IBM NAAN MUDHALVAN INTERNET OF THINGS

Phase 3:

Development part 1

Topic:

Smart parking

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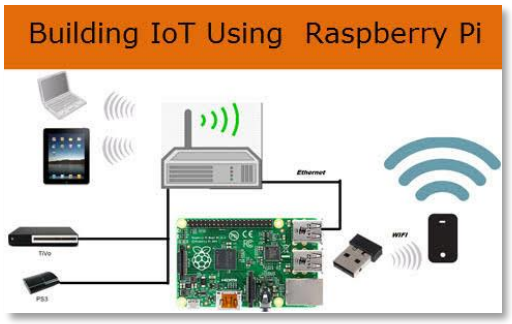
Start building the IoT sensor system and Raspberry Pi integration.



SYSTEM ARCHITECTURE

In many cities, people would appreciate their luck if they could find a parking slot smoothly. People keep roaming around in search of vacant parking slots, and after a lot of struggle, they find one. Due to lack of a proper mechanism to identify free parking slots, they move randomly in search Of parking space wasting a lot of time. This problem can be solved if the drivers could check the availability of parking spaces in And around their intended destination.

Parking Sensors:

For our parking system we have made use of sensors like Infrared, Passive Infrared (PIR) and Ultrasonic sensors. The work of these sensors is the same i.e. to sense the parking area and determine whether a parking spot is vacant or Not. In this case we are using ultrasonic sensors to detect the presence of a car. The ultrasonic sensors are wirelessly connected to Raspberry pi using the ESP8266

chip. The sensors are Connected to a 5V supply either from raspberry pi or an external source.External source being more Preferable.

INTEGRATING RASPBERRI PI WITH ULTRASONIC SENSOR

HSC-SR04 is the commonly used ultrasonic distance Sensor which operates to find the distance Between 2 to 400 cm distances. This ultrasonic distance sensor module Contains four pins such as

- VCC -Input Power of 5V
- TRIG – Trigger Input
- ECHO – Echo Output
- GND –Ground Upon trigger

The TRIG pin with minimum Required High signal of at least 10 S duration, it will Transmit eight 40 KHz Ultrasonic burst through the sender. The ECHO pin will get high voltage for the duration of Time taken for Sending and receiving ultrasonic sound Signals. Based on the distance of obstacle the pulse width Will vary Entire operation of ultrasonic control such as to Initiate the sender to trigger sound waves, listening. The Receiver to calculate the distance will be controlled Through Raspberry Pi and Python scripts.

INTEGRATING RASPBERRI PI WITH CAMERA

The Raspberry Pi Camera Module is specifically designed Extension hardware to work in connection with Raspberry Pi. Raspberry Pi Camera connects with the Raspberry Pi device through the dedicated CSI interface bus which is capable of Transmitting high volume of pixel data. The transmission of Data to the camera and Pi device will happen through BCM2835 processor embedded to the Camera board. The

Camera board is a tiny, at around 25mm x 20mm x 9mm and Weights just 3g making it portable of mobile like applications and other digital devices where size matters in specific. The camera board connects to Raspberry Pi by the way of a short Ribbon cable Once the camera module is integrated then the Raspberry pi should be installed with camera module to access The camera by any of the high level programming languages. The prototype establishes here uses Python Script for Controlling the camera, that is to take to take the capture of Number plate details of car being parked. The camera module Code will be activated once confirmed that the vehicle is in Specific distance from the sensor and this will be intimated by The ultrasonic sensor to the camera module to activate.

CHALLENGES OF SMART PARKING SYSTEM

The challenges for the proposed system are wide from Protecting the system from environmental conditions and Harsh weather so as to making it operational in all weather. Integration of the devices amongst various hardware and Software modules Protection can be provided by using a Proper insulator case for the hardware module which will not affect the functionality of the device and also provide Durability, resistance against external weather and mechanical Forces. The major challenge in Parking Systems is of system Integration due to wide variety of hardware and software Platforms involved and hence possess a great concern to the system scalability. The technology platform supporting P&E, PARC and PUCRS systems comprises of Dynamic messaging systems, a myriad of hardware sensors and traffic control devices, wireless and wire line. Telecommunications systems, computer clients, servers and Hardware drivers and application interfaces. Enabling all these Devices from thousands of different vendors to communicate With each other and tying them together into

one platform is the greatest challenge in reducing the complexity and cost of Smart parking. The variety of infrastructure hardware and Software systems that need to be integrated is enormous and an add-on to it the conventional older hardware making investment in Smart Parking solution. It is highly risky and fragmented. Another major pain point comes from the electronic payment vendors. These payment processors provide permit based electronic payment, typically for a Convenience fee. Scalability is the key to many of these hosted solutions which is the ability of the transaction processor to support over wide geographical market and Service areas with minimal cost. Income based Market evaluation.