## Overview

### Topic

The team proposes to build an application that remotely opens and closes a garage door by controlling a web-enabled Raspberry Pi. As well as this basic feature the product will be able to determine if the garage door is open or closed, log the times the door mechanism is triggered and therefore calculate for how long the door has been open. Setting up push notifications if the door has been open for longer that a pre-determined period of time would also be desirable. It is proposed that determining whether the door is open or closed will be done through the use of magnetic sensors attached to the door and its guide rails. An infra-red transmitter and receiver could also be connected here to create a wireless safety beam to prevent the door closing on objects.

Beyond this, we also propose to integrate weather data, such as current temperature, humidity, whether it is raining and weather forecasts, into the application as we believe this sort of information could be useful to the user of such a product – either to see the forecast when opening the garage door to leave for the day, or in deciding to close the door if it has been unintentionally left open. Integrating other data, such as current fuel prices, is also being considered.

### Motivation

The initial motivation for the project stems from a real-world problem that one team member has encountered. A garage door that is remotely accessible (i.e from another location, not with a short-range radio transmitter that is commonly available) is not just a matter of convenience. Given that garages typically contain valuable items beyond cars such as power tools, gardening equipment and machinery, sports equipment and exercise equipment, and also frequently contain an internal door to the main house, it can also potentially help to solve a security issue, as if such a garage door is left open and unattended for a long period of time, it can leave the owner open to theft or burglary. As will be discussed in a later section, retrofitting older garage door mechanisms to be opened

This project follows the growing trend of the “Internet of Things” (IoT), a concept first conceived in the 1990s (Sunyaev, 2020) but one that has begun to take off as technology has advanced and broadband internet has become more widespread (Ranger 2018). It is estimated that the number of internet-connected devices will exceed 30 billion this year and up to 75 billion by 2025 (*IoT: number of connected devices worldwide 2012-2025 | Statista* 2016), and our idea of a web-enabled garage door opener would be one of these. Were our group able to work on a project such as this, we believe that it would show a number of “soft” skills such as problem solving, communication and team work, as well as potentially some IT specific skills, particularly related to programming were we able to learn to code both the Raspberry Pi to act as the garage door opener and as a web-server, or to code the application that would control it.

### Landscape

A number of IoT garage door openers that will work in Australia already exist, each with their various positives and negatives. Most of the major manufacturers of garage door opening mechanisms now have openers that can have smart features enabled on them to facilitate remote opening via a smartphone application such as the myQ system by Chamberlain/Merlin (*myQ Connected Home | Merlin* 2020), the Controll-A-Door Smart system by B&D (*Controll A Door Smart* 2020) and the Smart Phone Control Kit provided by ATA (*Smart Phone Control - ATA* 2019). However, all of these systems are dependent on the installed garage door opening mechanism being more recently released models, and usually a premium model. This obviously differs from our project idea as our idea is intended to be retro-fitted to older opening mechanisms. Some third-party products have also been identified, such as the Gogogate2 (*Gogogate2* 2020), Garadget WiFi Smart Garage Door Controller (*Garadget* 2020) and the Aeotec Z-Wave Garage Door Controller (*Z-Wave garage door controller, Aeotec* 2020). All three provide somewhat similar solutions to the basic problem, however also all have issues that we believe mean that our project would have a significant point of difference. Reviews of both the Gogogate2 and the Garadget criticise their smart phone applications and the Aeotec garage door opener requires a secondary Z-wave hub, which while useful if using other IoT solutions utilising the same technology, would add significantly to the cost as a stand-alone solution. None of these solutions appear to integrate information from other sources, such as weather forecasts, into their applications either.

*Controll A Door Smart/* 2020, www.bnd.com.au, viewed 7 May 2020, <https://www.bnd.com.au/product-detail/controll-a-door-smart/>.

*Garadget* 2020, Garadget, viewed 7 May 2020, <https://www.garadget.com/product/garadget/>.

*Gogogate2 - Open, close and monitor your garage. Anywhere. Anytime.* 2020, Gogogate 2 - The easy way to open your garage door or gate with your smartphone, viewed 7 May 2020, <https://www.gogogate.com/>.

*IoT: number of connected devices worldwide 2012-2025 | Statista* 2016, Statista, Statista.

*myQ Connected Home | Merlin* 2020, Go Merlin, viewed 7 May 2020, <https://www.gomerlin.com.au/products/myq-connected-home/>.

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*Smart Phone Control - ATA* 2019, ATA Garage Door Openers, viewed 7 May 2020, <http://www.ata-aust.com.au/accessories/smart-phone-control/smart-phone-control>.

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*Z-Wave garage door controller • Aeotec* 2020, aeotec.com, viewed 7 May 2020, <https://aeotec.com/z-wave-garage-door-controller/>.