# Improving elderly healthcare through the Internet of Things.

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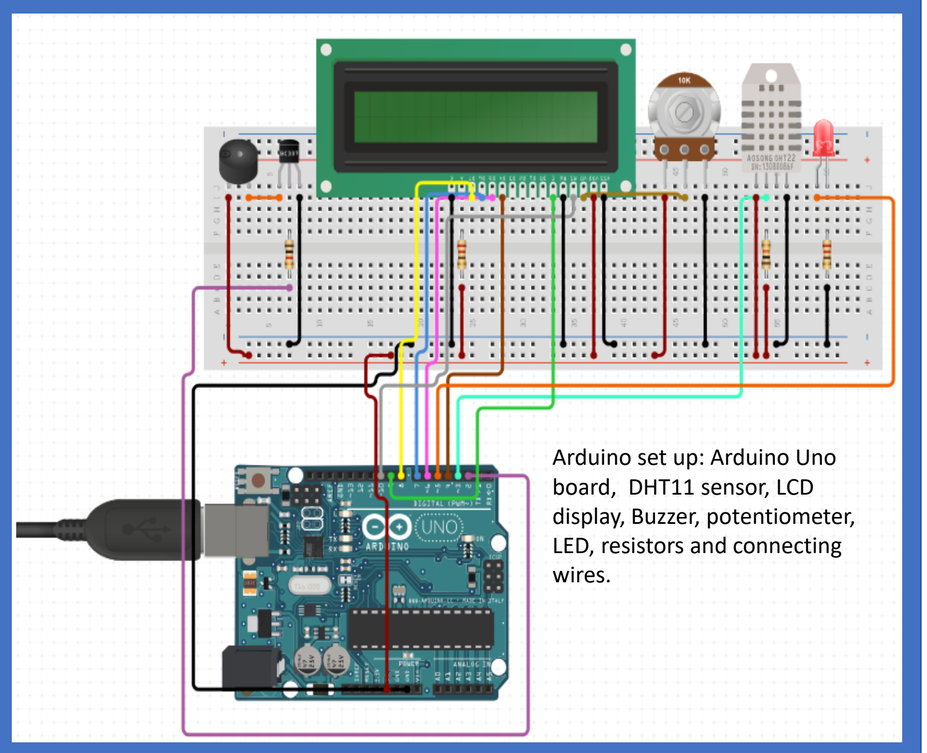
## INTRODUCTION

- The UN estimated the world's population of over sixties to be 962 million and the population of those over sixty to be growing at around three percent yearly (U.N, 2017). With the advancement of healthcare, people are living longer. Elderly people require careful monitoring because a minor injury can have detrimental effects
- The Internet of things (IoT) allows for discreet and adaptable devices, which could allow the elderly to stay in their own home. Research into how the IoT can be beneficial in the care of the elderly is significant because the IoT has the potential to monitor their physical and mental wellbeing, easing the pressure of the caregivers and ensuring the elderly receive the care they require
- An Arduino with sensors will be used to code a thermostat. The thermostat can detect temperature and humidity and alert of adverse readings. This alert system could prevent further health problems, such as hypothermia and so less elderly are likely to get ill, allowing them to continue to live independently




Arduino set up: Arduino Uno board, DHT11 sensor, LCD display, Buzzer, potentiometer, LED, resistors and connecting wires.

**Figure 1: Arduino thermostat alert system**

## METHOD

- Arduino board used to prototype the embedded system
- Arduino will take temperature and humidity readings and send them to serial monitor
- Realterm, the free serial monitor program was used to collect the data from the Arduino IDE serial monitor
- Saved as text file, the data was then displayed as graphs using Microsoft Excel

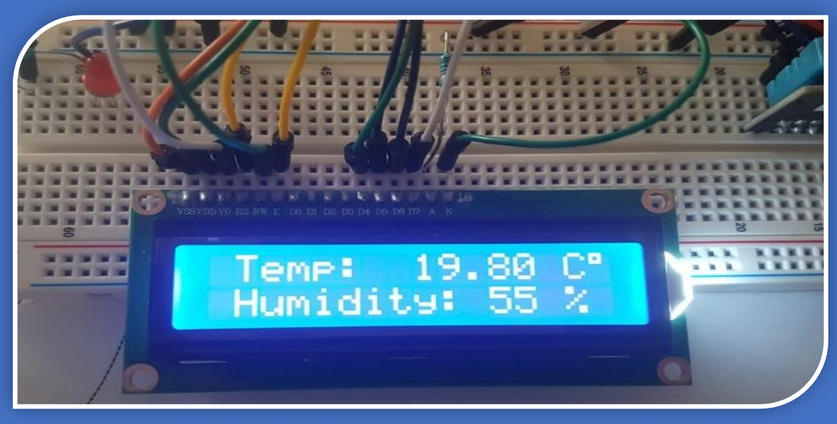
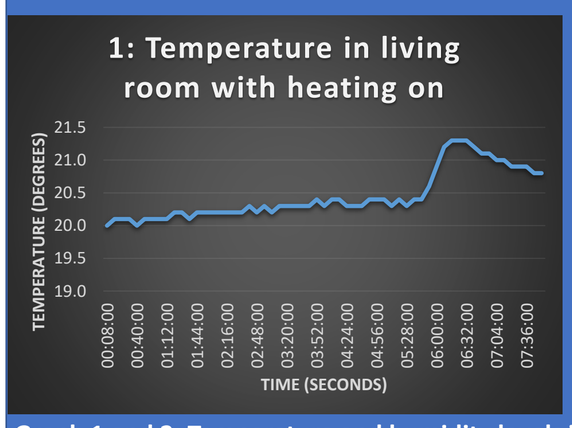
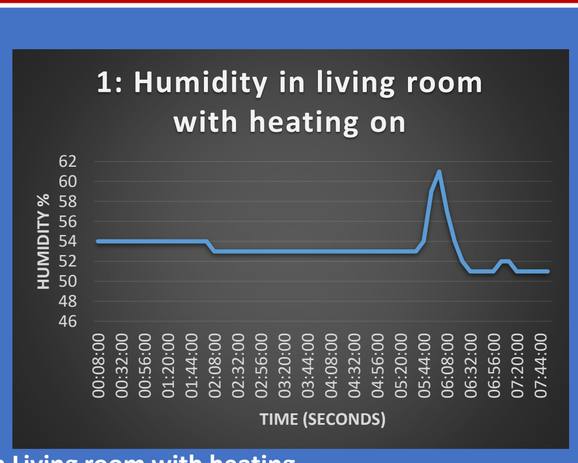
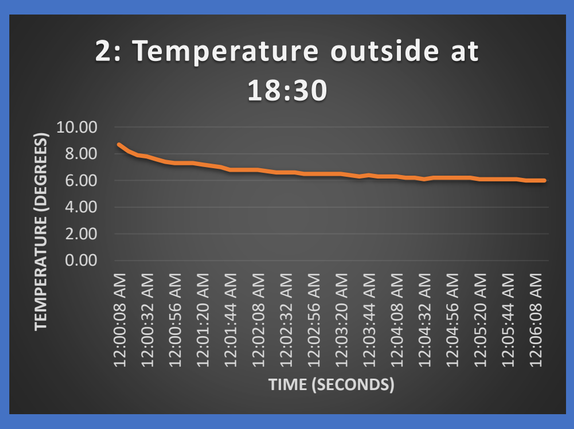


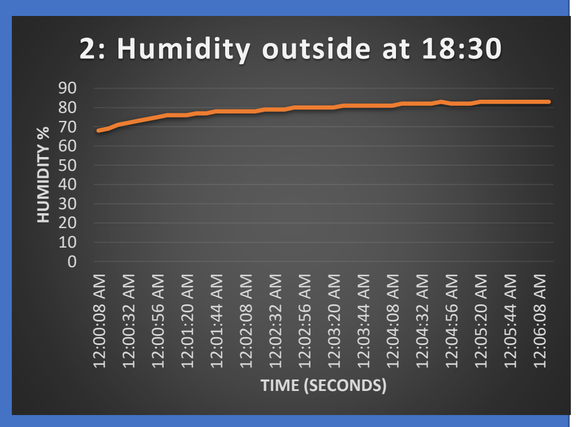

**Figure 2: LCD display showing current temperature and humidity readings**



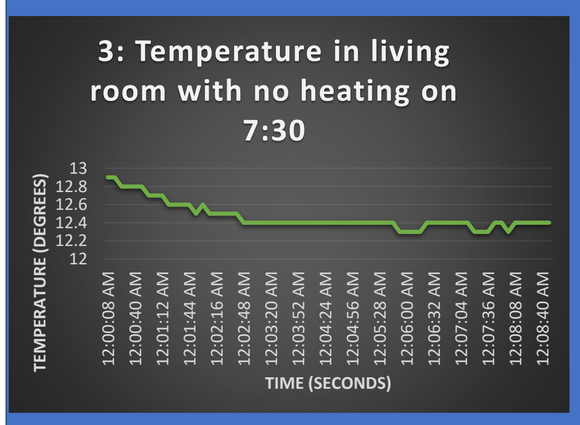



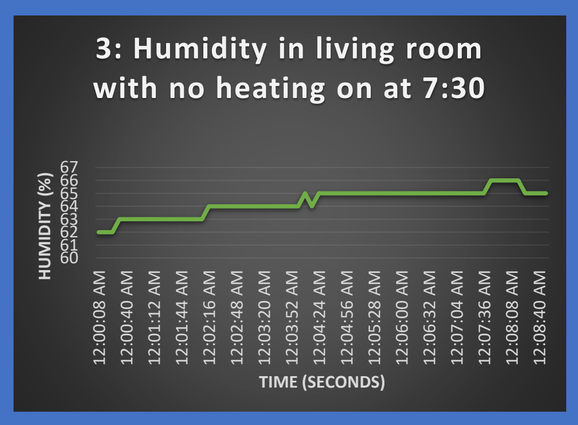

**Graph 1 and 2: Temperature and humidity levels in Living room with heating**



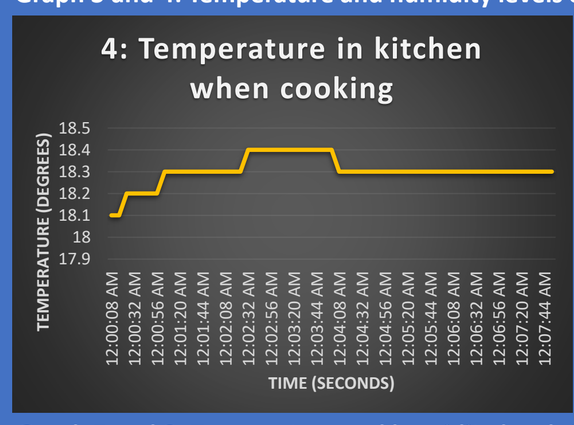



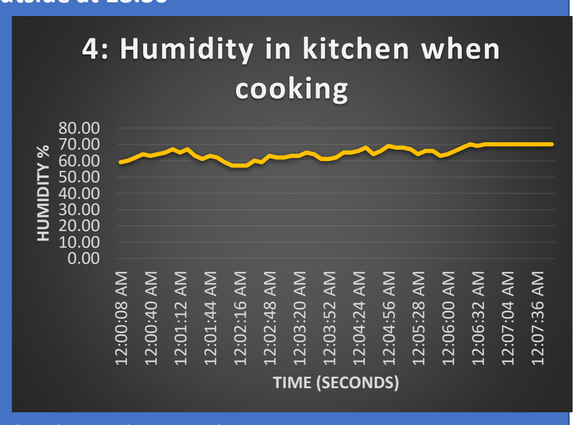

**Graph 3 and 4: Temperature and humidity levels outside at 18:30**




**Graph 5 and 6: Temperature and humidity levels in Living room with no heating**




**Graph 7 and 8: Temperature and humidity levels in kitchen when cooking**

## CONCLUSION

- The results of the thermostat support the idea that the IoT can be used to assist and improve the healthcare of the elderly in their homes
- Although only a small example, this demonstrates that the IoT, when applied on a larger scale could revolutionalise the care of the elderly
- Alerting carers of adverse temperatures could ensure quicker assistance
- Not just an alarm system, the Arduino thermostat also gives carers an insight to the status of the elderly person. This is seen in the results, such as the fluctuating humidity levels on graph 8, which could indicate to the carer that the elderly person is in the kitchen or bathroom
- This could also be extended further by adjusting the thermostat to a wearable device. This would monitor the elderly person's temperature constantly, alerting carers if their temperature was to be outside the safe range. Other IoT devices could be combined with this one, such as blood pressure monitoring or fall detection. The combination of which would ensure constant monitoring

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**References:**

U.N. (2017), *Ageing* [online]. Available at: http://www.un.org/en/sections/issues-depth/ageing/ [Accessed: 16 Jan. 2019].