

IoT Automated Workspace

Department of Mechanical, Industrial &
Electrical Engineering

ECD811S – Project Presentation

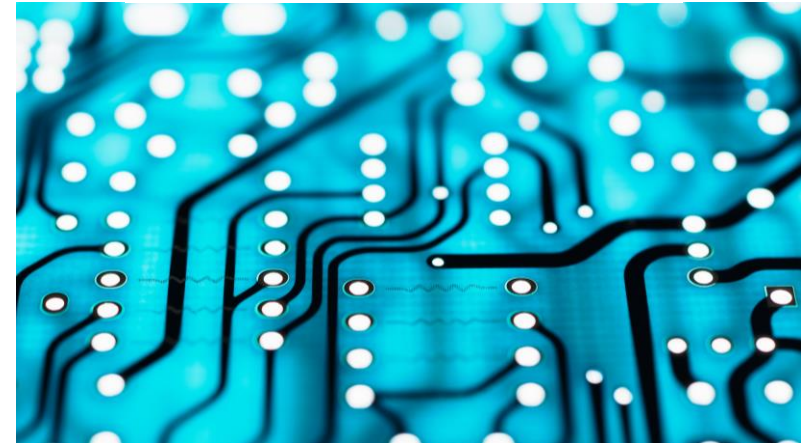
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PAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Faculty of Engineering



OBJECTIVES

- To utilize an Infrared motion sensor to detect human presence on the workspace/office to actuate the lights, fan, and buzzer if motion is detected after work hours.
- To utilize a digital temperature sensor to measure the workspace temperature and determine when to actuate the fan.
- To deploy an IoT system that facilitates monitoring and control of the entire system remotely.



PROJECT INSPIRATION

- The tendency to forget to switch off fans, air conditioners and other devices when knocking off.
- Enhance physical security through automated monitoring and alert systems.
- Contribute to sustainability efforts by reducing energy waste.
- Leverage IoT technology to create a smarter, more responsive workspace environment.



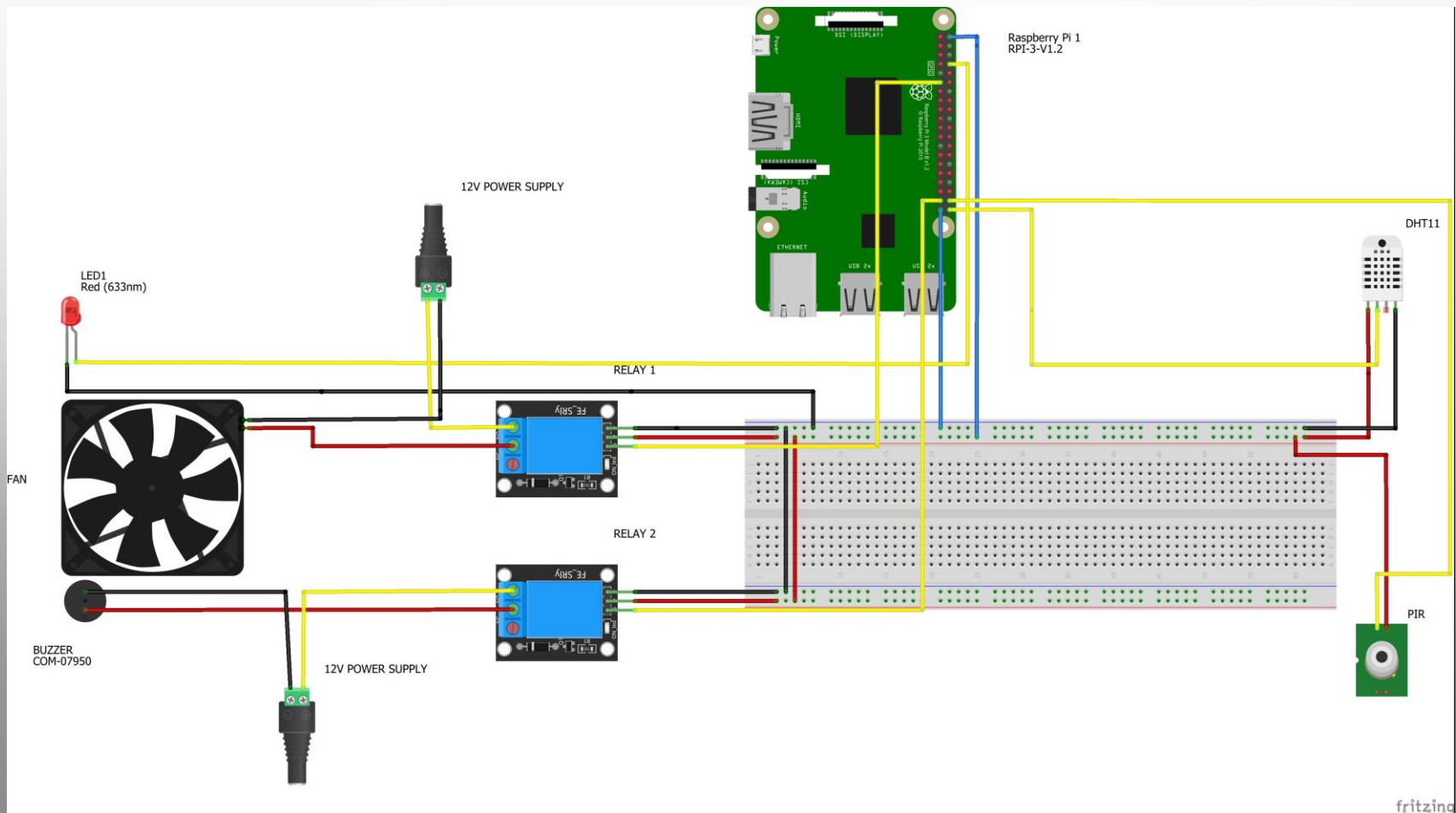
SYSTEM COMPONENTS

- Raspberry Pi 3B+ Microcontroller
- Power Adapter
- PIR sensor
- DHT11 sensor
- 12V Fan
- Blue LED
- Breadboard and Jumper Wires
- Banana to Crocodile cables (2 pairs)
- Relay (2)
- DC power supply
- Buzzer
- HDMI – VGA converter
- VGA Cable

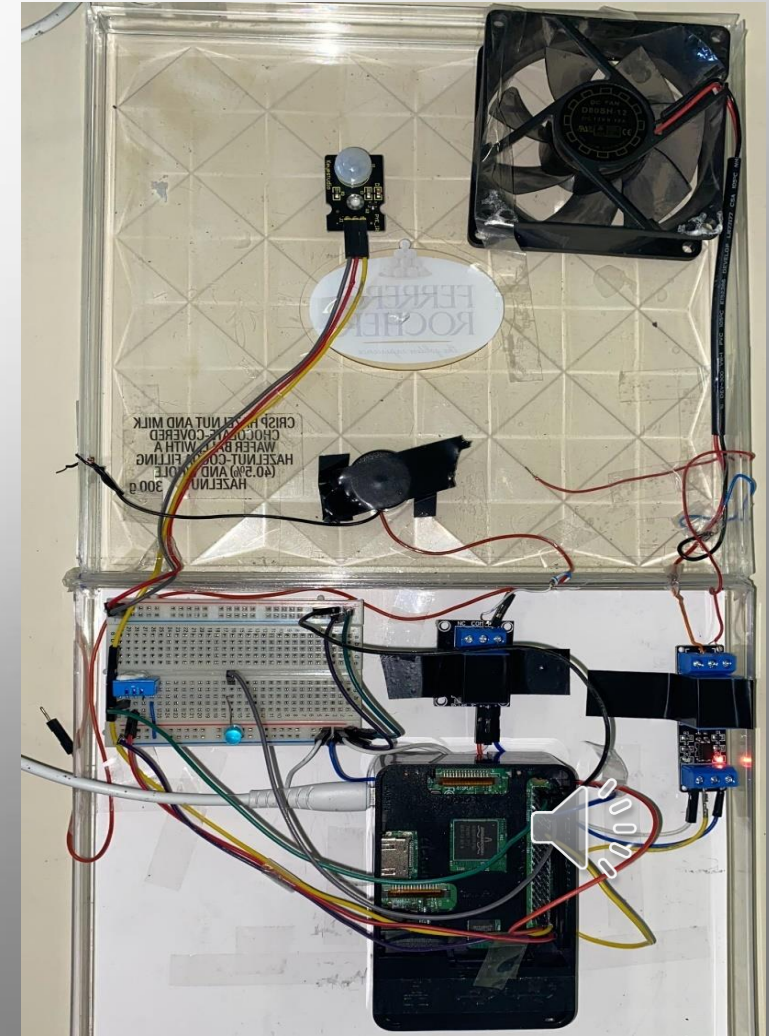


DESIGN

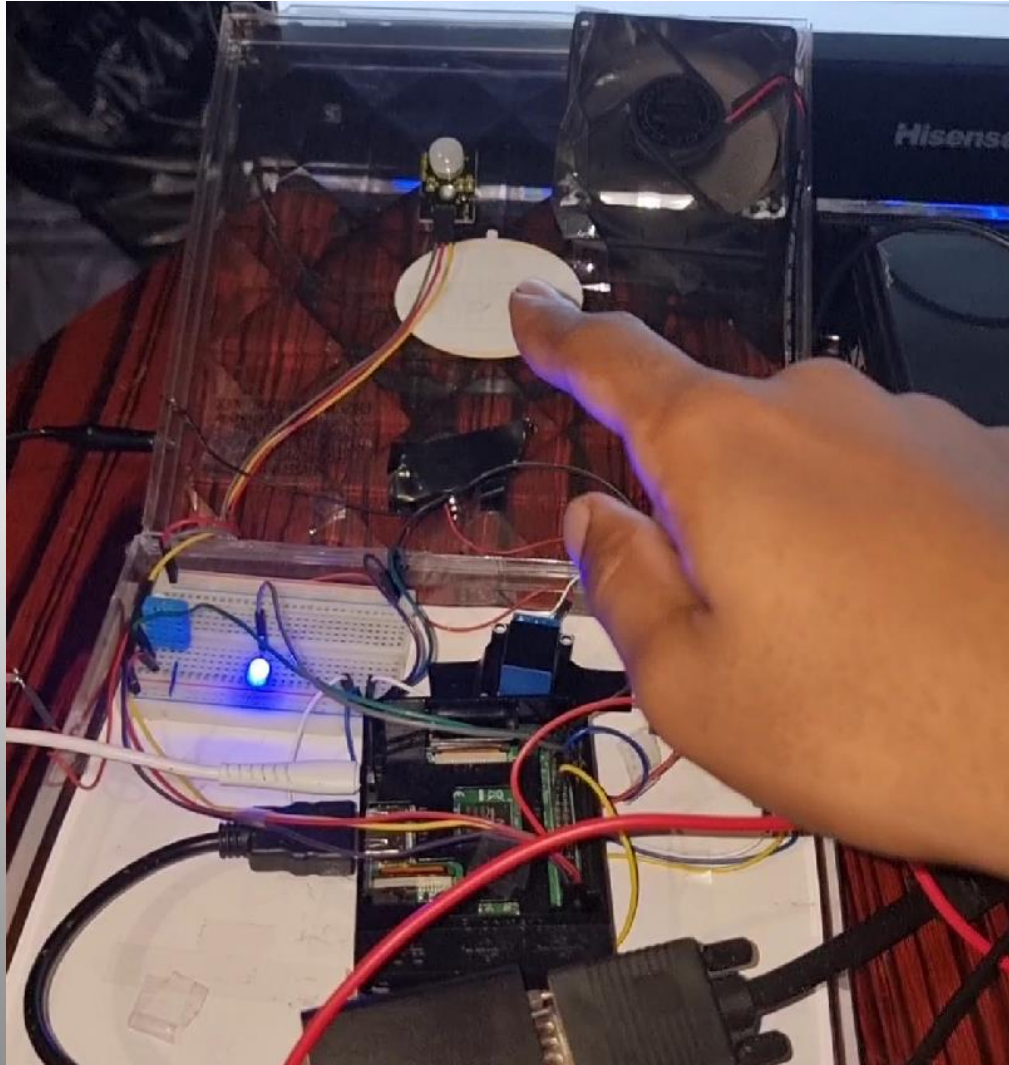
SCHEMATIC DIAGRAM



ACTUAL BUILT SYSTEM



RESULT 1: OFFLINE



```
31 # Global variables to store sensor data
32 temperature = 0
33 humidity = 0
34 motion_detected = False
35

Shell %
NO ALERT

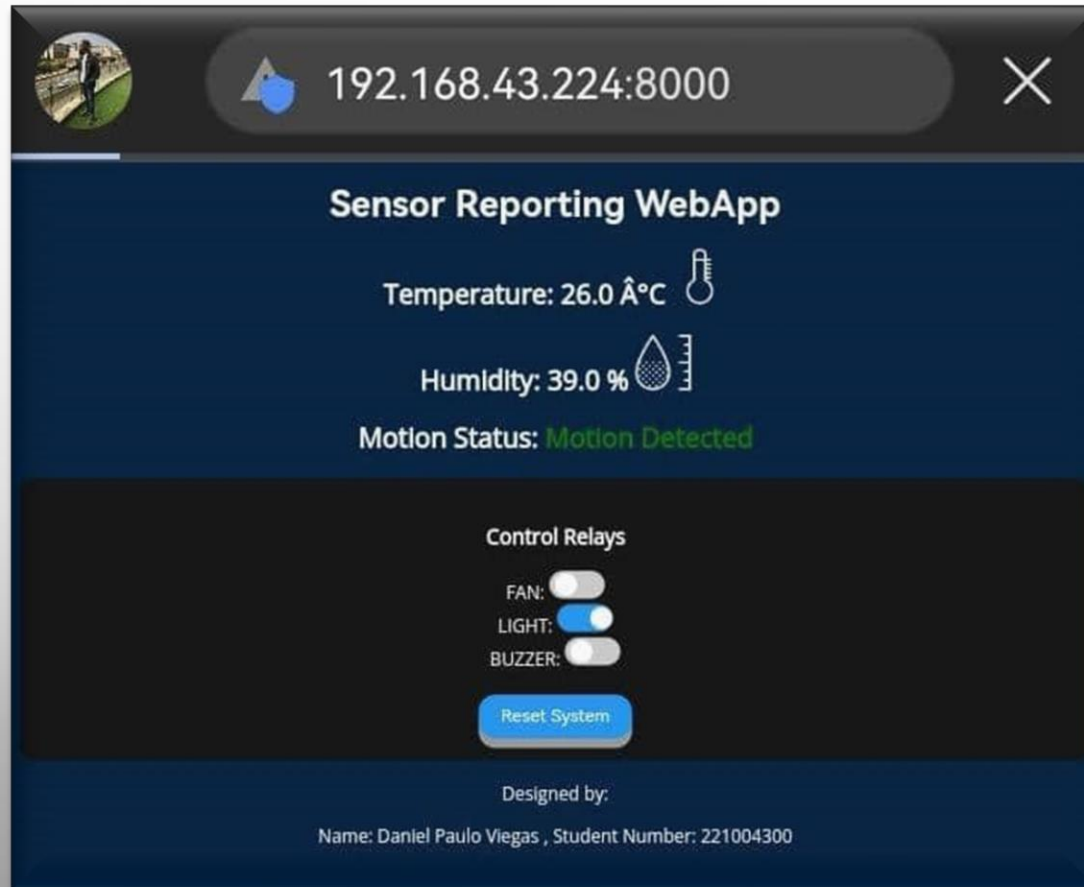
=====
22.0 °C, 43.0 %
Motion detected and High Temp - Relay ON
MOTION: BULB ON
NO ALERT
=====
```

The figure shows the offline results of the system on the serial monitor.

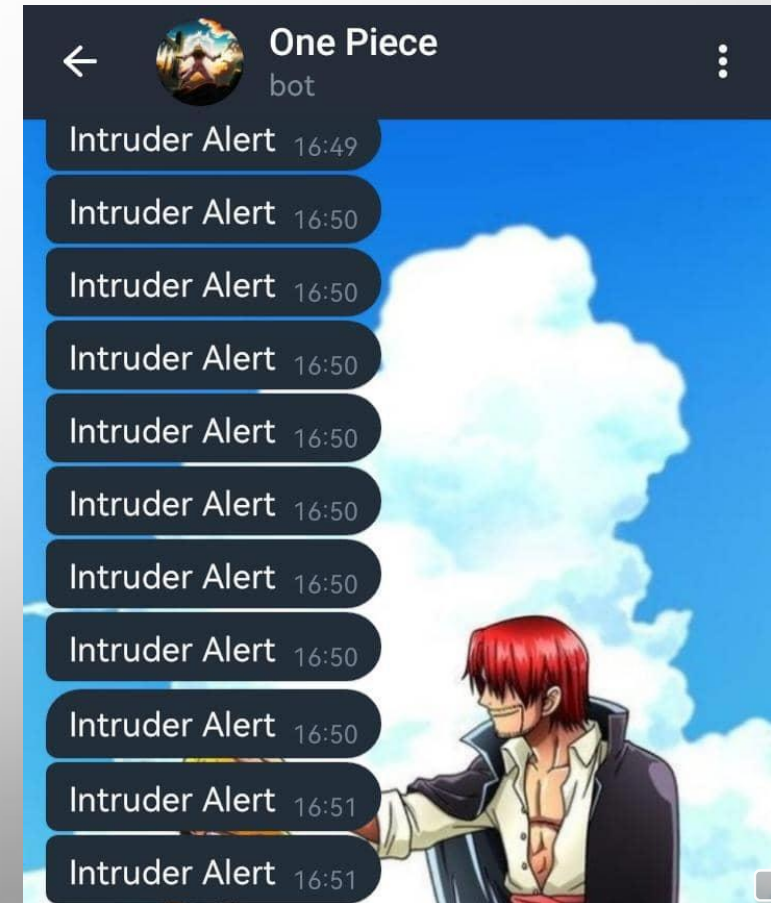


RESULT 2: ONLINE IoT

Website Application



Telegram Bot



The figures above show the online results of the system as observed via the IoT.

SWOT ANALYSIS

STRENGTHS

- Offline Monitoring
- Real Time - Remote Monitoring and Control
- System Scalability

WEAKNESS

- Internet dependency on Remote applications
- No password required to access Web-App

OPPORTUNITIES

- Low costs for R&D
- Exhibit at Career Fair

THREATS

- Limited time to fully test the prototype and rectify errors due to external factors.
- Component reliability



CONCLUSION

The IoT Automated Workspace system was successfully built, and it is a possible solution to energy efficiency and security challenges within office environments. The system's dual modes of operation offer flexibility and convenience.

This project proves that microcontrollers are not simply just for school but can be used improve businesses by supplementing human effort to increase efficiency. Future improvements can further enhance the system's capabilities.



RECOMMENDATION

- Implement a logging system for historical data analysis.
- Add power consumption alerts to optimize energy usage.
- Integrate a security camera for enhanced monitoring.
- Further encryption of Web-App

