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Automation of Dry-Wet Dust Collection to Support Swachh Bharat Abhiyaan and Monitoring Over Internet of Things (IOT)

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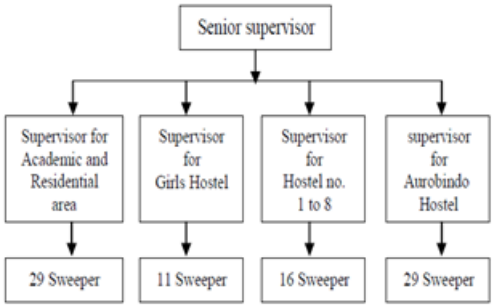
Introduction:

Swachh Bharat Abhiyan (English: Clean India Mission and abbreviated as SBA or SBM for "Swachh Bharat Mission") is a national campaign by the Government of India, covering 4,041 statutory cities and towns, to clean the streets, roads and infrastructure of the country.

The aim of the mission is to cover all the rural and urban areas of the country to present this country as an ideal country before the world. With the proliferation of Internet of Things (IoT) devices such as smart phones, sensors, cameras. It is possible to collect massive amount of garbage.

Existing System:

In swatch Bharat mission dry and wet waste is collected separately.



Flow Chart of Staff Engaged In Solid Waste Management

Drawback

There is no automation using motors and no wireless communication is used for updating the information.

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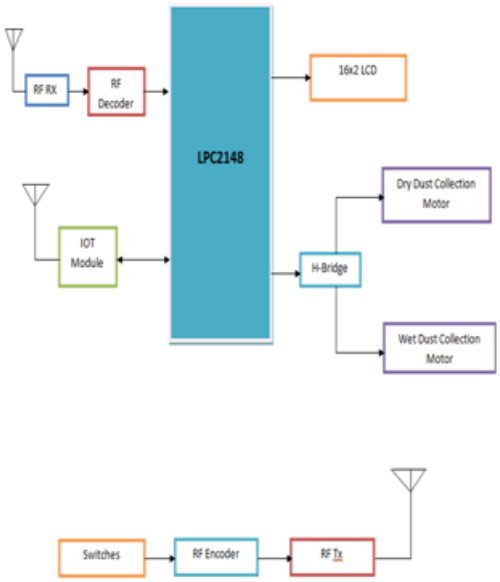
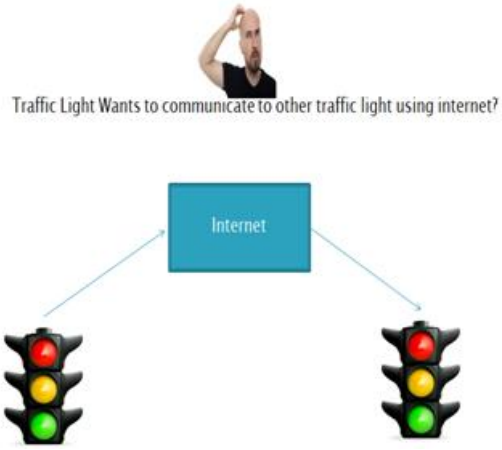
Proposed System:

This project is designed for the effective dry and wet dirt collection using Embedded System. The main motto of this application collecting of dry and wet waste separately into the dumping vehicles. We will place a conveyor belt on which the dry waste collected dust bins are placed left side and wet waste collected bins on right side. The system gets the input through the dust collecting boy through switches. The switches send the signal to the Micro controller using RF technology and that makes the H-bridge to rotate the conveyor belt. When the belt is rotating the dust bins are emptied to the dumping vehicle in sequence. Here we are using LPC2148 as our controller. Here IoT is interfaced to make the information available in the internet about the motor movement.



INTERNET OF THINGS

Internet is helping people to communicate each other using different applications



What if I want to communicate Things

Each other using Internet?

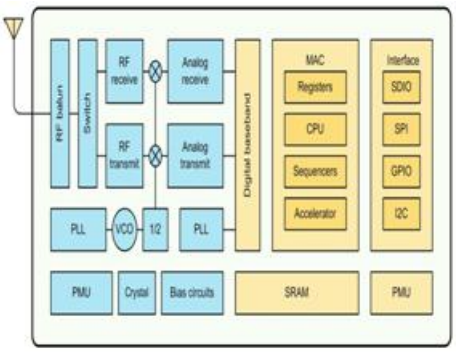
Internet of things helps the things to communicate each other using IoT module

ESP8266EX

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.

Different Modules

- ESP8266(ESPRESSIF)
- ESP8089
- ESP6203



Wi-Fi module

ESP8266EX offers a complete and self-contained WiFi networking solution; it can be used to host the application or to offload WiFi networking functions from another application processor.

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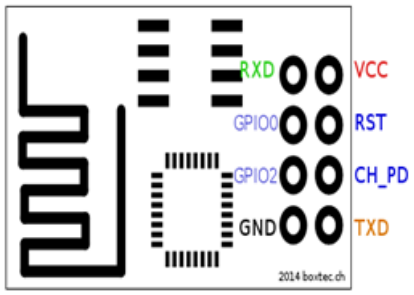
When ESP8266EX hosts the application, it boots up directly from an external flash. In has integrated cache to improve the performance of the system in such applications. Alternately, serving as a WiFi adapter, wireless internet access can be added to any micro controller-based design with simple connectivity (SPI/SDIO or I2C/UART interface). ESP8266EX is among the most integrated WiFi chip in the industry; it integrates the antenna switches, RF balun, power amplifier, low noise receive amplifier, filters, power management modules, it requires minimal external circuitry, and the entire solution, including front-end module, is designed to occupy minimal PCB area. ESP8266EX also integrates an enhanced version of Tensilica's L106 Diamond series 32-bit processor, with on-chip SRAM, besides the WiFi functionalities. ESP8266EX is often integrated with external sensors and other application specific devices through its GPIOs; sample codes for such applications are provided in the software development kit (SDK).

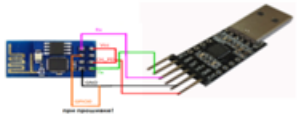
Features

- 802.11 b/g/n
- Integrated low power 32-bit MCU
- Integrated 10-bit ADC
- Integrated TCP/IP protocol stack
- Integrated TR switch, balun, LNA, power amplifier and matching network
- Integrated PLL, regulators, and power management units
- Supports antenna diversity
- WiFi 2.4 GHz, support WPA/WPA2
- Support STA/AP/STA+AP operation modes
- Support Smart Link Function for both Android and iOS devices
- SDIO 2.0, (H) SPI, UART, I2C, I2S, IR Remote Control, PWM, GPIO
- STBC, 1x1 MIMO, 2x1 MIMO
- A-MPDU & A-MSDU aggregation &0.4s guard interval
- Deep sleep power <10uA, Power down leakage current < 5uA
- Wake up and transmit packets in < 2ms
- Standby power consumption of < 1.0mW (DTIM3)
- +20 dBm output power in 802.11b mode
- Operating temperature range -40C ~ 125C
- FCC, CE, TELEC, WiFi Alliance, and SRRC certified

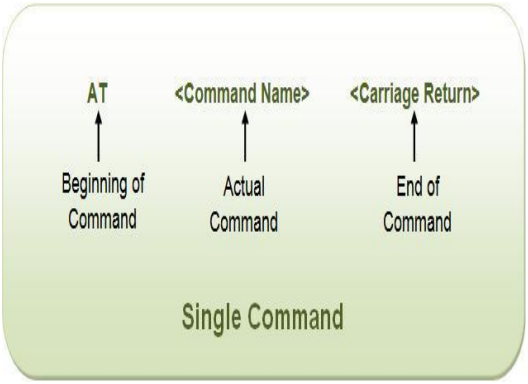
Pin Definitions



Interfacing with USB UART



AT commands are used to control MODEMs. AT is the abbreviation for Attention. These commands come from Hayes commands that were used by the Hayes smart modems



Important AT commands

- **AT+CWLAP** List all the access points
- **AT+CWJAP?+CWJAP="ssid", "password"** Join Access Point
- **AT+CIFSR** Get IP Address

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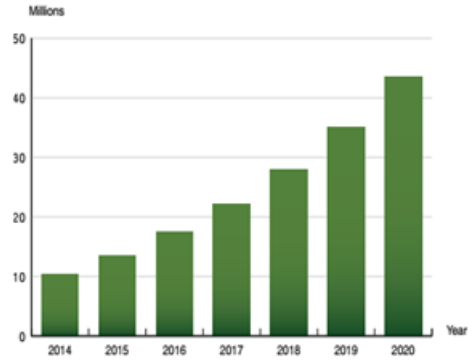
- **AT+CWMODE?+CWMODE=3** Select the respective mode

Wireless IoT improves performance throughout the enterprise value chain

Wireless connectivity is instrumental in the Internet of Things era and the use of wireless solutions in industrial automation is increasing rapidly at all levels of automation systems. Industrial automation systems utilize wireless communication to connect remote and local facilities and equipment to increase operational efficiency. A wireless automation system contains a mix of network technologies, equipment and systems including enterprise and automation systems, network equipment, control devices and field devices. The most common wireless technologies in industrial automation include cellular, 802.11.x Wi-Fi, proprietary unlicensed ISM radio, Bluetooth and 802.15.4 based protocols such as WirelessHART, ISA100.11a, WIA-PA and ZigBee. Berg Insight estimates that shipments of wireless devices for industrial automation applications including both network and automation equipment reached 3.7 million units worldwide in 2014.

Growing at a compound annual growth rate of 23.2 percent, shipments are expected to reach 12.9 million by 2020. The installed base of wireless devices in industrial applications is forecasted to grow at a compound annual growth rate of 27.2 percent from 10.3 million connections at the end of 2014 to 43.5 million devices by 2020. Wi-Fi is widely used for backbone communications as well as in monitoring and control applications within factory automation where Industrial Ethernet has got a strong foothold. Bluetooth is also popular – often as a point-to-point wire-replacement between for example a mobile HMI solution and a field device or control unit. 802.15.4 networks are often used to connect wireless sensors and instrumentation in process automation. Cellular connectivity is typically used for backhaul communication between plants, connecting remote devices in long haul SCADA applications and for third party access to machinery and robots. Most of the major vendors of wireless IoT devices in industrial automation offer a wide range of devices with various wireless technologies in order to support many different applications. Global automation solution providers such as Emerson, GE, ABB, Honeywell, Schneider Electric, Yokogawa and Rockwell Automation are all major providers of wireless solutions to the automation industry. As wireless solutions have become increasingly popular, more and more major automation equipment and solution vendors are offering wireless technology as part of their solutions. Eaton is a major provider of Wi-Fi and cellular devices for industrial automation applications



Installed base of active wireless devices in industrial automation (World 2014–2020)

Major fields of ESP8266EX applications to Internet-of-Things include:

- Home Appliances
- Home Automation
- Smart Plug and lights
- Mesh Network
- Industrial Wireless Control
- Baby Monitors
- IP Cameras
- Sensor Networks
- Wearable Electronics

Hardware Modules used in this project

ARM7TDMI Processor Core

- Current low-end ARM core for applications like digital mobile phones
- TDMI

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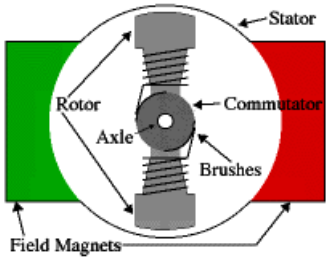
- T: Thumb, 16-bit compressed instruction set
- D: on-chip Debug support, enabling the processor to halt in response to a debug request
- M: enhanced Multiplier, yield a full 64-bit result, high performance
- I: Embedded ICE hardware

- Von Neumann architecture

DC MOTOR

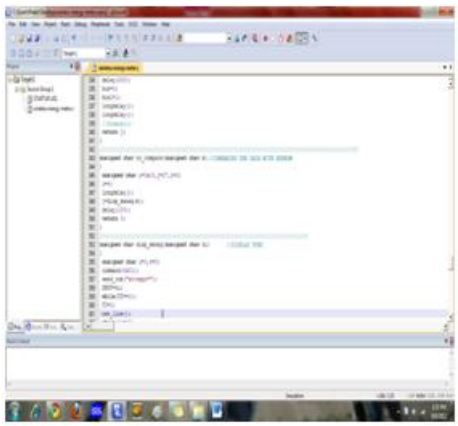
In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion. Let's start by looking at a simple 2-pole DC electric motor (here red represents a magnet or winding with a "North" polarization, while green represents a magnet or winding with a "South" polarization).



Every DC motor has six basic parts -- axle, rotor (a.k.a., armature), stator, commutator, field magnet(s), and brushes. In most common DC motors (and all that BEAMers will see), the external magnetic field is produced by high-strength permanent magnets[1]. The stator is the stationary part of the motor -- this includes the motor casing, as well as two or more permanent magnet pole pieces. The rotor (together with the axle and attached commutator) rotate with respect to the stator. The rotor consists of windings (generally on a core), the windings being electrically connected to the commutator. The above diagram shows a common motor layout -- with the rotor inside the stator (field) magnets.

Software Tools:

Keil compiler is a software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.



Flash Magic

Flash Magic is a tool which is used to program hex code in EEPROM of micro-controller. It is a freeware tool. It only supports the micro-controller of Philips and NXP. It can burn a hex code into that controller which supports ISP (in system programming) feature. Flash magic supports several chips like **ARM Cortex M0, M3, M4, ARM7 and 8051.**

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ADVANTAGES:

- Can maintain Hygienic health conditions.
- Easy way collecting the waste.
- Limited labor and time allocation

APPLICATIONS:

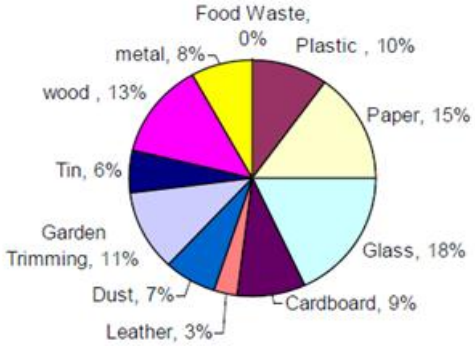
- Urban cities
- Metros
- Industries

Composition of Solid Waste Generated

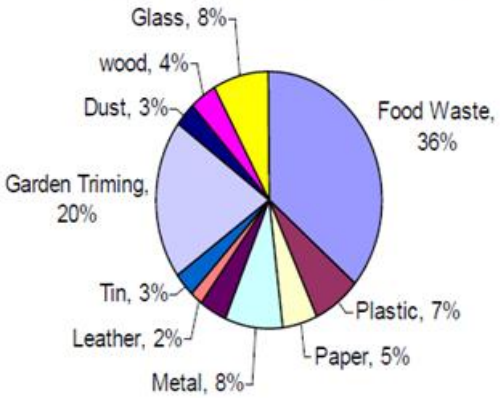
S. N.	Type of Waste	Calculated Amount	Percentage
1	Food waste	0 kg	-
2	Plastic	33 kg	10 %
3	Paper	46 kg	15 %
4	Glass	34 kg	18 %
5	Cardboard	31 kg	9 %
6	Leather	9 kg	3 %
7	Dust	22 kg	7 %
8	Garden trimming	36 kg	11 %
9	Tin	19 kg	6 %
10	Wood	46 kg	13 %
11	Metal	24 kg	8 %
	TOTAL	300 kg	100 %

CONCLUSION:

Hence by this project we can deals with RF controlled collection of garbage to make the premises clean.



Composition of waste in Academic Area



Composition of waste in Residential Area

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