



# Internet of Things - COE

## Vision

To be an innovation hub that develops world class products in the emerging area of Internet of Things

## Objectives

- 1) To provide ecosystem for realizing, testing and validating innovative product prototypes that solve societal problems with smart applications
- 2) To facilitate multi-technology and multi-disciplinary research projects
- 3) To train and develop industry ready competency among students and faculty
- 4) To promote indigenization and entrepreneurship
- 5) To support MSMEs for technology automation through consultancy



The facility comprises of Embedded programmable hardware, Wireless sensor devices and Heterogenous communication platform. It supports students and faculty with necessary understanding and knowledge to kick start their project. The center has built innovative applications and domain capability across verticals for country's needs such as Smart City, Smart Health, Smart Manufacturing, Smart Agriculture, etc. The center fosters start-up community and entrepreneurial ecosystem for IoT



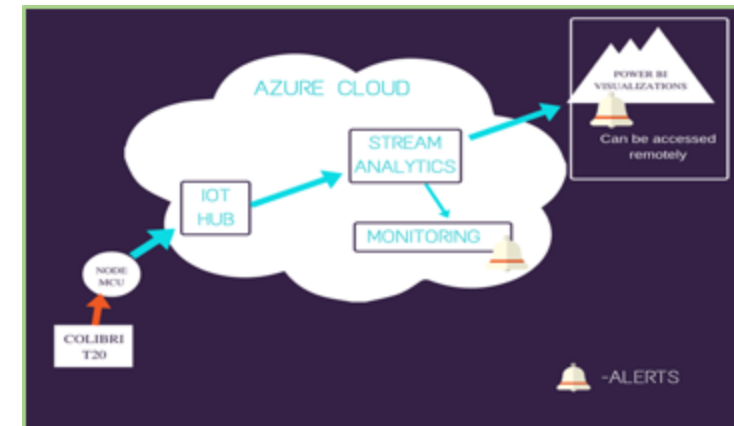
The Internet of Things (IoT) is a network of physical objects or 'things' embedded with electronics, software, sensors, and connectivity to enable objects to exchange data.

IoT allows direct integration between the physical world and computer-based systems, helping to connect people, processes and devices.

The IoT-CoE at SNIST has developed following products:

- 1) **Healthcare** – Optimus: Smart Pill Companion and Smart Saline Dispenser
- 2) **Agriculture** – Precision Pixhawk: Hexacopter, Greeops: Smart plant health monitoring and Famco: Instantaneous analysis of Soil Quality,
- 3) **Water Conservation** – Aquart: Smart water budgeting and Scheduling
- 4) **Driver Assistance System** - Sphast: Collision Prevention Gadget
- 5) **Food Industry** - Smart Container

Many of the above developed products are at Technology Readiness Level (TLR) of either 6 and above. The COE has also successfully completed consultancy work for NucleonixSystems Pvt. Ltd, Cherlapally, Hyderabad.



## IOT Center of Excellence – List of Equipment



<u>S.No.</u>	<u>Description</u>	<u>S.No.</u>	<u>Description</u>
1	<b>IOT Embedded Kits</b> a. Raspberry Pi 3 - 15nos b. Raspberry Pi 4 - 5nos c. NVIDIA Jetson Nano - 8nos d. Beagle Bone (Blue) - 1nos e. Nano ESP32 (webmos D1) - 30nos f. Node MCU - 20nos	1	<b>Communication Modules</b> a. Bluetooth Module BLE 4.0 - 8nos b. GPS Modules - 5nos c. Sim 900 (GSM Module) - 3nos d. XBEE Module - 5nos

2

### **IOT Sensors List**

- a. DHT11 Temperature, Humidity Sensor - 15nos
- b. Ultrasonic Sensors - 30nos
- c. MQ2 Smoke Sensor- 20nos
- d. PIR Sensors - 20nos
- e. Soil Moisture Sensor - 10nos
- f. MQ 135 Gas Sensor - 10nos
- g. RPLIDAR - 360 Degree Lidar Laser Scanner - 3nos.
- h. Ph Sensor: The Analog PH Sensor Kit - 2nos
- i. Touch Sensor - 5nos
- j. Flame Sensor - 5nos
- k. 9 axis Gyro scope Sensor - 10nos
- l. Flow Sensor - 10nos
- m. LORA Modules for short and long ranges - 5nos
- n. IR Sensor - 20nos
- o. Dust Smoke Sensor - 5nos
- p. RGB Color Sensor with IR Filter - 5nos
- q. Flex force Sensors - 5nos
- r. Bump/Hit Sensor - 5nos
- s. Reed Sensor - 10nos
- t. The Knock Sensor Module - 5nos
- u. Tilt Sensors - 10nos
- v. Pulse Sensor - 3nos
- w. Pi Cameras - 5nos
- x. RFID Readers & Cards - 5nos
- y. MPU 6050 Accelerometer - 5nos

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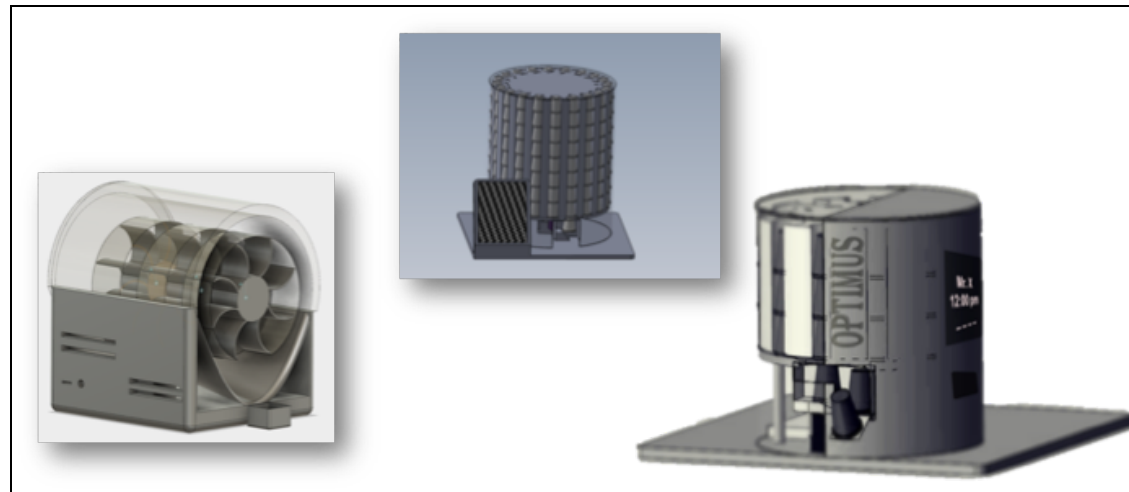
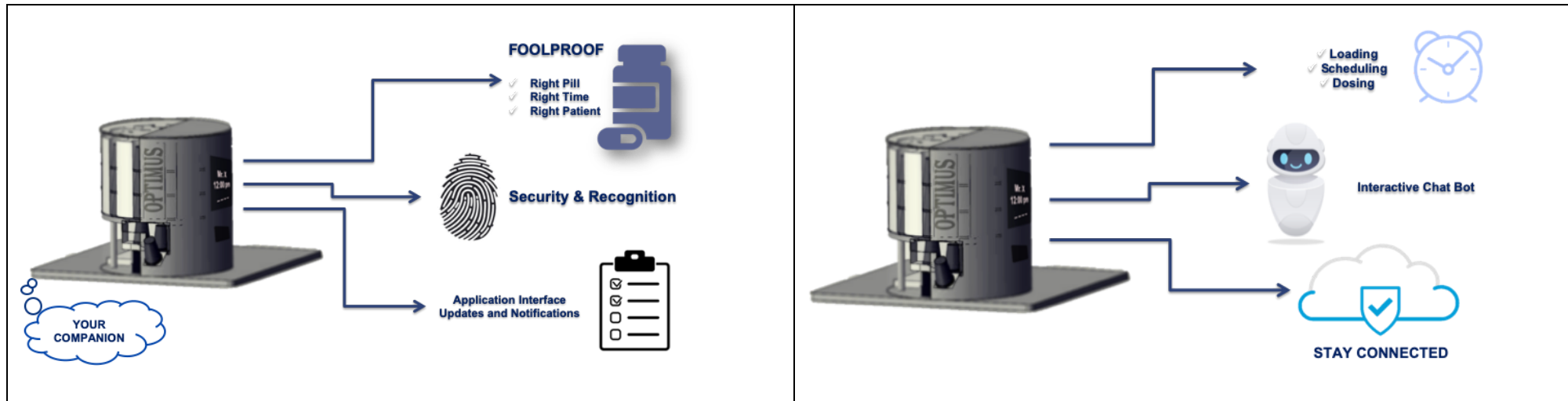
### **IOT Actuators**

- a. DC Motors with driver module - 15nos
- b. Servo Motors MG996R - 5nos
- c. Brushless DC Motor - 3nos
- d. Coreless DC Motor - 15nos
- f. Dual Motion Actuator (linear and rotary) - 10nos
- g. Hybrid Stepper motor Linear Motion Actuator - 5nos

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**Miscellaneous**

- a. 5" LCD Display - 1no
- b. Raspberry Pi 7" Touch Screen Display - 5nos
- c. Solid State Relays
- d. 5V Relay - 20nos
- e. RGB Lights - 100nos
- f. Smart Switch - 5nos
- g. Solar Panels for projects available in different power ratings- 5nos
- h. 32- Channel PC Based Logic Analyzer - 10
- i. RTL SDR - 2nos
- j. Buzzers - 20nos
- k. Card Readers - 4nos
- l. wi-fi routers - 2nos
- m. Force Gauge - 1nos
- n. Extension Board - 5nos
- o. Soldering Station - 1no
- p. Resistors (100K,1K,470,10K,2.2K)
- q. LEDs (Red,Green, white etc)
- r. Pixhawk 4 - 1no
- s. Telemetry - 1no

## Optimus - Smart Pill Companion





# Aquart - Water Conservation and Budgeting Solution



## Smart Water Conservation and Budgeting Solution

Aquart - Features	
Continuously monitors water	
◆ Detecting Leakages and Blockages	<ul style="list-style-type: none"> <li>➢ Leakage protection by pressure monitoring</li> <li>➢ Avoiding water wastage</li> <li>➢ Turns off/disable water supply automatically</li> </ul>
◆ Budgeting and Scheduling	<ul style="list-style-type: none"> <li>➢ Daily/Weekly/Monthly limits with time slots</li> <li>➢ Alert generation for approaching threshold limits</li> <li>➢ Average monthly consumption report for each room</li> </ul>
◆ Sending alert notifications and usage data	<ul style="list-style-type: none"> <li>➢ Easy interface to smart phone and Home Wifi</li> <li>➢ Profile creation based on home size and statistical data</li> </ul>
◆ Remote Configuration	<ul style="list-style-type: none"> <li>➢ Option to set home/away mode</li> <li>➢ Ability to identify water outlets/top in a home through unique water usage signature</li> </ul>

- Additional Features**
- Wireless Operation
  - App or voice (via Amazon Alexa and Google Home)
  - Built-in Shutoff Valve
  - Clamp-on Model
    - Pipe cutting not required for installation
  - Rechargeable Battery operated
  - Sensors do not require power outlet
  - Built-in testing and remote support



- Sensors and Actuators**
- Ultrasonics flow measurement sensor
  - Water pressure and temperature sensor
  - Dry pipe and leakage alarm



- Real Time Monitoring and Customer Support**
- Unique ID to each Aquart Unit
  - Device Malfunction Alert & Health Monitoring
  - Device Calibration
  - Monitor Operating Conditions and Life Cycle Management

