Room Monitoring System

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Introduction

The Room Monitoring System (RMS) is a system of fully integrated IoT devices that collect, store, process, and display information about a room.

Problem Seeks to Solve

The purpose of the RMS is to increase the efficiency of hotel staff by providing data at the glance of an eye.

This includes:

• Progress meter of when to clean the floor
• If water was detected on the counters
• If towels and paper needs to be restocked
• If the trash needs to be emptied

Components and Costs

♦ ATmega328P x 5 = $6
♦ HC-SR04 Ultrasonic Sensor x 2 = $8
♦ ESP8266 ESP-01 Wi-Fi Module x 4 = $8
♦ HC-05 Bluetooth x 1 = $3
♦ DHT 11 Sensor x 1 = $3
♦ IR Obstacle Sensor x 2 = $2
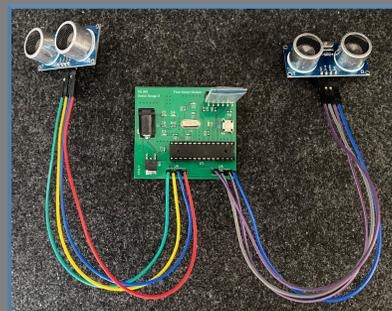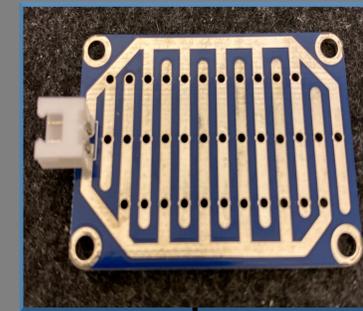♦ Raindrop Sensor x 1 = $1
♦ PCB = $15

Total Cost $46

Design

Inventory Checker Module
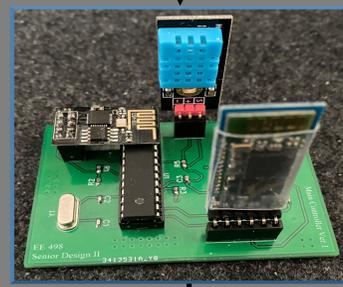

Floor Sensor Module

Water Detection Plate

Trash Monitor Module

Controller

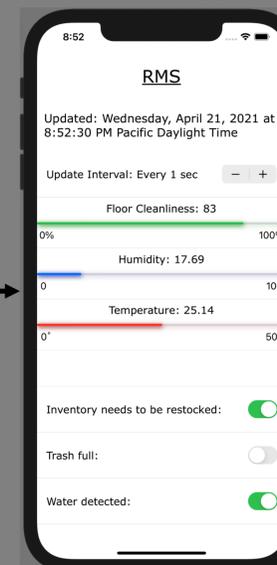Water Detector Module

Cloud Server — MQTT

RMS — Device details — ThingsBoard Cloud Platform — Edgar Customer

	Last update time	Key ↑	Value
☐	2021-04-21 20:52:28	cleanliness	83
☐	2021-04-21 20:52:29	humidity	17.69
☐	2021-04-21 20:52:00	inventory	true
☐	2021-04-21 20:52:30	temperature	25.14
☐	2021-04-21 20:51:30	trashBin	false
☐	2021-04-21 20:52:20	wetSurface	true

HTTP

Mobile App

Operation

Our design consists of four tiers.

1. Sensors that collect and transmit data
2. Controller that receives and transmits data
3. Cloud server that receives and stores data
4. Mobile app that retrieves and displays data

The sensors and controller are implemented using custom PCBs. The sensors transmit data via Bluetooth and the controller via Wi-Fi.

The cloud server receives data through MQTT. The mobile app retrieves JSON data through HTTP.

Conclusions

The RMS was built utilizing off the shelf components and open protocols and software. Compiled into a system that leverages the power of IoT, the RMS efficiently yet inexpensively completes a task.

Future Improvements

• Add support for other types of sensors

• Improve the capability of device by implementing a voice control function.

References:
. https://learn.sunfounder.com/category/sensor-kit-v2-0-for-arduino/
. https://icons8.com

ARDUINO   ThingsBoard   Download on the App Store