



AutoSec - Automated Network Configuration

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PROBLEM - Kelly Aurand

Many individuals lack awareness of automated network configuration systems and have little understanding of how routers and switches actually operate. This often leads to confusion when managing network setups, troubleshooting connectivity issues, or even implementing basic networking tasks. Recent industry surveys show that only 3% of organizations feel their teams have sufficient automation skills, and more than 25% cite staffing shortages as a major barrier to adopting network automation. In educational environments, limited funding and understaffed IT departments create additional challenges, with nearly 30% of schools reporting they do not have enough resources to support modern networking technologies. Together, these factors highlight a growing need for tools and solutions that simplify configuration processes, automate repetitive tasks, and reduce the reliance on deep technical expertise.

CURRENT SYSTEM - Anatholy Blanco

There are many websites that can explain what switches and routers are but very few actually teach IT professionals how to actually configure them especially through Automation. Most resources teach users basic concepts and definitions rather than teaching hands-on skills. Even automation tools such as Python scripts or configuration frameworks to automate network setups are rarely covered. Basically, there is a lack of skill-based education in automated network configuration.

REQUIREMENTS - Sebastian Gamboa

To achieve its goal, AutoSec is required to help people manage routers and switches without deep networking knowledge and provide easy guidance for setup and configuration. It automatically detects mistakes and suggests simple fixes, while offering simple-to-understand explanations of what each setting does.

- Glossary of basic networking terms
- Quick help pop-ups explaining features in simple terms
- Optional help that walks the users through each action

SYSTEM AND OBJECT DESIGN 1 - Giovanna Curry & Cecil Mais

- Frontend: HTML and CSS were used to create the website in which we educate our users about automated configuration environments.
- Backend: Python was used to create the switch and router scripts. It is used to automate the configurations while Python is utilized for storing the configurations.

```
12  # Configuration commands
13  config_commands = [
14      "hostname Switch1",
15      "enable secret StrongPassword123",
16      "banner motd #Unauthorized access is prohibited!#",
17      "interface vlan 1",
18      " ip address 192.168.1.2 255.255.255.0",
19      " no shutdown",
20      "ip default-gateway 192.168.1.1",
21      "line console 0",
22      " password ciscocon",
23      " login",
24      " logging synchronous",
25      "line vty 0 4",
26      " password ciscovty",
27      " login",
28      " transport input telnet ssh",
29      "interface range FastEthernet0/10 - 24",
30      " shutdown",
31      "end",
32      "write memory",
33  ]
34
35  def main():
36      # Connect to device
37      print("Connecting to switch...")
38      connection = ConnectHandler(**cisco_switch)
39
40      # Enter enable mode
41      connection.enable()
42
```

← [Switch1.py](#) code

```
31
32  /* ----- Header ----- */
33
34  .header {
35      padding: 40px 0 20px;
36      text-align: center;
37  }
38
39  /* remove the big white bar */
40  .header .container {
41      background: transparent;
42      box-shadow: none;
43      border-radius: 0;
44  }
45
46  .logo {
47      color: var(--white);
48      font-size: 2.4rem;
49      font-weight: 700;
50      letter-spacing: 1px;
51  }
52
53  .header p {
54      margin-top: 10px;
55      color: var(--white);
56      font-size: 1.05rem;
57  }
58
59  /* ----- Intro Section ----- */
60
```

Stylesheet.css
code →

SYSTEM AND OBJECT DESIGN 2 - Giovanna Curry & Cecil Mais

By utilizing HTML, CSS, and Python we were able to create three deliverables:

- AutoSec official website with the following pages:
 - Home - an introduction to our company with corresponding links to each page
 - Switch 1 - provides information about the main switch used in the switch/router demo
 - Router - teaches users about what a router is and how it is used
 - Failover Switch - explains that a failover switch is used in case the main switch fails
 - Usage - provides a step-by-step guide on how to set up the switch/router demo
 - About - teaches users about Python scripts
- Switch file - made with Python code
- Router file - made with Python code

Rapid Deployment

Push updates, patch changes, or new settings to dozens of devices in minutes instead of hours of manual CLI sessions.

Automation Friendly

Integrate Python scripts into CI/CD pipelines, cron jobs, or orchestration tools to schedule checks and configuration tasks automatically.

Error Reduction

Centralize commands and logic in a script, reducing the chance of mistyped commands or inconsistent setups between devices.

How to Use a Python SSH Automation Script

1. Define your device settings:

```
import netmiko

device = {
    "device type": "cisco_ios",
    "ip": "192.168.1.100",
    "username": "admin",
    "password": "your_password",
    "secret": "enable_password",
}
```

The Purpose of Switch 2

Switch 2 extends the network's capacity and resilience by adding additional connection points and supporting distributed traffic management. It ensures that as more devices join the network, performance and security remain consistent.

Why a Second Switch Is Good and Necessary

1. **Increased Port Capacity:** Expands the number of available network connections for additional users and devices.
2. **Improved Network Segmentation:** Allows separation of traffic using VLANs for better organization and security.
3. **Redundancy and Reliability:** Provides failover protection to maintain uptime in case of hardware failure.
4. **Performance Optimization:** Reduces congestion and improves throughput across the network.
5. **Scalability and Flexibility:** Enables easy expansion as the network grows without redesigning the entire setup.

Protection When Switch 1 Fails

Switch 2 plays a critical role in keeping the network operational when Switch 1 encounters hardware failure, misconfiguration, or power loss. Properly linking the two switches provides redundancy that prevents total network downtime.

- **Automatic Failover:** Redundant trunk links allow Switch 2 to continue forwarding traffic if Switch 1 goes offline.

FIU

IMPLEMENTATION: AutoSec Website - Giovanna Curry

Step 1: Write HTML Code

```
body {
  font-family: 'Segoe UI', Tahoma, Geneva, Verdana, sans-serif;
  line-height: 1.6;
  color: var(--text-gray);
  background: linear-gradient(135deg, var(--fiu-blue) 0%, var(--fiu-light-blue) 100%);
  min-height: 100vh;
}

.container {
  max-width: 1200px;
  margin: 0 auto;
  padding: 20px;
}

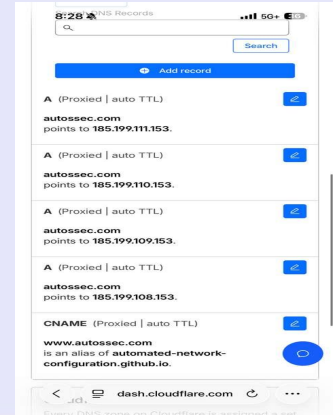
/* Header */
header {
  text-align: center;
  color: var(--white);
  padding: 60px 20px 40px;
  margin-bottom: 30px;
}
```

↑
Screenshot from index.html file

Step 2: Write CSS Code to add style and colors

```
1 /* Variables: Base colors and fonts */
2 :root {
3   --fiu-blue: #001E3F;
4   --fiu-light-blue: #B6B8BC;
5   --fiu-gold: #B08C3C;
6   --fiu-light-gold: #D4A55B;
7   --white: #FFFFFF;
8   --light-gray: #F5F7FA;
9   --text-gray: #C0C0C0;
10  --dark-text: #0D3748;
11 }
12
13 * {
14   margin: 0;
15   padding: 0;
16   box-sizing: border-box;
17 }
18
19 body {
20   font-family: 'Segoe UI', Tahoma, Geneva, Verdana, sans-serif;
21   min-height: 100vh;
22   background: linear-gradient(135deg, var(--fiu-blue), var(--fiu-light-blue));
23   color: var(--text-gray);
24 }
25
26 .container {
27   max-width: 1180px;
28   margin: 0 auto;
29   padding: 0 20px;
30 }
```

Step 3: Buy the domain name, then configure the CNAME and A Record



FIU

IMPLEMENTATION: Router and Switch Code - Cecil Mais

Step 1: Define the device settings

```
import netmiko

device = {
    "device_type": "cisco_ios",
    "ip": "192.168.1.100",
    "username": "admin",
    "password": "your_password",
    "secret": "enable_password",
}
```

Step 2: Connect and run commands

```
from netmiko import ConnectHandler

connection = ConnectHandler(**device)
connection.enable()

commands = [
    "hostname AutoSec-SW1",
    "interface vlan 1",
    "ip address 192.168.1.5 255.255.255.0",
    "no shutdown",
]

output = connection.send_config_set(commands)
print(output)

connection.save_config()
connection.disconnect()
```

Step 3: Extend to multiple devices

```
devices = [device1, device2, device3]

for dev in devices:
    with ConnectHandler(**dev) as conn:
        conn.enable()
        conn.send_config_set(commands)
        conn.save_config()
        print(f"Configured {dev['ip']}")
```

FUTURE WORK - Giovanna Curry

- Creating a full curriculum that teaches our viewers how to create their own automated configuration environments entirely from scratch, even if they have no prior experience in coding or hardware.
- Provide a live demo in which they can ask questions and take notes, which will include an environment to practice new skills.
- Including a live chat with trained professionals to answer questions and to guide our users along their training videos.
- Research and observe IT professionals in order to create an authentic and genuine virtual experiences that our clients will use during their curriculum.

SUMMARY - Sebastian Gamboa

- Intricate technical knowledge can be a hurdle to overcome
- Lack of skill-based education in the field
- AutoSec covers the basic requirements without overwhelming user with complex terms
- HTML, CSS, and Python make up the site
- 3 main deliverables created from mentioned languages
- Proof of concept shows it working across multiple networks

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