Prototype Implementation Using Cisco Packet Tracer

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1 System Overview

The prototype was implemented in Cisco Packet Tracer to simulate a smart home security IoT system. The design integrates essential IoT components and demonstrates interaction between sensors, actuators, and a monitoring device.

2 Components Used

- Smart Door
- Smart Window
- Motion Detection Sensor
- Smart Camera
- Siren
- Smart Light
- Home Gateway
- Switch
- Home Router
- Smartphone (monitoring device)

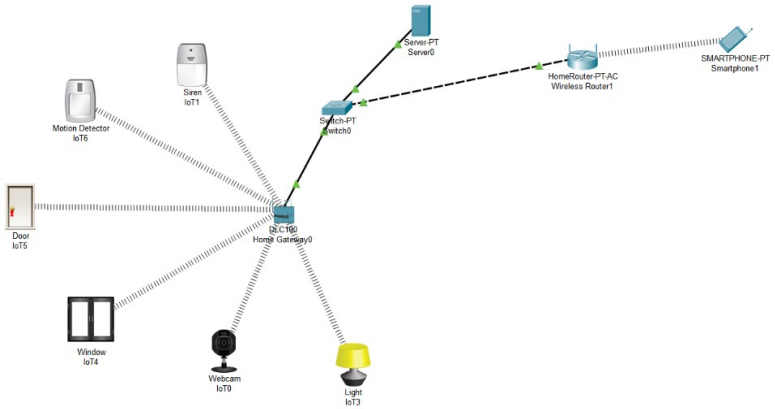

Figure 1: Overall System.

3 IoT Levels of Implementation

1. **Level 1 – Motion Detection**
   A motion sensor detects any movement within the monitored area.

2. **Level 2 – Network Setup**
   The smart devices (door, window, light, siren, and camera) were connected to the home gateway through a switch. A home router was integrated to allow smartphone connectivity for monitoring.

3. **Level 3 – Automated Response**
   When motion is detected, the system automatically activates the siren, camera, and smart light.

IoT Monitor X

IoT Server - Device Conditions

Home | Conditions | Editor | Log Out

Actions	Enabled	Name	Condition	Actions
Edit Remove	Yes	S-W	IoT1 On is true	Set IoT0 On to true
Edit Remove	Yes	OFF	IoT6 On is false	Set IoT1 On to false Set IoT0 On to false
Edit Remove	Yes	D-L	IoT5 Open is true	Set IoT3 Status to On
Edit Remove	Yes	MD-S2	Match all: • IoT6 On is true • IoT5 Lock is Lock	Set IoT1 On to true

Figure 2: Conditions of System.

4. **Level 4 – Remote Monitoring**
   A smartphone connected via Wi-Fi to the home router acts as the user interface, enabling monitoring of the smart home devices.

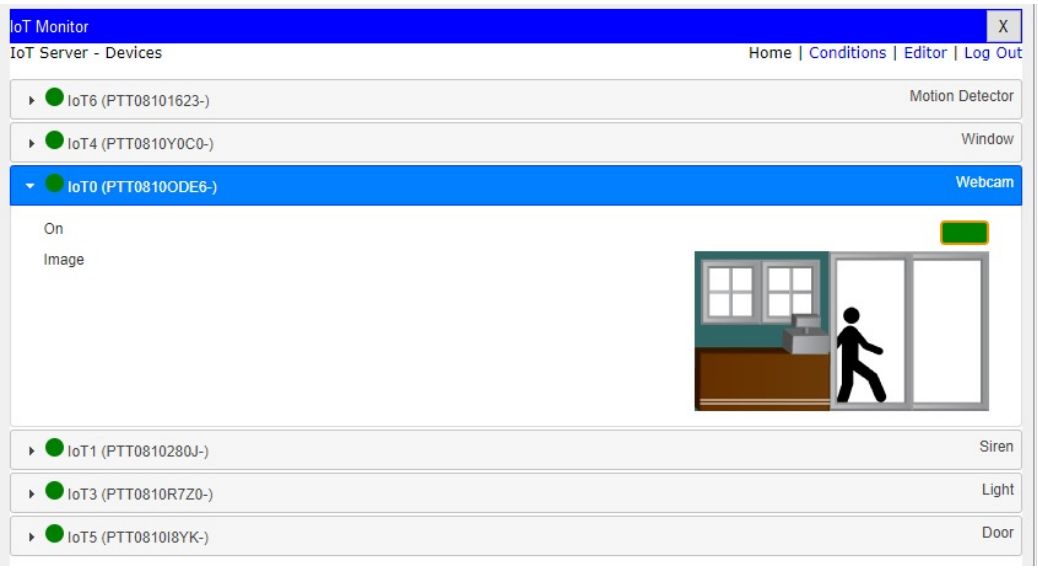

Figure 3: Monitoring the System.

4 Challenges Encountered and Solutions

1. **Level 1 – Sensor Customization**
   The motion detection sensor had limited configuration options, restricting flexibility.

2. **Level 2 – Addressing and Connectivity**
   Initially, the smartphone was incorrectly connected directly to the home gateway. Reconfiguration was required so that the smartphone connected to the home router, ensuring proper addressing and device registration.

3. **Level 3 – Limited Automation Capabilities**
   The system supported only basic *if/then* automation rules, without advanced analytics or complex conditional logic.

4. **Level 4 – Monitoring vs. Control**
   While monitoring through the smartphone was possible, full device control was not supported in the simulation environment.

5 Conclusion

The simulation successfully demonstrated a functional smart home prototype with motion detection, automated responses, and remote monitoring

through a smartphone. Despite limitations in customization, control, and analytics, the project highlights the core features of an IoT-enabled home security system. Future improvements could include enhanced automation logic, two-way control via the smartphone, and integration with cloud-based analytics platforms.