

## Personal info:

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Github information:

<https://github.com/shaneandrewmitchell/IIT>(Repository)

<https://shaneandrewmitchell.github.io/IIT/> (Web page)

## Background info:

I currently live in Sandgate, Brisbane. I am originally from Melbourne but have been living in Brisbane for about 4 years. An opportunity to live on the Sunshine Coast originally presented itself in 2016 to work for a Radio Communications company in Mooloolaba so I left Melbourne for an exciting journey to the Sunshine Coast. I was the Technical Manager and looked after the radio communications operations for Surf lifesaving Queensland. In my tenure at this company, I was the Project/Technical Manager that upgraded the antiquated analogue radio system to a digital radio system from Mackay to Port Douglas, FNQ. The project was completed and I had to return to Brisbane for work. I worked for another communications company in Brisbane and ended up in the R&D team programming in Python and C. Unfortunately, that company closed and I ended up as an Electronics Technician at my previous employer, MST Global. I wrote several programs in Python, C and designed a few minor electronic products using Arduino and automation software.

## Education:

1. Associate Degree in Electronic Engineering
2. Certificate IV Management
3. C programming language
4. Python programming language

## Languages:

1. English, native
2. Japanese, basic

## Hobbies:

1. Playing guitar
2. Coding
3. Listening to music
4. Going to the gym

## *Interesting facts:*

1. Owned two recording studios, one analogue and one midi. Recorded music for local bands and artists.
2. Researched and developed smart meter electronics for Alinta Energy at Vipac Engineers and Scientists.

## **Interest in IT:**

As a child, I always had an interest in electronics and how things worked. I was constantly disassembling electronic/electrical devices around the house, fascinated by the how and why. In those days there was no such thing as IT, the internet and personal computers didn't exist. As I got older, I decided to pursue a career in electronics and became an Electronics Technician at 18 and started to repair devices that had microcontrollers in them. I was amazed how they worked and wanted to learn more.

Eventually, I was able to afford a PC (ATARI 4MB ram 12Mhz bus, 16Mhz processor) and at \$1600 was expensive for those days. This was for my Midi recording studio and was running QBase as the midi software. I was again fascinated by how it controlled the electronic instruments and the communications between those instruments with the QBase software.

I finally decided to embark on the Associate Degree of Electronic Engineering to further my knowledge of microcontrollers and electronics. After completing the course, I had several different jobs working in the field of electronics. I've watched electromechanical devices evolve into purely electronic devices without moving parts and with increasing software/firmware running them.

The industry of electronics, in Australia, is rapidly declining and most of the design/manufacturing is done in other parts of the world where it is cheaper. It's a shame, as understanding electronics is not an easy skill to attain.

I've been watching the decline in electronics for a few years now and decided earlier that I would teach myself the C programming language to improve my skills. I enjoyed it so much I decided to learn Python as well. Now I enjoy coding more than I enjoy electronics. I then decided I wanted to pursue a career in IT and learn the nuances of this field. I investigated several institutions and computer science courses, which lead me to RMIT's bachelor of IT. It offered everything I needed in a course, flexibility, autonomy and content. My father and friends have been educated at RMIT and all have had successful careers.

After completion of the bachelor of IT I'm hoping to gain employment working in the field of IoT, software development, embedded design, frontend/backend development, maybe AI/ML. I'm hoping I will have a greater understanding of IoT, computer systems, networking, AI/ML, software development to facilitate a quality outcome in my future development in these fields. My interests in IT may change as I learn more and become more aware of the direction in which IT is heading.

## **Ideal job:**

### *Position description:*

Working with a team of engineers to develop web applications that are embedded on Linux IoT devices. Backend/frontend development on electronic devices, IoT developed software to interface to the cloud, future product development and legacy product support.

This job has great appeal to someone with my interests.

1. Working with other engineers/developers.
2. IoT electronic devices.
3. Developing software/firmware in the imbedded realm.
4. Web development on IoT devices.
5. Assisting in future product design.
6. Background in electronics.

### *Skills/experience required:*

Bachelor of IT, computer science or software engineering. At least 3 years in a similar role. Vue development, PHP language, AWS serverless technologies, SQL, GitHub version control via the command line, Webpack, embedded Linux/Ubuntu, web security, C++, HTML5, Nginx web servers. Ability to problem solve, adapt, communicate effectively, and learn new technologies quickly.

### *Current Skills:*

1. Associate Degree Electronic Engineering.
2. 33 years of Electronics experience.
3. IV Management. Problem solving skills.
4. Python programming language.
5. C programming language.
6. Basic Linux /Ubuntu command line.
7. Embedded design using C on microcontrollers.

### *Plan to obtain above skills:*

The first step to attain the skills required for this job is to complete the Bachelor of IT. I'm hoping it will provide the necessary information and skills to self-learn the above technologies. I already have an understanding of the C programming language so the next logical progression would be to learn C++. I am currently learning GitHub and HTML and hopefully, in this course, I will learn some of the other skills that are required. I hope to gain employment in a lesser role in IT such as, IT help desk support well before I complete this course then, hopefully work up to a more responsible role as I become more skilled. The proceeding steps will be highly dependent on how I progress in the course and my ability to learn new technologies quickly.

## Personal profile:

Myers-Briggs test: INTJ-Turbulent.



ALL ABOUT INTJ PERSONALITY TYPE In-text: (All About the INTJ Personality Type, 2021) Your Bibliography: Truity.2021. All About the INTJ Personality Type. [online]Available at: <<https://www.truity.com/personality-type/INTJ>> [Accessed 13 March 2021].

## Big 5 test:

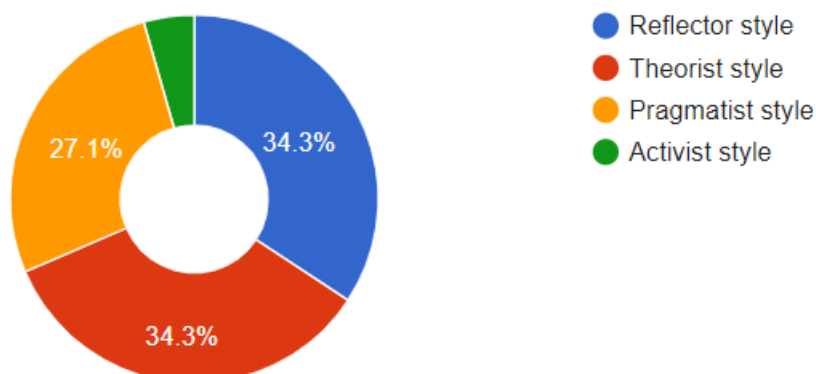
Factor	Factor label	Raw score	Score percentile
I	Extroversion		13
II	Emotional stability		34
III	Agreeableness		2
IV	Conscientiousness		87
V	Intellect/Inagination		76

Big five personality trait scores calculated by [openpsychometrics.org](https://openpsychometrics.org)

In-text: (Test, 2021) Your Bibliography: Test, M., 2021. Big 5. [online] My Personality Test. Available at:<[https://my-personality-test.com/big-5?gclid=CjwKCAiA4rGCBhAQEiwAeIVti8Byd\\_oBkysOrDWDd87p7oTOLk0ctQ9q4Mkr1B8hn6orbr1k-AIWaxoCMycQAvD\\_BwE](https://my-personality-test.com/big-5?gclid=CjwKCAiA4rGCBhAQEiwAeIVti8Byd_oBkysOrDWDd87p7oTOLk0ctQ9q4Mkr1B8hn6orbr1k-AIWaxoCMycQAvD_BwE)>[Accessed 13 March 2021]

## Honey and Mumford learning style test:

### Learning styles pie chart



LEARNING STYLES QUIZ In-text: (Learning Styles Quiz, 2021) Your Bibliography: Emtrain.eu. 2021. Learning Styles Quiz. [online] Available at: <<http://www.emtrain.eu/learning-styles/>> [Accessed 13 March 2021].

I'm unsure what the test results represent as I believe that personalities are dynamic. In the tests I could have chosen what I would wish to believe about myself and not chosen the reality. This could skew the results and not be a truthful representation of my personality, learning style or psychometric evaluation.

The results of these tests indicate I prefer to work on my own and a possibility of dismissing other team members ideas. They also indicate that I can be critical of myself and others, which can possibly alienate me or aggravate the team.

I believe the best action to take would be to inform the team of my personality traits and what the challenges could be. Communication is paramount to a high functioning team. Choosing the right type of personalities in a team is crucial however, that is not always possible and some team members may not fit. If I'm a square peg in a round hole, I may need to find an appropriate team to join.

## IoT Project:

### *Background:*

The past decade has shown some remarkably interesting developments in information technology and one such development that piques my interest is IoT. There are a multitude of applications for this technology from mining, healthcare, construction, infrastructure, manufacturing, agriculture etc. The use of these devices has become the norm for data collection and monitoring. WiFi and cellular infrastructure have also dramatically increased allowing the use of such devices and ease of connection to the internet. The future, I believe, will only improve in terms of data collection and wireless monitoring using IoT.

### *Overview:*

I envisage an IoT device that connects to existing WiFi infrastructure and reports to a console and reports data that is collected from the IoT device. The IoT device will be an ESP8266/Arduino Nano 33 IoT, transmitting via WiFi, that connects to a local hotspot/WiFi connection. The information will be displayed on a GUI (Web page, PC application, smartphone, tablet etc.) that will display the data collected and report the position of the IoT device relative to a WiFi hotspot or a WiFi connection point using RSSI (receiver signal strength indicator) levels to determine position. GPS would be another alternative for position location however, buildings, underground car parks, underground mining don't always offer GPS signals and pose great difficulty and expense to implement such technologies. The data collected from the IoT device could be heart rate from a patient, position and vital signs from a miner, position of a nurse/doctor in a hospital that is without GPS, position of vehicle in an underground car park, position of vehicle in a tunnel etc.

### *Motivation:*

I had the opportunity to work with some high-level technology at MST Global (my last employer), which I found quite interesting. The most compelling of which, is their underground tracking systems for miners and equipment. I can see there are many uses for this technology in various sectors of other industries. One would be in the healthcare industry where patients and medical staff can be tracked within a building that doesn't offer GPS. This will aid in the saving of lives as well as time resources and money for healthcare facilities. An outpatient can also be monitored remotely from their home reducing the need for onsite healthcare and reducing cost to the patient and healthcare systems. This technology already exists however, I'm interested in how this technology is developed and the software/firmware that is behind its functionality.

## **MST GLOBAL | YOUR DIGITAL TRANSFORMATION PARTNER**

**In-text:** (MST Global | Your digital transformation partner, 2021)

**Your Bibliography:** MST Global. 2021. *MST Global | Your digital transformation partner*. [online]

Available at: <<https://mstglobal.com/>> [Accessed 11 March 2021].

*Detailed description of project heartrate monitor/tracker:*

The IoT heartrate monitor/tracker consists of an IoT device that is battery operated and is worn by the patient. It will use an ESP8266 or an Arduino Nano 33 IoT device that will monitor the patient's heartbeat via a sensor that detects light through the skin. This sensor uses infrared to achieve this. The sensor will require 3.3V to 5V for its voltage supply and this will be supplied by the Arduino Nano or ESP8266. The IoT device will run from a 9V Alkaline battery or 3.6V lithium-ion battery and the internal regulators will supply the 5V. The communication from the heartbeat sensor to the IoT microcontroller will use I2C serial interface. This serial interface will provide the microcontroller with the data from the heartbeat sensor. This data will be analysed, processed and then sent out via WiFi (TCP/IP/UDP) to the monitoring software. The MAC address of the IoT device will aid in the individual identification of the device.

The WiFi connection on the PC laptop/desktop will be receiving the data from the IoT device. The monitoring software will be constantly taking data from the IoT device and displaying the data on its GUI interface as beats per minute. It will also be monitoring the receiver strength level (RSSI) of the IoT device to allow it to display an approximate location to the receiving laptop/desktop. This will be displayed on a simple map at first and progress to something more complex in future developments. The position of the sensor will rely heavily on the WiFi hotspot's ability to receive quality radio signals. If there are enough WiFi hotspots, a process of triangulation will be employed for accuracy of location. There will be a maximum and minimum setting for the heartrate data that will produce and alarm if the heartrate is above or below the set limits. This is to alert a healthcare professional that the patient is suffering and requires urgent medical attention. The monitoring software will be written in Python 3.x and will use socket programming to interface to the WiFi IoT device. The IoT device will use C/C++ to program its firmware.

Future for further development and integration will include a smartphone application that can monitor position, heartrate and alert healthcare professionals of patient health statistics. A web page with similar information of patient statistics can also be developed. This web page can be hosted on a local server or cloud and storage of vital data such as time, position, heartrate etc, for future data analysis. Development of ethernet network connection to the monitoring software will also be implemented. Development of over the air configuration of the IoT device for quick and easy deployment as the device is changed from one patient to another. This feature will be added to the existing applications and will require special permission such as a password to program the device. Security of the data will also be implemented as to protect the patient's details and to help eliminate data corruption.

## *Hardware required:*

1. ESP8266 or Arduino Nano 33 IoT (Digikey)
2. PC, laptop or desktop
3. Heart rate detection device XC3740 heartbeat module (Jaycar)

## *Software/firmware tools (Free and open sourced):*

1. JetBrains Python IDE, Community PyCharm, VS Code or equivalent
2. Arduino IDE
3. QT designer or Page (TKinter)

## *Programming languages:*

1. Python 3.x
2. C or C++

The ESP8266 and Arduino Nano 33 IoT are WiFi capable devices with on board microcontrollers that can interface many different hardware sensors including I2C serial interface. The IoT device will use the open-sourced Arduino IDE platform for programming and will use C or C++ for the programming language. The PC application will use the Python 3.x interpreter. The application will be wrapped to be an executable file and developed in an IDE such as Community PyCharm or equivalent, which is an open-source development environment.

## *Skills required:*

Basic knowledge of serial data, electronics, microcontrollers and WiFi radio propagation. To write code for the Arduino or ESP8266 will require reasonable knowledge of C/C++ and the Arduino IDE platform. There also will be a need to have a basic understanding of TCP/IP and UDP. The PC application will require reasonable knowledge of Python, PyCharm/VS Code and socket programming. The GUI will use TKinter or QT for development. Page (TKinter) and QT Designer are drag and drop GUI designers that will help with the look and feel of the application for the PC. The software for both is free and open sourced and require some time to learn. PyGame, which is a Python framework, maybe used to design the IoT device location map.

## *Outcome:*

I'm hoping to develop this technology to a level that is usable and has a purpose in various industries. On my journey, I hope to discover new areas of industry where this technology could be applied. I hope to have a deeper understanding of IoT, other technologies and improve my skills to a level of competency that will be valued by the IT industry. My programming abilities in various languages need some improvement and my aim is for considerable improvements during this project development. Web development is an area that I lack knowledge in, which I would like to learn to a higher degree.