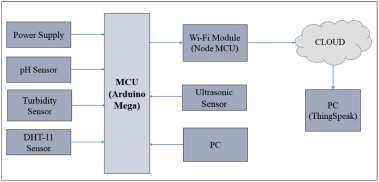
*ENVIRONMENTAL MANAGEMENT IN PARKS*

*INNOVATION:*

*Air Management:*

* **Nooku**, developed by **Filament PD**, is a cost-effective, human centred air quality system that engages with each member of the family via a smartphone or on device display, helping them to improve air quality within their home
* Nooku’s modular design enables multiple lower cost ‘base’ devices to be placed within different rooms throughout the home, building up a daily picture of air quality.
* A more capable and portable module, with touch screen display, can be moved between base sensors, providing broader pollutant monitoring and actionable feedback when and where it’s needed.
* To engage even the youngest family members a pair of animal ears snaps on to the top of Nooku, transforming the device into a fun, interactive and educational character
* **4. Methodology of the proposed system**
* The proposed system uses four sensors which are pH, turbidity, [ultrasonic](https://www.sciencedirect.com/topics/physics-and-astronomy/ultrasonics), DHT-11, microcontroller unit as the main [processing module](https://www.sciencedirect.com/topics/engineering/processing-module) and one [data transmission](https://www.sciencedirect.com/topics/physics-and-astronomy/data-transmission) module ESP8266 Wi-Fi module (NodeMCU).
* The microcontroller unit is a significant part of the system developed for water quality measurement because The [Arduino](https://www.sciencedirect.com/topics/physics-and-astronomy/arduino" \o "Learn more about Arduino from ScienceDirect's AI-generated Topic Pages) Mega consumes low power, and it is a small size, where the size is a good use for a crucial point-of-sale [technology](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/science-and-technology) criterion.
* Among four sensors, two of the sensors collect the data in the form of [analog signals](https://www.sciencedirect.com/topics/engineering/analog-signal" \o "Learn more about analog signals from ScienceDirect's AI-generated Topic Pages); the MCU has an on-chip ADC that translates the sensor analog signals into the digital format for further study. So, to get this analog output from the sensor, the sensor's analog output of will be connected to the MCU's analog pins.
* Whereas the other two sensors output directly connected to the digital pins of the MCU units. All the sensors data processed by the MCU and updated to the ThingSpeak server using the Wi-Fi data [communication module](https://www.sciencedirect.com/topics/computer-science/communication-module) ESP8266 (NodeMCU) to the central server ([Daigavane & Gaikwad, 2017](https://www.sciencedirect.com/science/article/pii/S2405844020309403" \l "bib5)). The [block diagram](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/block-diagrams) of the system proposed for water quality measurement is shown in [Figure 1](https://www.sciencedirect.com/science/article/pii/S2405844020309403#fig1).
* 
* The whole system is designed in Embedded-C and simulating the written code using Arduino IDE. In order to collect data on pH, turbidity, level of water, temperature, and humidity of the surrounding atmosphere, the water quality monitoring system employs sensors ([Moparthi et al., 2018](https://www.sciencedirect.com/science/article/pii/S2405844020309403" \l "bib10)).
* Authorized users can access these data using a user ID and password for accessing data on the ThingSpeak server by logging into their accounts. The information is gathered, stored, analyzed and transmitted in real-time.
* The ESP8266 is a low-cost Wi-Fi module consists of a full TCP/IP stack Wi-Fi chip and microcontroller chip which is manufactured by M/S Espino.
* The code boots from external flash directly during the processing of the program, thereby increasing the system performance and the storage requirements due to their optimized cache capacity.

* ESP8266 uses Tx and Rx serial [transceiver](https://www.sciencedirect.com/topics/engineering/transceiver) pins for sending and receiving data, for changing wireless module settings, for changing serial query commands. Two pins (Tx/Rx) are required to communicate, but only attached, between a Wi-Fi module and a microcontroller but connected oppositely. It is easy to set up an [IoT](https://www.sciencedirect.com/topics/engineering/internet-of-things" \o "Learn more about IoT from ScienceDirect's AI-generated Topic Pages) application via Wi-Fi Module via [SPI](https://www.sciencedirect.com/topics/chemistry/selective-population-inversion) and UART.