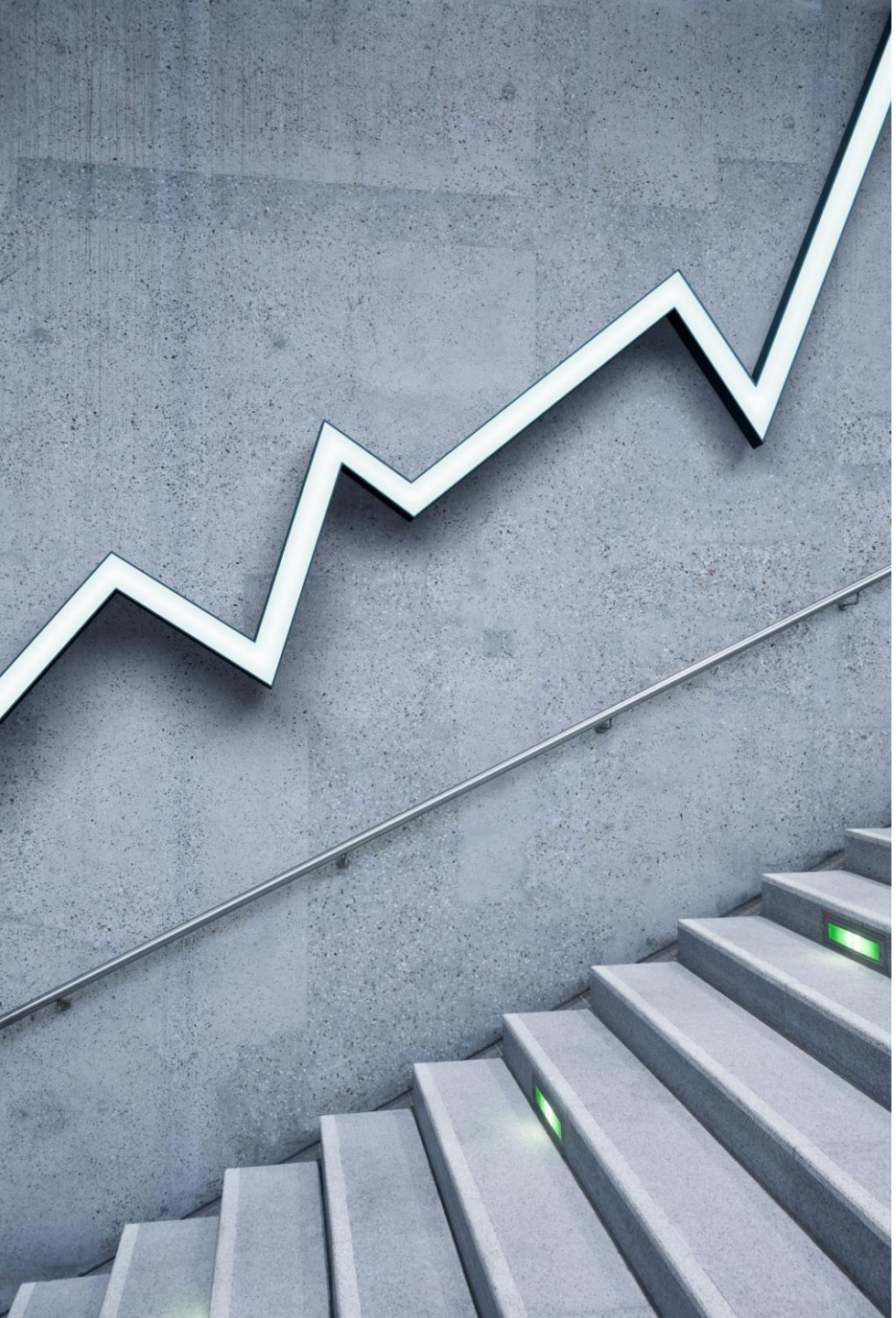

SIT225 Data Capture Technologies

TASK 9.1P: USE CASE DESIGN

Vehicle Alarm Device

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https://www.supercheapauto.com.au/in-car-tech-2/preventing-vehicle-theft.html

Problem Statement

Due to a rise in crime, vehicle related theft has become more prevalent. More commonly, petty theft of items left in unattended vehicles. I have witnessed this myself where thieves have worked through carparks in search of unlocked vehicles, leaving doors wide open and even stealing from my housemate's car in our driveway.

Existing Methods

Such pre-existing devices that combat this type of theft are typically of two types. The first being a wireless tracker, and the second, an integrated tracking sensor.

The wireless tracker is the cheapest yet least functional solution as it does not protect against theft of items.

The integrated device is very effective, since it is able to sense both movement of the vehicle and persons in proximity. This option is the most expensive since features, such as alerts to a user's phone, are subscription based and exclusive to the business's ecosystem.

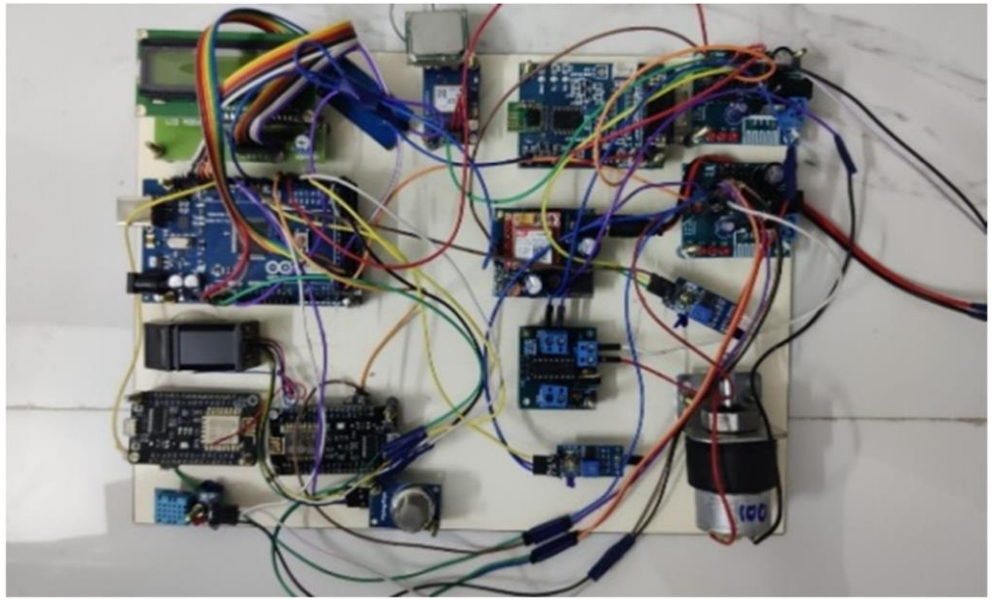
https://www.batterymate.com.au/products/4g-gps-tracker-tracking-device-powerful-magnet-vehicle-car-real-time-location-au
https://anytrack.com.au/gps-tracking-for-vehicles/

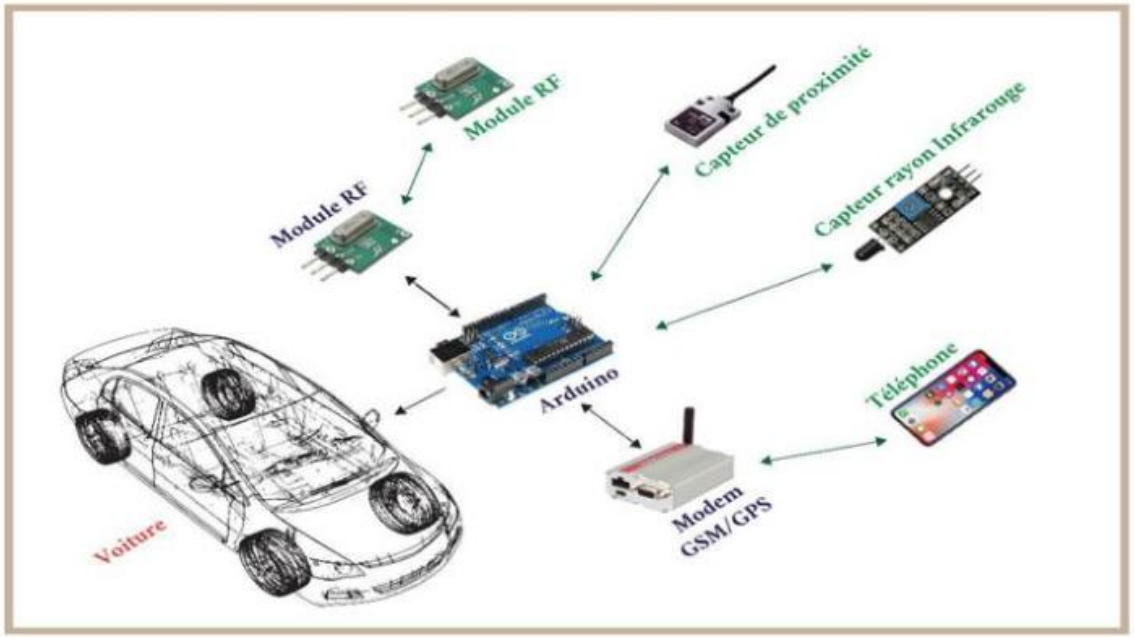
Existing Methods

In terms of other DIY devices, I came across two research papers with different approaches. One being a full black box system and the other, a motion detection system.

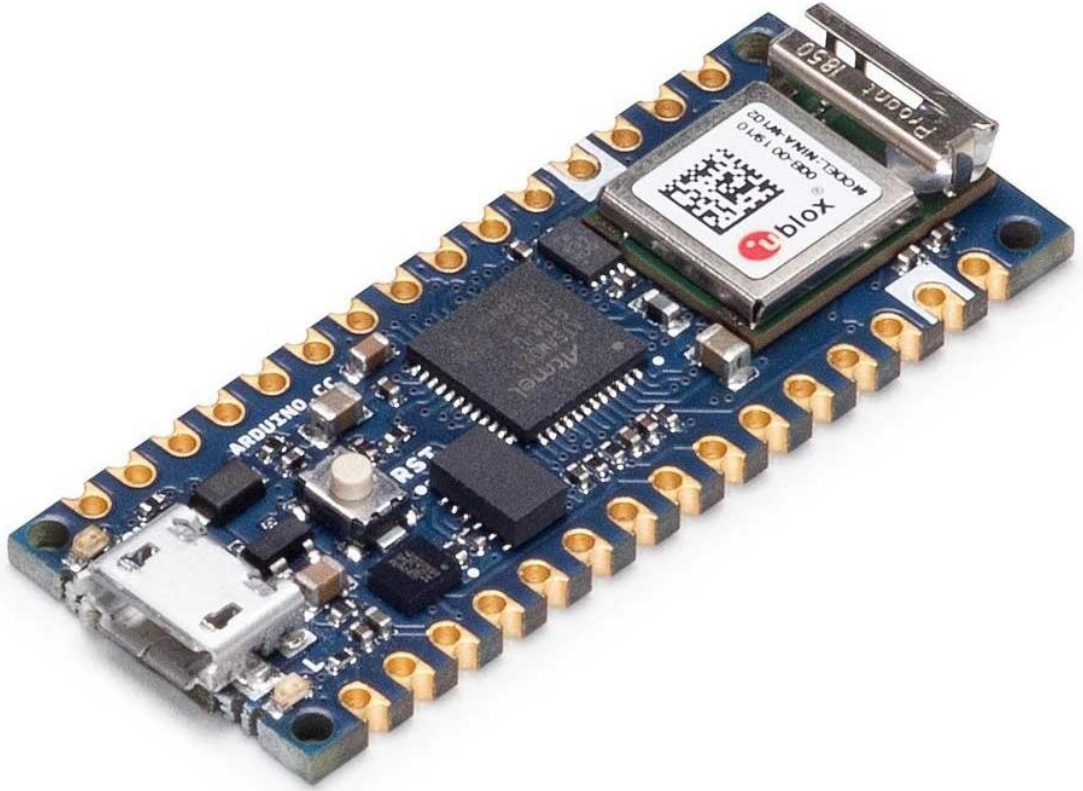
Whist the black box device was very extensive with many sensors and a reliable means of communication to the user, the design is too complicated and expensive for this problem.

On the other hand, the motion detection system is fairly simple, with only the necessary sensors and modules needed to function.





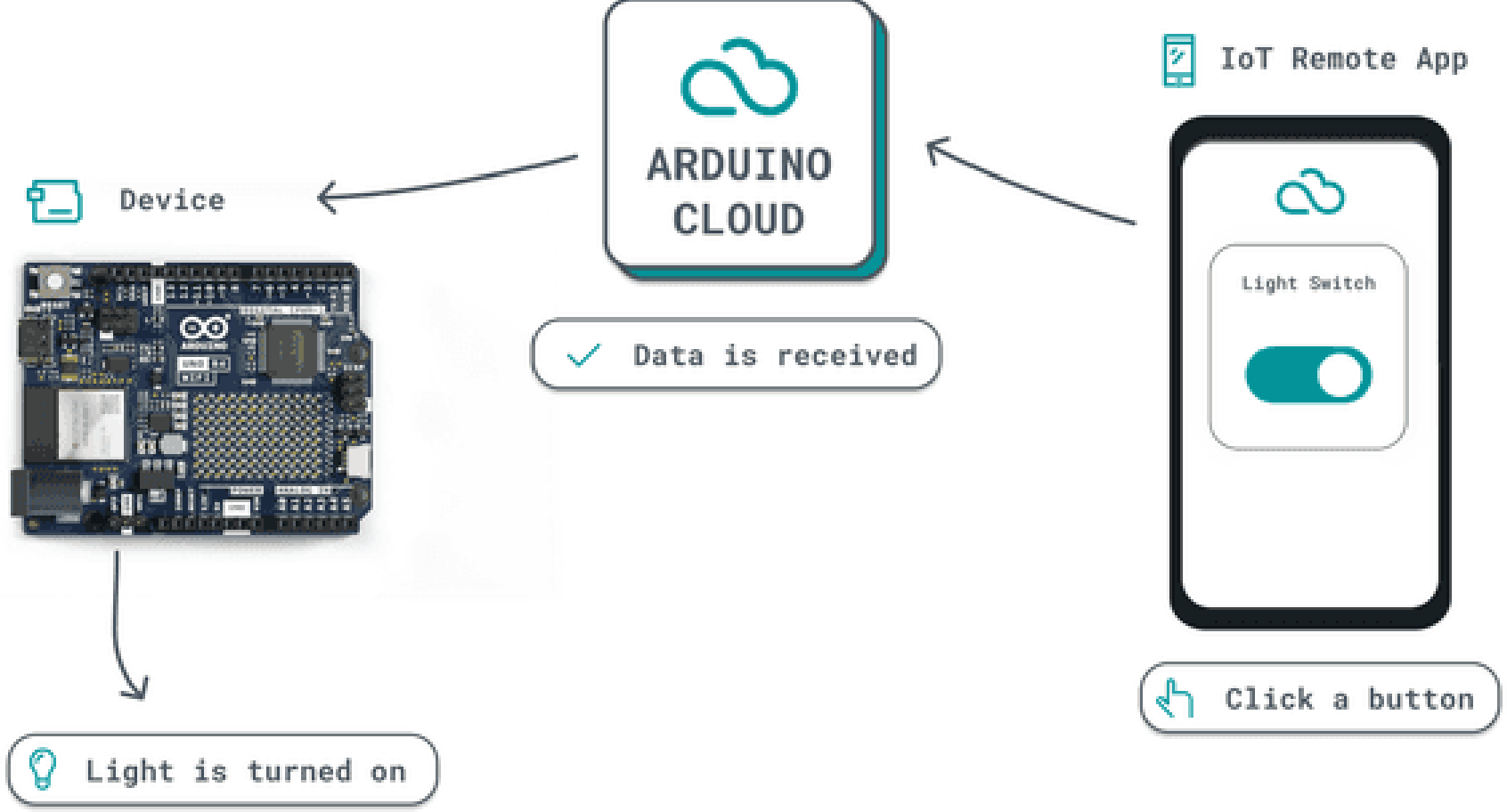
https://dx.doi.org/10.56327/ijiscs.v7i1.1436
https://doi.org/10.1016/j.measen.2023.100721



https://arduinodiy.wordpress.com/2014/09/18/1093/
https://core-electronics.com.au/arduino-nano-33-iot.html

Proposed Method

My prototype to resolve this problem plans to primarily use an Arduino Nano 33 IoT and HC-SR501 sensor. Taking inspiration from the other DIY motion detection system, I have simplified my system by utilising this type of Arduino since its features allow me to create a prototype using a regular internet connection. For proper iterations of the device, a GSM module is required for active WiFi and SMS alerts



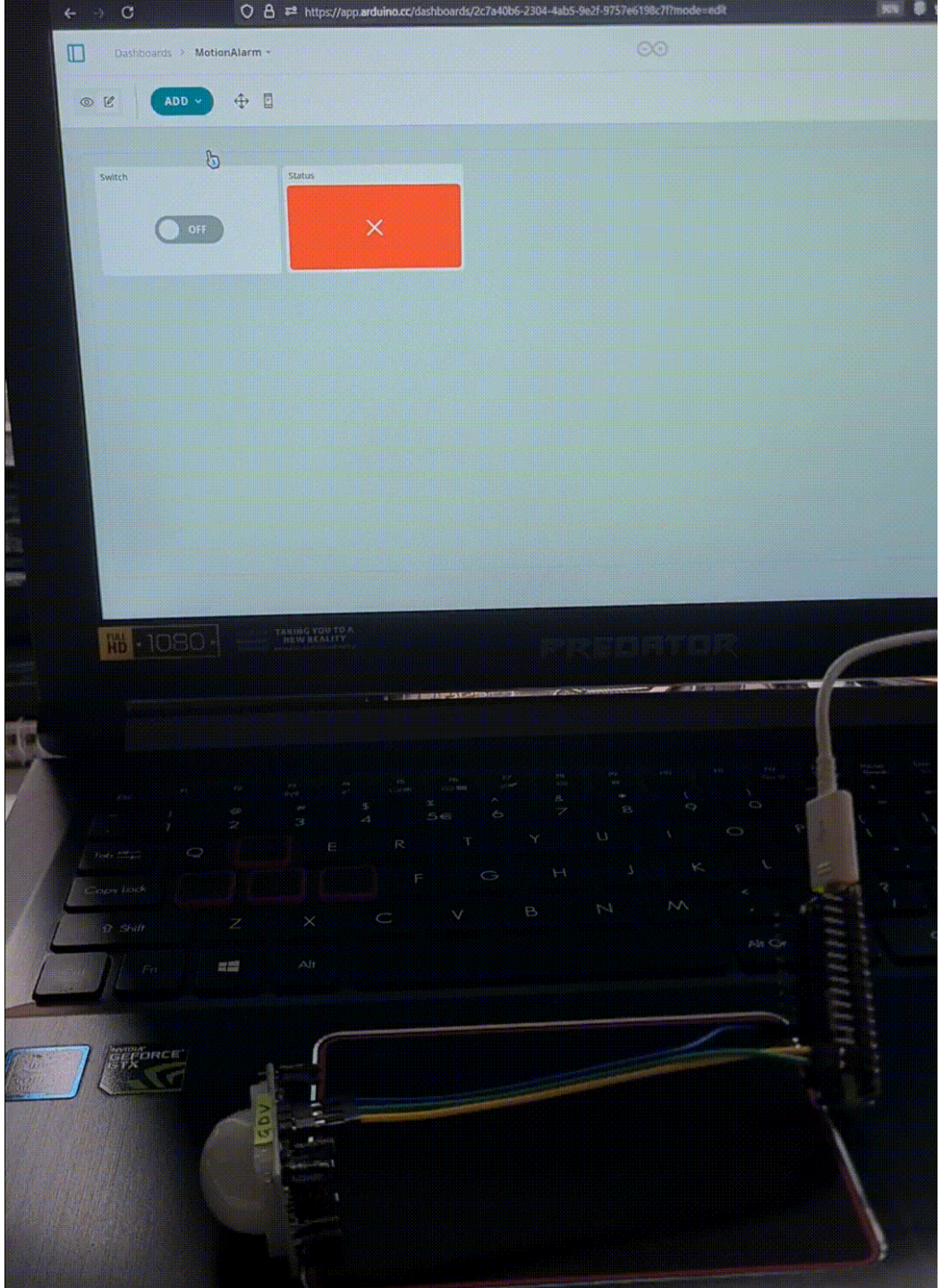
Proposed Method

Initially for my prototype, I planned to utilise Arduino Cloud Triggers in order to create user alerts for the status of the alarm without the use of a GSM module. But this was later to found to be exclusive to the Maker level of subscription plans. Although by using the other features of Arduino Cloud, it's function would be very simple to link if I were to take this path.

Proposed Method

Using Arduino Cloud, I was able to create a dashboard to view and control the status of the alarm.

In this test the sensitivity and time delay was adjusted for more consistent demonstrations with the movement of the whole sensor.



https://www.whichcar.com.au/advice/do-you-need-a-faraday-bag

Conclusion

I would consider my prototype to be somewhat of a success, since the addition of a GSM module and mobile service would bring the cost within the range of existing methods. But the device is able to provide freedom without the reliance of a specialized system as seen with the other commercial devices. It can be used stationary at home with Arduino Cloud triggers, or with active GPS tracking using a GSM module and any mobile service.