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Ensure the securities in IoT for smart home monitoring system

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ABSTRACT

Smart building using IOT technique is used to maintain home automation in a smart way. In order to improve security in the home, the various sensor is used. In that PIR and MQ-6 sensors plays a major role. The data from various sensors are sent to the Arduino board and get stored in the cloud. In this paper home monitoring system with intrusion, detection technique is used. For data security, wireless sensor network (WSN) playa a major role. To facilitate data encryption, a method namely DES based on efficient key generation mechanism was proposed.

Keywords— *IoT technique, Intrusion detection, DES, RSA*

1. INTRODUCTION

The smart automation using IOT is a wireless home security project. In today's world security for home is essential. If any sensors found any intruders, then it will send an alert message and for faster data transmission the ESP8266 sensor plays a major role, which is used to control and monitor the system. To provide security for the transmitted data the Data Encryption Standard and RSA algorithms are used. In this proposed system the security algorithms used are highly reliable and it will consume very less time in comparison with the existing system. IoT involves extending internet connectivity in many devices such as desktops, laptops, smartphones and tablets.

In SHAS schema, connecting a TV to the Internet might be considered as a normal scenario, since it would make our life easier. However, the single fact of connecting such devices to the IoT world might generate a potential vulnerability since a hardening standard is still not in place to protect such devices. In addition, the risk arises as the SHAS is being used to handle physical security services, such as opening doors or preventing burglars from entering a place.

2. SECURITY APPROACHES

2.1 A monitoring system is built for the home automation system

In Shetel and Agarwal IOT paper (2016) explain internet connectivity for all kind of devices and physical objects in real time system. This paper used to provide security for the data.

In Lee(2017) explains in their paper the explains the physical objects in IOT which contains the embedded technology helping in developing machine to machine or man to machine communication. This paper gives data about the security provided for the stand-alone system.

In Chou (2017) describes in their paper a home automated system has a remote-controlled operation. This paper tells about the problem of providing security for the data. The Home Automation System requires heterogeneous, an eternal and distributive computing environment's careful study to develop the suitable HAS.

3. PROPOSED SYSTEM

In this paper, we are proposing a smart home automation system with some sensors. The Arduino is an important sensor and acts as a brain of the system and it will receive all the data sent by the sensors. The Arduino board is used to transfers the collected data to the cloud for storage. During data transmission, to prevent the data from intruders an algorithm named Data Encryption Standard and RSA is used. This algorithm provides confidentiality and security for the data by comparing their efficiency. So that the data can be prevented from the third party.

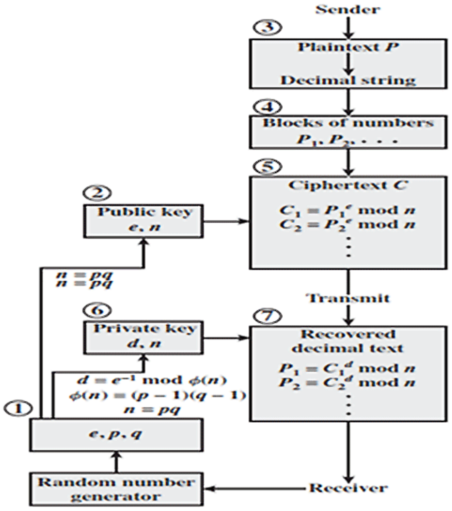


Fig. 1: Proposed system algorithm

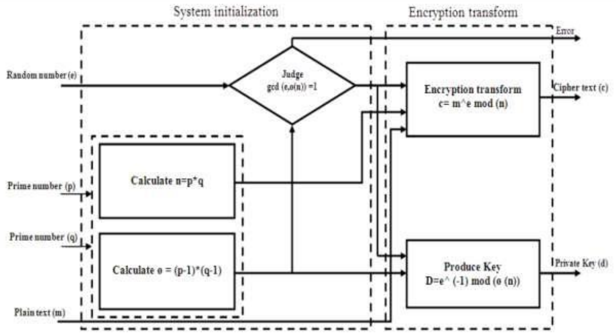


Fig. 2: Proposed system process

4. SYSTEM DESIGN

The **Data Encryption Standard (DES)** is a symmetric-key block cipher used to provide encryption for the data. DES is an implementation of a Feistel Cipher. It uses a 16 round Feistel structure. The block size is 64-bit. Though the key length is 64-bit, DES has an effective key length of 56 bits since 8 of the 64 bits of the key are not used by the encryption algorithm (function as check bits only)

RSA (Rivest–Shamir–Adleman) is the public-key encryption algorithm used to provide security for data. In such an algorithmic program the secret writing secret's public and it's totally different from the secret writing key that is unbroken secret (private). In RSA, this spatiality relies on the sensitive issue of the factoring of the merchandise of 2 giant prime numbers, the "factoring problem".RSA may be a comparatively slow algorithmic program, and sense of this,less unremarkablelyaccustomed directly inscribe user knowledge. More often, RSA passes encrypted shared keys for regular key cryptography that successively will perform bulk encryption-decryption operations at abundant higher speed. cryption operations at much higher speed.

5. HARDWARE REQUIREMENTS

Arduino acts as a brain of the system and processes the information from the **s**ensing element and facilitates the shift ON/OFF of the electrical appliances. Arduino is an associate ASCII text file physical science platform **s**upported easy-to-use hardware and code. Arduino boards are able to browse inputs - light-weight on a sensing element, a finger on a button, or a Twitter message- and switch it into associate output - activating a motor, turning on the associated diode, business one thing online.it consists of each a physical programmable printed circuit and a bit of code, or IDE (Integrated Development Environment) that runs on your pc, wont to write and transfer coding system to the physical board.

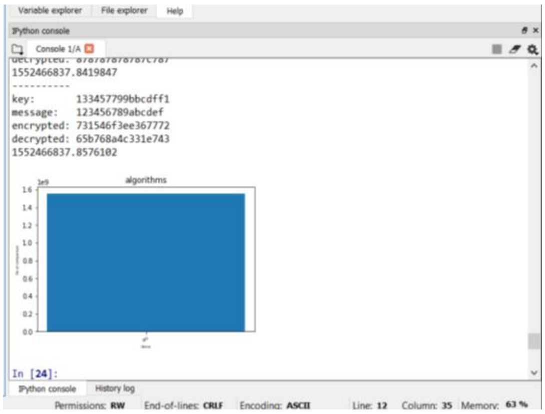
6. INTRUSION IN THE CLOUD

Many IoT systems use a cloud for data analysis, storage, and management. Because cloud providers are responsible for security.Cloud infrastructure working in Internet protocols, which may encourage potential attackers. While part of the responsibility lies with the cloud provider, device manufacturers are responsible for the end user.

7. IMPLEMENTATION AND RESULTS

From this implementation, the comparison graphs clearly show that the data encryption standard (des) security algorithm provides the best security than RSA algorithm for data in the Arduino board then the data are securely stored in the cloud.

7.1 DES algorithm



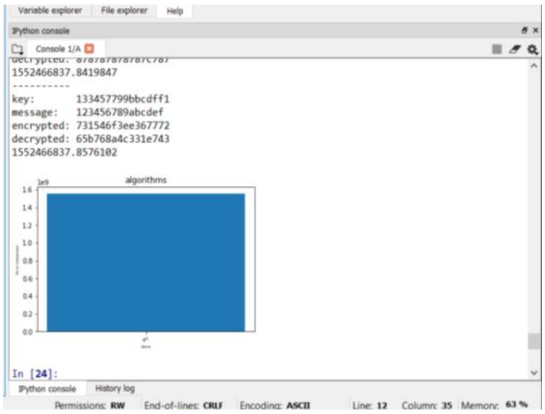
```
1552466837.8419847
----------
key:        133457799bbcdff1
message:    123456789abcdef
encrypted:  731546f3ee367772
decrypted:  65b768a4c331e743
1552466837.8576102
```

```
In [24]:
```

Permissions: RW   End-of-lines: CRLF   Encoding: ASCII   Line: 12   Column: 35   Memory: 63 %

Fig. 3: Efficiency of DES algorithm

7.2 RSA algorithm



```
1552466837.8419847
----------
key:        133457799bbcdff1
message:    123456789abcdef
encrypted:  731546f3ee367772
decrypted:  65b768a4c331e743
1552466837.8576102
```

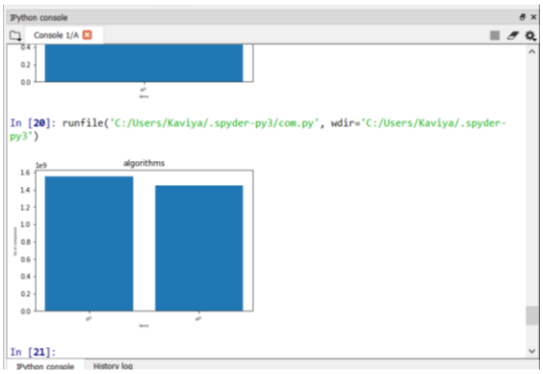
```
In [24]:
```

Permissions: RW   End-of-lines: CRLF   Encoding: ASCII   Line: 12   Column: 35   Memory: 63 %

Fig. 4: Efficiency of RSA algorithm

7.3 Efficiency graph

This graph will clearly prove the data encryption standard algorithm provides the best efficiency.



```
In [20]: runfile('C:/Users/Kaviya/.spyder-py3/com.py', wdir='C:/Users/Kaviya/.spyder-py3')
```

```
In [21]:
```

Fig. 5: Efficiency graph

8. CONCLUSION

The purposed system helps to provide a complete secured building by providing features such as intruder alert, automating electronic item usage. The sensors used here are of low cost. The sizes of the devices are also manageable which makes the purposed system cost-effective. Secured IoT-based home automation applications using WSNs. In WSNs, because of the limited power of sensor nodes, effective key generation mechanism which could accomplish all major data security requirements and consumes less processing time for data encryption is well needed. A security algorithm, namely DES is based on a simple and efficient key generation procedure. The proposed IoT integrates low power ESP 8266 and the proposed DES in WSNs with internet to provide additional benefits of increased coverage range and capability of supporting a large number of sensor nodes due to the usage of low power ESP 8266, it also consumes less processing time for data encryption because of the utilization of DES algorithm.

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