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(54) **STORAGE DEVICE UTILIZING PHYSICALLY UNCLONABLE FUNCTION (PUF) BASED SECRET SHARING SCHEME FOR DATA ENCRYPTION/DECRYPTION**

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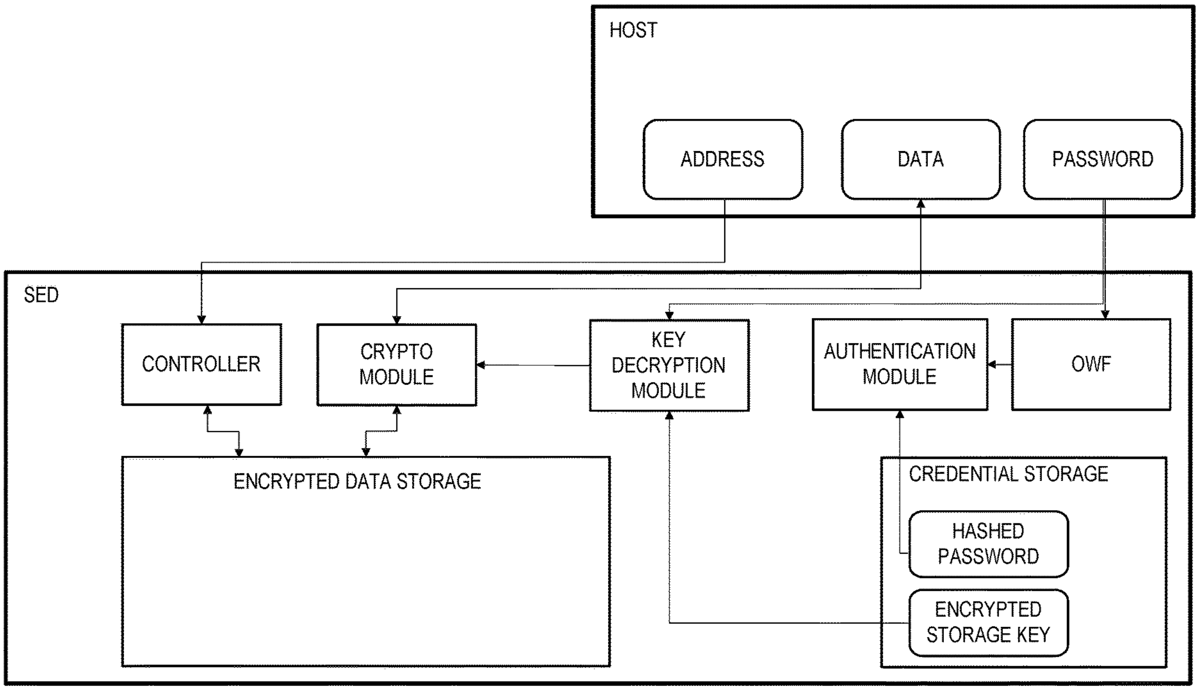
(57) **ABSTRACT**

Systems and methods are disclosed herein for protecting data in a storage device by encrypting or decrypting the data with a Data Encryption Key (DEK). The storage device is communicatively coupled to a host and is locked with the host by secret sharing. In one example, the storage device comprises a Physically Unclonable Function (PUF) configured to, during a key generation phase of operation, generate a set of DEK responses based on a set of DEK challenges (chalDEK) and an assembler configured to obtain a set of SED DEK secret shares (SS_{SED}) based on the first set of DEK responses, receive additional data, and assemble at least the set of SED DEK secret shares (SS_{SED}) and the additional data to create a DEK master secret. The storage device also comprises a crypto module configured to receive a DEK based on the master secret and perform encryption and/or decryption of data using the DEK.


HOST
ADDRESS
DATA
PASSWORD
SED
CONTROLLER
CRYPTO MODULE
KEY DECRYPTION MODULE
AUTHENTICATION MODULE
OWF
ENCRYPTED DATA STORAGE
CREDENTIAL STORAGE
HASHED PASSWORD
ENCRYPTED STORAGE KEY