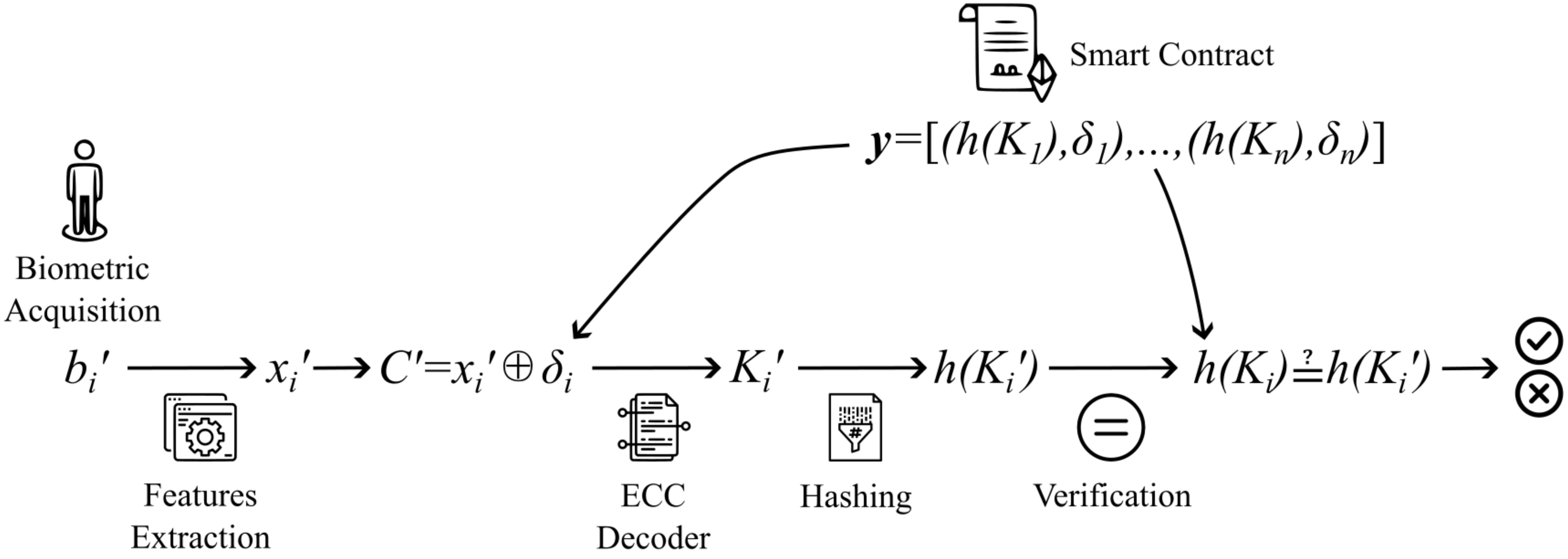


Authentication stage



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- Any EC can invoke a function of the smart contract that erases the user records from the list of enrolled users

- The enrolling data are still stored in past transactions, but in an encrypted form, and no personal data of revoked users can be retrieved

Conclusions

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Conclusions

- The proposed protocol incorporates blockchain technology into biometric systems, using Fuzzy Commitment Scheme
- Using different blockchains, the protocol can be adapted to different scenarios, being both *efficient* and *cost-effective*
- A security analysis found the protocol to be *strong* and *secure*
- Future work will address issues as scalability and interoperability, and will test the method in real-world scenarios

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Thanks for your kind attention!

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