Voice-O-Mata Using IOT

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Abstract. Waste bins are being used in an indoor environment by every common man for over many decades. Proper Voice-o-mata is a blend term of Voice Automation. Automation is a term which has been gaining a lot of attention lately. The idea of this project is using the HT-05 Bluetooth module and Arduino IDE achieving automation of a home or industry using IoT. Also inherent Security system composed of features like password protection of home or industry, Flame and Smoke detection and alarm system. This flexible and reliable setup which is capable of being implemented real time minimizes human effort and also increases security features. The significant feature is that over conventional automation features this setup uses voice based automation. This may be further extended to achieve full scale security, real-time monitoring of devices.

Keywords: IoT, Arduino IDE, HT-05 Bluetooth module

1. Introduction
Embedded systems are kind of indispensable advancements which are crucial and unavoidable in today. They almost find applications is every possible domain and have contributed immensely.
The concept of automation is always something which fascinates one. The idea of this particular project is to construct a personalized automated environment depending on the interests of the individual. The flexibility of the design model is something which is prioritized in this project. The setup designed will be user configurable and hence the choice of appliances or devices which is to be automated lies with the users. The entire setup can be split into three divisions. Firstly, the HT-05 Bluetooth module is used to form a network of devices which could be accessed with the aid of a convenient mobile application and hence can be controlled. Secondly, the MQ-02 Gas Sensor and the flame sensor interfaced with the Arduino is used to detect the presence of any smoke or fire or presence of harmful gases in large scales and hence produces alarms, thus being suitable for real-time monitoring. Finally, a password protected door lock feature which improvises the overall security to access the home.

1. Block Diagram

![Block Diagram](image)

**Figure 1.** Flowchart of the proposed Voice-o-mata Kit.

In the above block diagram, the HT-05 bluetooth module is interfaced with the Tx and Rx pins of the Arduino Uno board and power and ground connections are made to them. The outputs are connected to the bluetooth module which can be controlled using a mobile application. Similarly the Flame sensor and the MQ-2 Gas Sensor are connected with the DI/DO pins of the Arduino. The Matrix Keyboard is also connected to the input and buzzer is taken as output from the Arduino to serve as an alarm.
2. Hardware Description

2.1. HT-05 Bluetooth Module
The Module being used is a Serial Port Protocol Bluetooth module, which is primarily designed for transparent wireless serial connection setup. The feature of significance to be noted about the HC-05 Bluetooth Module is that it can be used in Master/Slave configuration. This makes it different from HT-06 module as it can be used only in slave configuration. This serial port Bluetooth module has 2.4GHz radio transceiver and baseband. It makes use of CSR Bluecore 04-External single chip Bluetooth system with CMOS technology and with Adaptive Frequency Hopping Feature.
The HC-05 module can be used in two functional modes of which one is the Data mode and the other is the AT Command mode. In the data mode, data can be received or sent from other Bluetooth devices. The key pin is the one which is used to switch between the two modes.
Pairing the HT-05 module with the microcontrollers is relatively easy. Typical power and ground connections and the TX&RX connections are important. In this project, this module is used to connect the outputs to be controlled with the module.

Figure 2: HT-05 Bluetooth Module

2.2. MQ-02 Gas Sensor
MQ series sensors are the most preferred type of sensors when it comes to measuring or detecting the presence of gases are involved. Since a module always comes with an op-amp comparator and a digital out pin, it is better to use it when only detection of gases is necessary.
The MQ-2 Gas sensor is suitable for measuring or detecting gases like Alcohol, LPG, Carbon-monoxide, Propane, Hydrogen, and even hydrocarbons like methane. Detection of gases is made easier as the module version of the sensor comes with a digital pin. Due to this feature, even without any controller the module can be used for detection. But when measuring the concentration of any gas in ppm the analog pin is necessary. The TTL driven analog pin works on 5V and hence it is compatible with most of the common microcontrollers.
Hence, this sensor can be used for detecting smoke and even detection of presence of poisonous gases in the indoor atmosphere. It can also be used to continuously monitor the levels of pollutant concentration in the indoors. Also it can be used to produce alarms in any of the fore mentioned situations.

In this project, this sensor is interfaced with the controller to produce alarms in case of presence of alarming levels of gaseous contaminants or smoke at indoors.

2.3. IR Flame Sensor

A flame-sensor is a kind of detector whose primary application is responding to flame or fire. Because of its working mechanism, the response of these sensors are fast, accurate while detecting the flame. This sensor is highly suitable for short range flame or fire detection. It can also be used to monitor projects and to implement safety precautions to cut down devices or to produce alarms. The sensor is very sensitive to IR range of wavelength between 760-1100 nm.

In this project, the flame sensor is used to detect the presence of flame or fire and hence produce alarms.

2.4. Controller

ARDUINO UNO: Arduino Uno is chosen as the microcontroller for this project. It is a ATmega328P based microcontroller board with 14 DI/DO pins and of these 14 pins, 6 pins can be used to obtain Pulse Width Modulated output. The microcontroller also has 6 analog inputs. It is an always ready microcontroller which can be connected to a computer at any time and programmed for any application. It can be powered by the computer or an adapter.

This microcontroller can be extensively used for a wide range of applications. It is extremely user-friendly and the cost involved is very less. Also, the Arduino IDE can be used to code a wide range of unique applications.
3. Working
The Bluetooth module HT-05 is interfaced with the Arduino UNO microcontroller in such a way that the T_X and R_X pins of it are connected with the R_X and T_X pins of the microcontroller. Now, using a relay the outputs which are to be controlled using the setup are connected. By, using a mobile application the HT-05 module connects with the mobile phone. The necessary command words are fed to the controller using the Arduino IDE by coding it in accordance with the user’s requirement. Now, by activating the mobile application and providing the commands the appliances or devices can be controlled.
The MQ-02 gas sensor and the IR Flame Sensor are interfaced with the Arduino UNO controller. The Flame sensor raises an alarm whenever flame or fire is detected by the sensor. The Gas sensor raises an alarm whenever the large amounts of gaseous contaminants are present in the indoors or whenever it detects smoke presence.
The Keypad lock feature is a model which is being used to provide security to the house which is being automated. By, providing the correct password the automation features can be activated every time. This password is also user configurable and hence increases the flexibility of the setup.

![Figure 5: Kit Prototype](image)

4. Advantages
1. Building up a personalized automated environment is made quite handy.
2. The cost involved with the installation of the setup is minimal.
3. Configuration will be more understandable and easier.
4. High flexibility and the terms of agreement with the users is high.
5. Conclusions
The specialty of this project lies in the flexibility of the setup. Users can configure the setup by making simple changes to the code and hence it provides a wide range of options. The primary advantage of the project is that the user can personalize the setup thus making it more user-friendly.

References

[1] K.Mohan Raj —IoT Based Smart warehouse monitoring system, 6th International Conference, November 2018.
[2] Y. A. Badamasi, "The working principle of an Arduino," 2014 11th International Conference on Electronics, Computer and Computation (ICECCO), Abuja, 2014, pp. 1-4.
[3] K. Mohan Raj, N. Balaji, R. Chithrakkannan —IoT Based Patient Monitoring System using Raspberry Pi 3 and LABVIEW, Pakistan Journal of Biotechnology, 2017.
[4] I. Krishna and K. Lavanya, "Intelligent Home Automation System using BitVoicer," 2017 11th International Conference on Intelligent Systems and Control (ISCO), Coimbatore, 2017, pp. 14-20.
[5] S. Ivanović, S. Milivojša, T. Erić and M. Vidaković, "Collection and Analysis of System Usage Data in Smart Home Automation Systems," 2017 IEEE 7th International Conference on Consumer Electronics - Berlin (ICCE-Berlin), Berlin, 2017, pp. 65-66.
[6] S. Somani, P. Solunke, S. Oke, P. Medhi and P. P. Laturkar, "IoT Based Smart Security and Home Automation," 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA), Pune, India, 2018, pp. 1-4.
[7] S. Arakliotis, D. G. Nikolos and E. Kalligeros, "LAWRIS: A rule-based arduino programming system for young students," 2016 5th International Conference on Modern Circuits and Systems Technologies (MOCAST), Thessaloniki, 2016, pp. 1-4.