Noise Pollution Monitoring System

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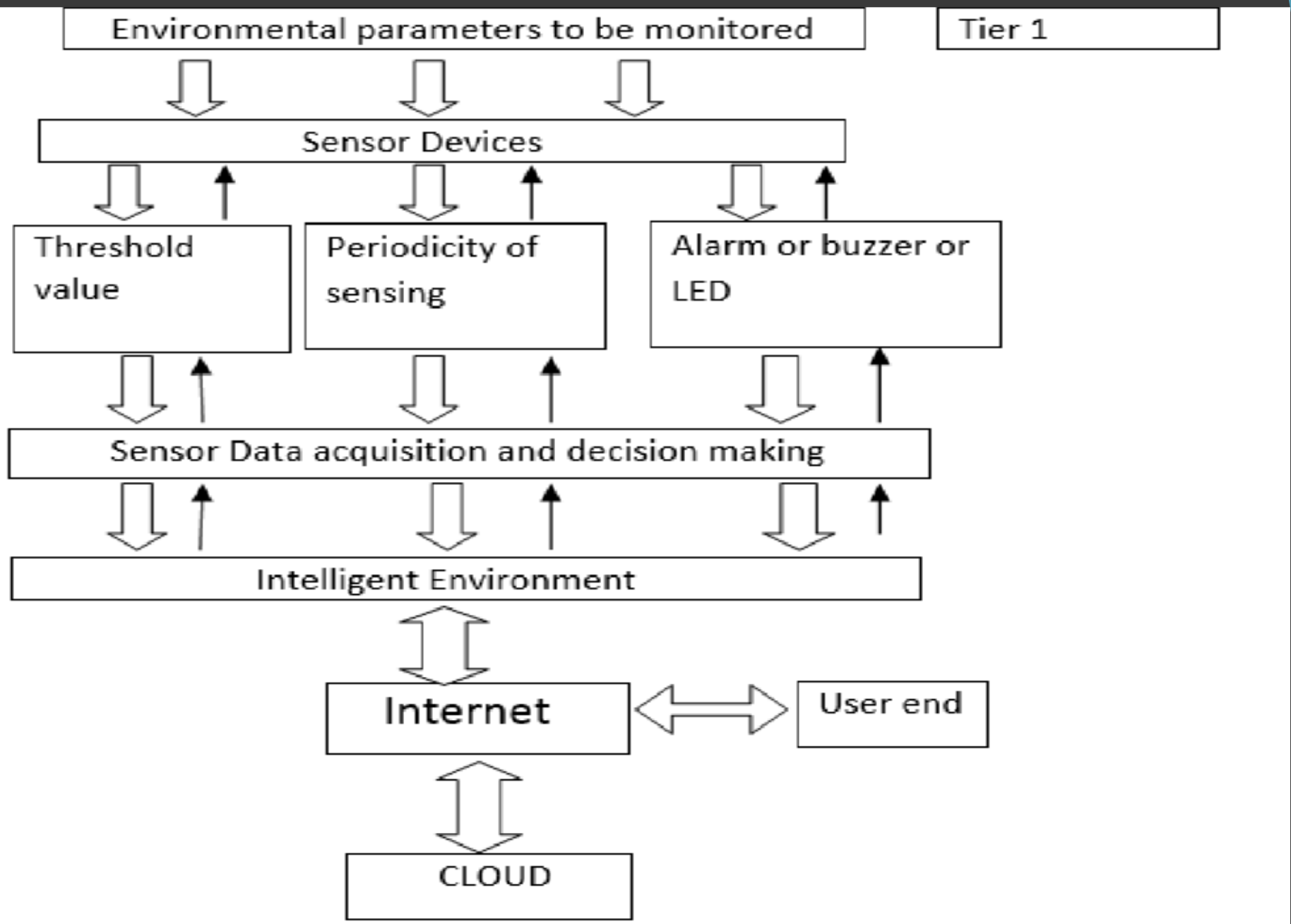
Introduction

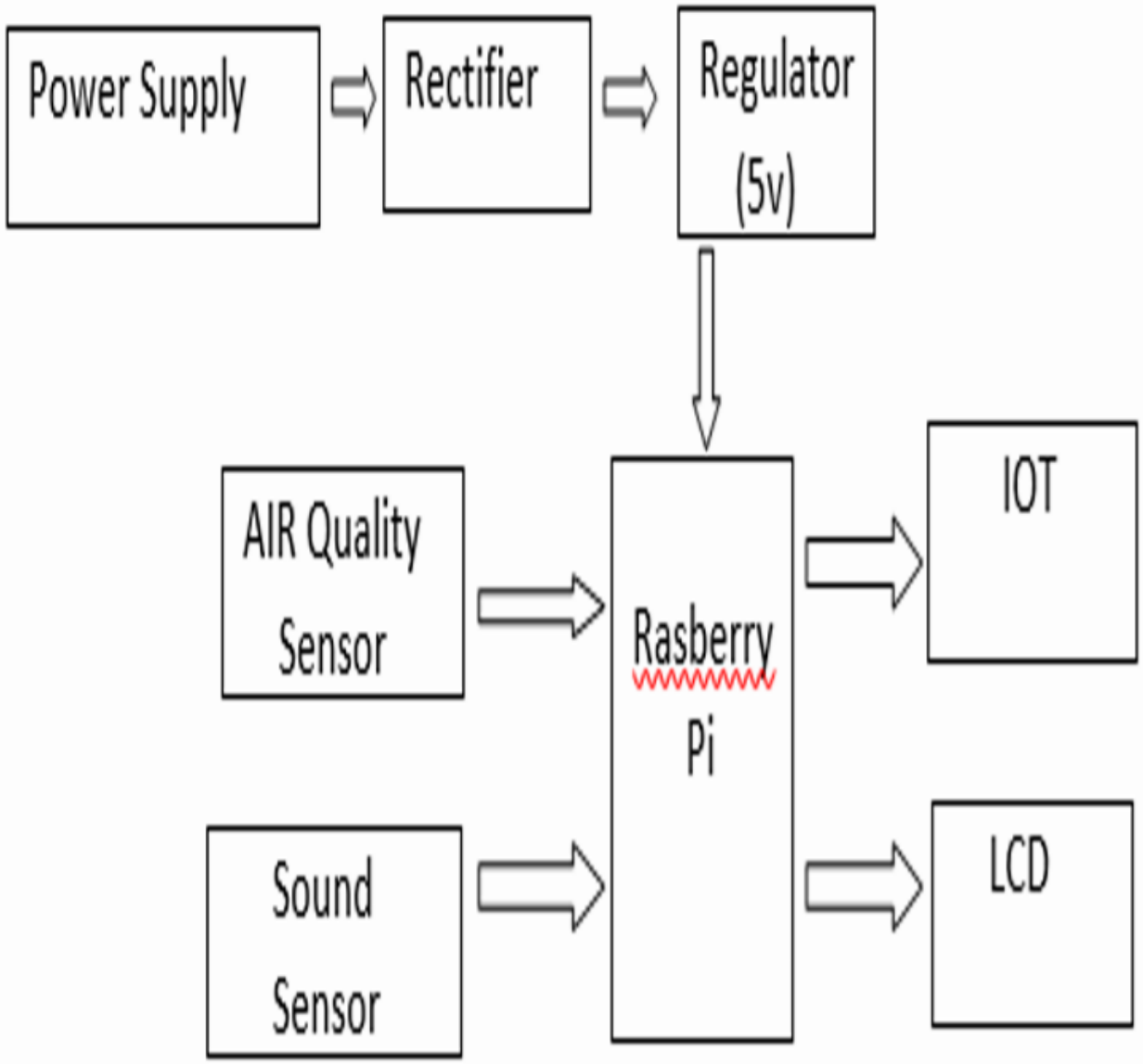
- In this era of modernization, technologies are making rapid progress.
- A day we feel some new technology coming in market to simplify our lives .
- Back in time checking the pollution during a particular frequency was a really tedious task which wasn't very efficient although.
- With rapidly increasing pollution and rapidly advancing technology various new methods were also introduced to stay and fix the rapid increase in polluted area by skill full activies.
- Only internet of things is one among the newest works that has been wiped out this path.
- The increment in use of internet and therefore the interaction of living one's

System Module And Assumptions

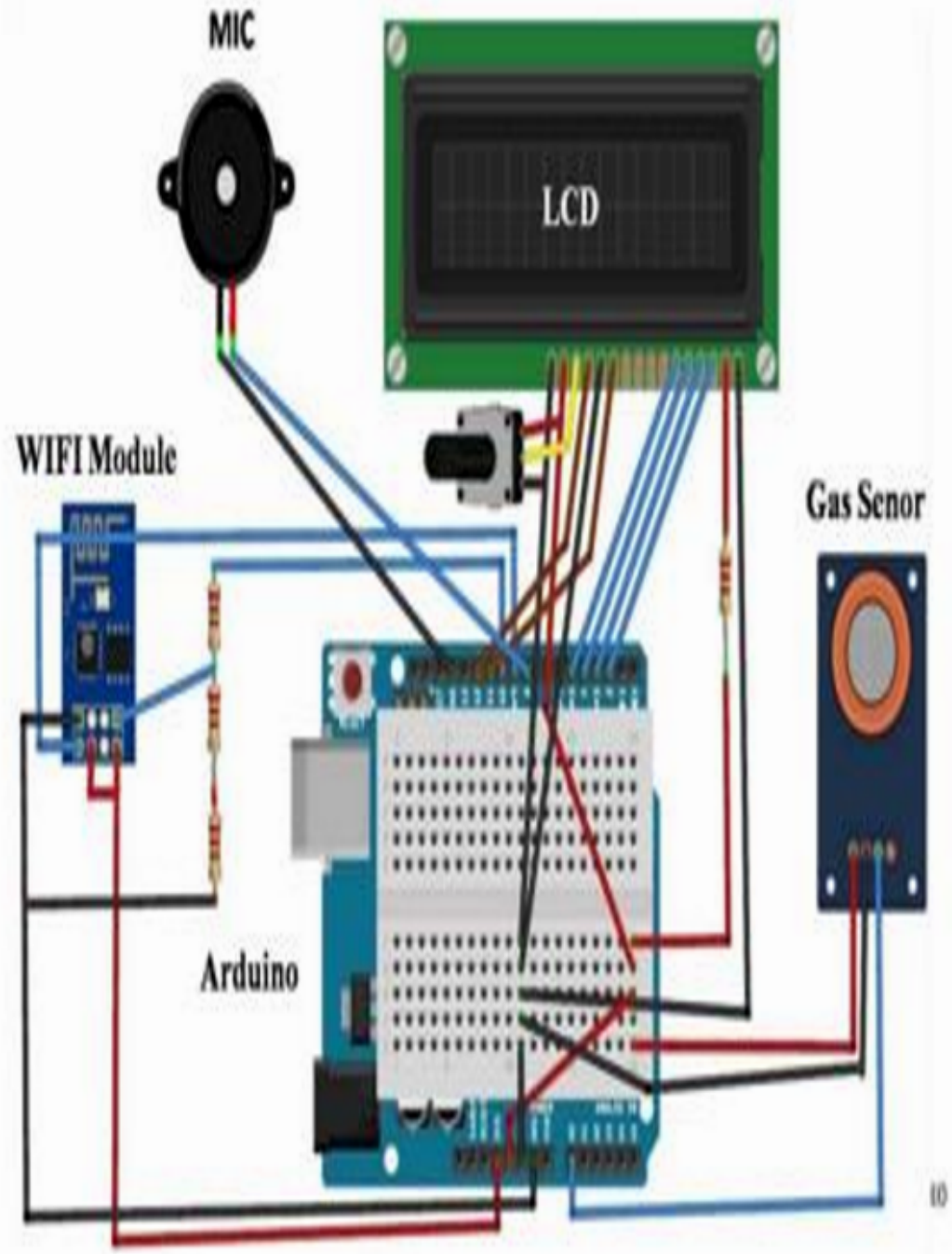
- Tier1 provides knowledge of the parameters under the region which is to monitor for noise and something control.
- Tier 2 deals with sensor device with suitable characteristics, features and every single sensor are operated and hold their sensitivity also because if the area of sensing.
- In b/w tier 2 and tier 3 obligatory sensing and controlling actions are going to be taken depending upon the drastic conditions, like fixing the edge value , periodicity of sensing, messages (buzzer or alarm) etc.
- Based on the data interpretation performed b/w tier 2 and tier 3 and from previous groundings the parameter threshold values during normal working conditions that are determined.
- Tier 3 tell us about the data acquisition from sensor devices and includes the decision making. Which specially specify the condition that the


Environmental parameters to be monitored
Tier 1
Sensor Devices
Threshold value
Periodicity of sensing
Alarm or buzzer or LED
Sensor Data acquisition and decision making
Intelligent Environment
Internet
User end
CLOUD

Block Diagram



System Architecture



Algorithm

- A decision tree may be a flowchart-like structure during which each internal node represents a "test" on an attribute (e.g. whether a coin flip comes up heads or tails), each branch represents the result of the test, and every leaf node represents a category label (decision taken after computing all attributes).
- The paths from root to leaf represent us about classification of rules.
- In decision we survey, a choice tree and therefore the closely related influence diagram are used as a visible and analytical decision support tool, where the expected values (or expected utility) of competing alternatives are calculated.
- A choice tree consists of three sorts of nodes: Decision nodes typically represented by squares Chance nodes typically represented by circles End nodes typically represented by triangles Decision trees are commonly utilized in research and operations management.
- In practice, decisions need to be taken online with no recall under incomplete knowledge, a choice tree should be paralleled by a probability model as a most suitable

Program

```
#include <iostream>
#include <vector>
#include <fstream>
#include
<portaudio.h>
// The callback function to process audio
data
static int audioCallback(const void *inputBuffer, void *outputBuffer,

                         unsigned long framesPerBuffer,
                         const PaStreamCallbackTimeInfo *timeInfo,
                         PaStreamCallbackFlags statusFlags,
                         void *userData) {

    // Cast the input buffer to a float array
    const float *in = static_cast<const
float*>(inputBuffer);
// Calculate the RMS (Root Mean Square) of the audio data as a noise level
indicator
double rms = 0.0;
for (unsigned int i = 0; i < framesPerBuffer; i++) {
    rms += in[i] * in[i];
```

```
    }
     rms = std::sqrt(rms / framesPerBuffer);
    // Open and append the RMS value to a log file
    std::ofstream logFile("noise_data.txt", std::ios::app);
    logFile << "RMS: " << rms << std::endl;


    return paContinue;

}
 int main() { // Initialize PortAudio
 PaError err;


 err = Pa_Initialize();
  if (err != paNoError) {
  std::cerr << "PortAudio error: " << Pa_GetErrorText(err) << std::endl;
  return 1;

}

 // Configure audio input parameters
PaStream *stream;
 PaStreamParameters inputParams;

 inputParams.device = Pa_GetDefaultInputDevice(); // Use the default input
```

```
inputParams.channelCount = 1; // Mono audio
inputParams.sampleFormat = paFloat32; // 32-bit floating-point
inputParams.suggestedLatency = Pa_GetDeviceInfo(inputParams.device)->defaultLowInputLatency;
inputParams.hostApiSpecificStreamInfo = nullptr;

// Open the audio stream
err = Pa_OpenStream(&stream, &inputParams, nullptr, 44100, 256, paClipOff, a
 if (err != paNoError) {
        std::cerr << "PortAudio error: " << Pa_GetErrorText(err) << std::endl;
        return 1;
}

// Start the audio stream
 err = Pa_StartStream(stream);
 if (err != paNoError) {
        std::cerr << "PortAudio error: " << Pa_GetErrorText(err) << std::endl;
        return 1;

}

std::cout << "Recording noise data. Press Enter to stop..." << std::endl;
std::cin.get(); // Wait for Enter key press
```

```
// Stop and close the audio stream
 err = Pa_StopStream(stream);
 if (err != paNoError) {
 std::cerr << "PortAudio error: " << Pa_GetErrorText(err) <<
std::endl;
 }

  err = Pa_CloseStream(stream);
  if (err != paNoError) {
  std::cerr << "PortAudio error: " << Pa_GetErrorText(err) << std::endl;

  }

  // Terminate PortAudio
  Pa_Terminate();

  return 0;
}
```

Working Of The Project

- Here we propose an air and also noise pollution quality monitoring system that permits/ allow us to check and watch air quality also as noise pollution in an area through IOT.
- System uses air sensor to sense presence of harmful gases / compounds within the air and constantly transmit that data to the user. Also, system keeps measuring sound level and report the data immediately.
- The sensors interact with raspberry pi which processes this data and transmits it over the appliance. This allows us the authorities to watch pollution in several areas and act against it.
- Also, same for sound pollution authorities can keep a watch on sound pollution near traffic and no honking areas. Network devices and therefore the internet of things (IOT) all types of ordinary house gadgets are almost modified to figure in an IOT system.
- Wi -Fi network adapters , cameras , microphones

Literature Survey

- The motive of creating a sensible city are often fulfilled by using technology, thus making the life better and also enhancing the quality of services, therefore meeting every individual's needs.
- With modern technology in fields of information and communication, it has become easy to interact with the authorized people of the city to inform the whereabouts of the world or city, how well the town is developing, and how to make it possible to achieve a better life quality. In this system, an application was created to make one more step in the fulfillment of the goal.
- An area is analyzed for evaluating how much pollution is affecting the area. The components of gases and their amounts are calculated and checked.
- If the amount is higher than normal then the officials are reported about it.
- After that, the people are made to clear the area and taken to a safe place.
- The combined network architecture and the interconnecting mechanisms for the accurate

Result

- The air and sound pollution monitoring system monitors air and noise pollution by employing a mobile application.
- It shows the digital value of air and noise pollution and the user can analyze it with a graph. It becomes very easy for us to rectify the amount and air and sound pollution around and plan for healthy living and surroundings.
- The figures that are included in our paper shows the way the system works and the way the output is obtained

Conclusion

- The Automatic Air & Sound management system may be a breakthrough to contribute an answer to the most important threat.
- The air & sound monitoring system overcomes the matter of the highly-polluted areas which may be a major issue. It supports new technology and effectively supports a healthy life concept.
- This system has features for the people to watch the quantity of pollution on their mobile phones using the appliance. So, it becomes very reliable and efficient for the Municipal officials alongside the Civilians to watch the environment.
- Letting civilians also involved in this process adds an extra value to it. As civilians are now equally aware and interested in their

THANK YOU