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Introduction: This project is about designing and implementing a wireless sensor network that monitors and controls temperature. The project includes the creation and testing of a small physical to gather data and a simulation that shows how a similar sensor would connect to a network and how it could operate heating and cooling devices or a thermostat. The main paper that gave me ideas on how to complete the project was the paper Data centre temperature monitoring with ESP8266 based Wireless Sensor Network and cloud based dashboard with real time alert system by S. Saha and A. Majumdar[1].

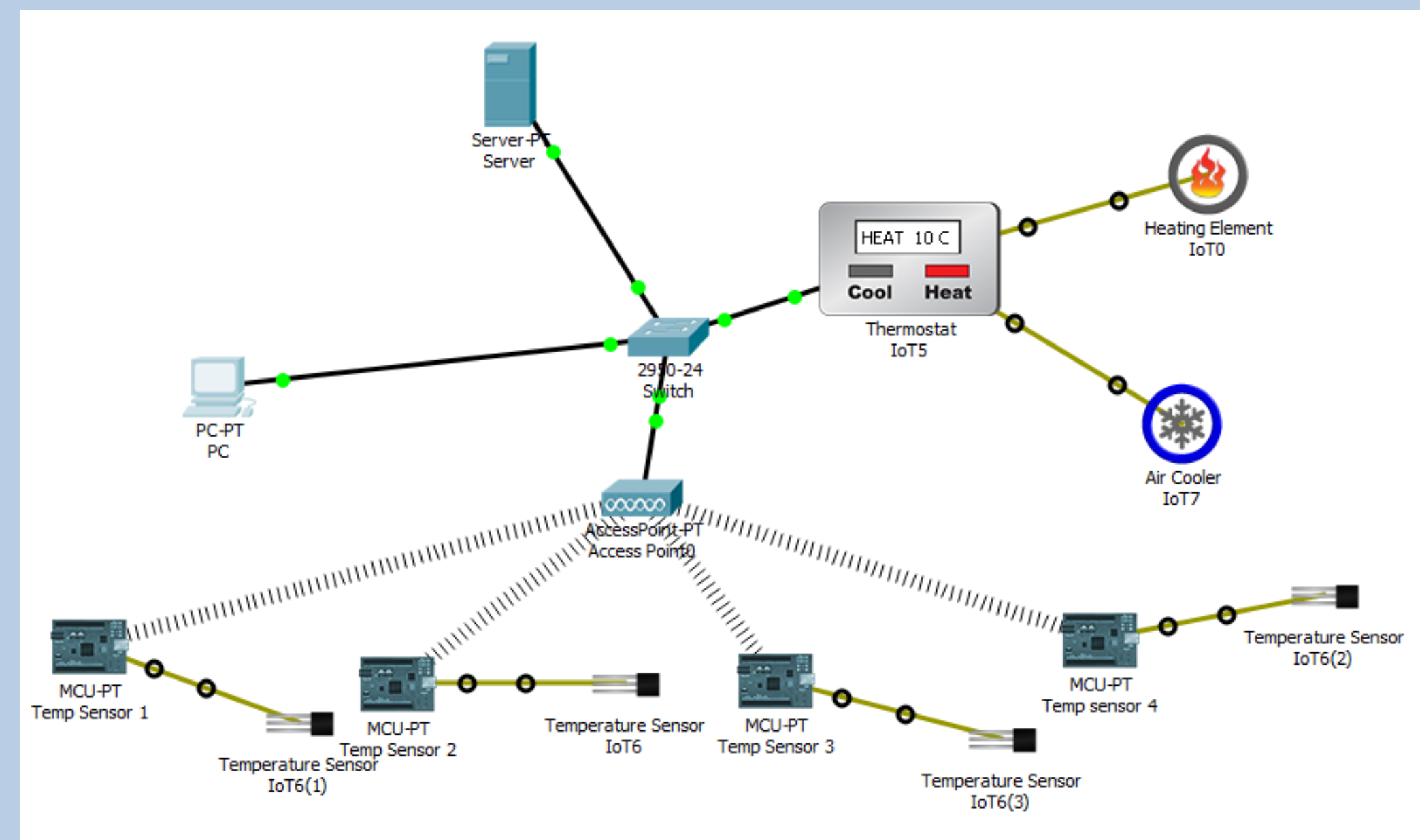
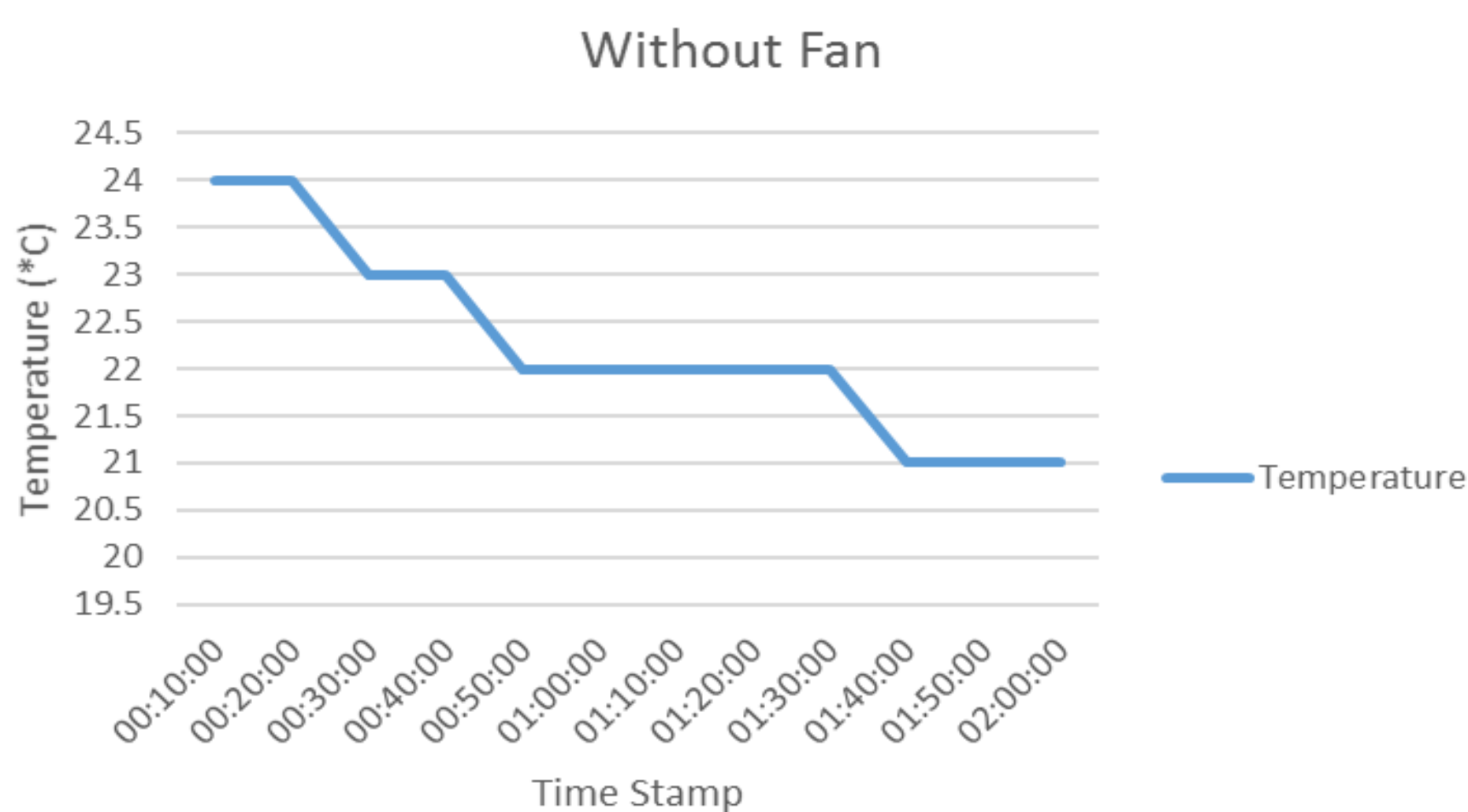
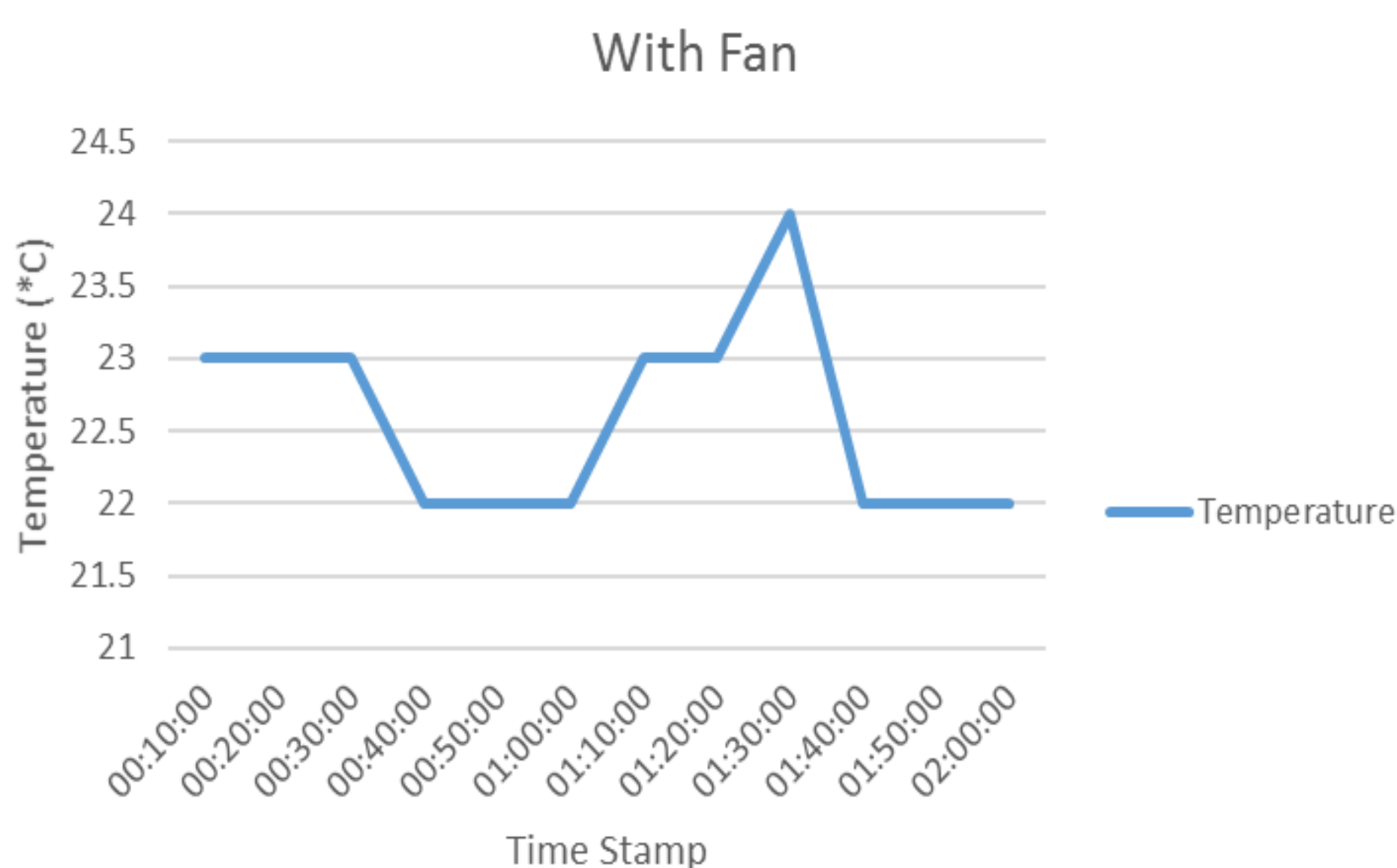


Figure 1 – Packet Tracer Simulation



Graph 1 – Results without the fan



Graph 2 – Results with the fan

References:

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Implementation: To test this project a small physical sensor as created to gather results and a simulation was created to show how it would work in a network. The physical model was made using a DHT11 temperature and humidity sensor and Arduino, the build controls a small fan with the temperature readings. The simulation includes a similar device to the Arduino board and a IoT server that allows the user to monitor and control the devices remotely.

Results: The first graph shows the results when using the physical model without the fan. The tests were run quite late during the day so the graph shows the natural temperature degradation over time as it goes down. Without the fan the temperature will continue to slowly decline over time. The second graph shows the temperature results when the fan was attached. The results started out lower and decreased quickly down to 22 degrees and stay steady there, the temperature then jumped up to 25 degrees because the heating was turned on in the house during testing causing the temperature to surge upwards. Once the heating was turned off the temperature slowly came back down to the temperature went back down to 22 degrees.

Conclusion / Future Work: The small temperature model worked as intended and managed to control the temperature in a small scale test, the results that came out of the first test without the fan were as expected, however the second test with the fan included some anomalous results when the heating got turned on causing the temperature to rise. One area for future work on the project would be making the physical model wireless, the build used to gather data in this project was not wireless since the Arduino kit used to make the model did not include a Wi-Fi module.