**Project Proposal CITS5506: Internet of Things**

**To be submitted by 8 PM 12 August, 2020**

1. Name of Project:

IOT Smart Fan using Temperature Sensors with Smart Phone Control

1. Group Number, Names and Student Numbers of team members:

Group 14:

Daniel Brown – 21967293

Jason Clark – 22601257

Hao Li - 22297697

Biying Wang – 22400062

1. An initial Distribution of Work among students by mutual discussion (You can change this distribution during the project, as per strengths of the members)

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| Name of Student | Work Assigned |
| Daniel Brown | Connecting smartphone controls and controlling settings using the Blynk app. |
| Jason Clark | Electrical connection of the system and code for the LEDs. |
| Hao Li | Working on the code to power the fan for both models given a standard input from the software. |
| Biying Wang | Reading temperature sensor values effectively and calculating the desired temperature and fan power level. |

1. Why ……………….Why you want to do this project. What benefit your project will bring?

This project has a significant place in Australia. Given the heat of our summers, cooling systems such as fans and air conditioning are very important to a comfortable livelihood. A smart fan system could help to improve current systems by taking the guesswork out of temperature control and ensuring that fan levels are adequate for current conditions.

While cooling of homes is one possible implementation of a smart fan, it could also be used for electronics cooling on a smaller scale, allowing effective cooling of small appliances. This could allow us to provide external cooling to smaller devices like Arduino’s that when they heat up through excessive processing, we can provide cooling to avoid the heat damaging the device.

The smart fan system can effectively control the win power of the fan by measuring the temperature, turning on the fan and cooling when the temperature is high and turning off when the temperature is low. This is effectively saving energy use and is environmentally friendly.

1. What ………………What is the problem you will solve? What benefit your solution will bring? What is its impact (How big will be the impact in terms of numbers of people, financial etc?)

This project will solve the issue of keeping cool during summer months. It is often difficult to keep buildings at a comfortable temperature through a constant fan setting, and it is normally required to increase and decrease fan settings as required when the temperature gets too hot or too cold in a room. It could also be used in the case of appliances cooling especially in cases such as small appliances like Arduino’s and Raspberry Pi’s. This project will also introduce a modern aspect of smart phone control of the device, which is desirable by consumers and excites people.

1. How ………………. How you will do it. Shortly explain your methodology.

We will be testing 2 different models of the system to see the performance of each and to test whether the system is viable and works effectively.

The first model will be the room cooling model. This model will utilize inputs from a temperature sensor, this sensor data will then be used to determine what temperature would be desirable within the room and how we need to alter the temperature in order to reach the desired outcome. The device will then power the attached fan (only a computer fan in this project but can be scaled to large fans in future) to achieve the cooling effect, with bigger changes needing more fan power to reach the outcome in a reasonable time.

The second model will consist of cooling a small electronic device. To achieve this, we will be attaching a temperature sensor close to the processing unit of an Arduino device. Depending on the temperature of the Arduino device, we will be powering the fan to cool the device and prevent overheating.

In order to control the system, we will be using a smart phone application called Blynk, which allows you to create custom smart phone apps to control IoT devices. Through this medium we will be able to turn the system on and off, as well as control system settings such as temperature thresholds for fan speed and manual control of the fan rather than relying on the temperature sensors.

In both models, we will also be giving visual output of its state via colored LEDs. The coloring system is yet to be determined, but the idea of the coloring will be to notify the user of things such as the system being on or off, the fan being on or off, and potentially how much of a change in temperature is required to reach a desired temperature.

An extension to these projects which will be investigated if time permits will be to use an LCD display to give easily accessible data regarding the system. Such as current inside and outside temperatures, as well as current fan power or something to that effect.

Steps for this methodology include:

1. Setup system with an Arduino (with Wi-Fi module), temperature sensor, fan.
2. Setup Arduino code with connections to the sensor, fan and accessing the Wi-Fi module.
3. Setup the Blynk application to connect to the Arduino and write code to connect the Blynk application on the Arduino.
4. Setup control of settings variables through the Blynk application.
5. Write code which reads temperature sensor values and processes them accordingly.
6. Write code which uses the processed temperature values in accordance with system settings to power the fan as needed.
7. Setup manual setting to control the fan using Blynk application manually rather than using the temperature values.
8. Setup some diodes and LCD display in order to display system notifications in an easy to see manner on the device and write code to control them as necessary.
   1. Hardware required (Each group has $75 budget for the items. UWA will pay so give the web address. Due to existing circumstances, you should choose items from Jaycar, Altronics and IoT store (<https://www.iot-store.com.au/>).

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| S. Nr | Items Description | Cost | Web address | Delivery Time |  |
|  | Computer fan  Type undecided | $15 - $20 | <https://www.jaycar.com.au/5vdc-30mm-thin-2-wire-fan/p/YX2500>  <https://www.jaycar.com.au/40mm-12v-dc-fan/p/YX2502>  <https://www.jaycar.com.au/60mm-12vdc-cooling-fan/p/YX2505> | 2 -5 days (or available in store) |  |
|  | ESP32 board which has inbuilt WiFi (rather than a WiFi shield at the same cost due to each of use of ESP32) | $40 | <https://www.jaycar.com.au/esp32-main-board-with-wifi-and-bluetooth-communication/p/XC3800> | 2-5 days (or available in store) |  |
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* 1. What will be the functionality of your software?

The software's functionality will be to control the fan operation based on smart phone inputs and temperature sensor inputs.

The smart phone inputs from the Blynk app will control if the system is on or off, manual or temperature sensing mode, in temperature sensing mode what the temperature thresholds for fan operation are, and in manual mode what the fan power is.

The temperature sensor inputs will be used alongside the settings in temperature sensing mode to determine what temperature regulation action needs to be taken.

Then in manual mode the system will use the inputted fan power, and in temperature sensing mode the calculated fan power to control the computer fan.

1. References (What research you have done while choosing this project)
2. M. Ektesabi, S. A. Gorji, A. Moradi, S. Yammen, V. M. K. Reddy, and S. Tang, “IoT-Based Home Appliance System (Smart Fan)”, 2018. doi: 10.5121/csit.2018.81604.
3. A. Bind, K. Ashtankar and M. Chahare, “An IOT Based Smart Fan Module”, 2020.
4. S. Yammen, S. Tang and M. K. R. Vennapusa, "IoT based speed control of Smart Fan," 2019 Joint International Conference on Digital Arts, Media and Technology with ECTI Northern Section Conference on Electrical, Electronics, Computer and Telecommunications Engineering (ECTI DAMT-NCON), Nan, Thailand, 2019, pp. 17-20, doi: 10.1109/ECTI-NCON.2019.8692304.
5. Blynk Inc. <https://blynk.io/>.
6. LED temperature sensor, <https://www.instructables.com/id/LED-Temperature-Sensor/>
7. LCD temperature display,<https://create.arduino.cc/projecthub/Parry21/temperature-on-an-lcd-d2e9d3>