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**Assignment 9**

**Aim:** Write a program using Arduino / Rasberry Pi Kit for Demonstration of IOT Application on any one of the following Topics.

* Appliance Remote Control
* Time Lapse Camera Controller
* Security / Automation Sensors
* The Traffic Light Controller
* Temperature Controller

**Hardware Requirements:**

Raspberry Pi B+/2/3

HDMI Monitor or HDMI to VGA converter

Digital Relay switch

12V Battery supply

Jumper cables(Male to Male (10), Male to Female(10), Female to Female(10)

Bread Board

Ethernet Cable or Wi-Fi adaptor

USB web-cam

**Theory:**

**Raspberry Pi**

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside its target market for uses such as robotics. It now is widely used even in research projects, such as for weather monitoring, because of its low-cost and portability. It does not include peripherals (such as keyboards and mice) or cases. However, some accessories have been included in several official and unofficial bundles.

The organisation behind the Raspberry Pi consists of two arms. The first two models were developed by the Raspberry Pi Foundation. After the Pi Model B was released, the Foundation set up Raspberry Pi Trading, with Eben Upton as CEO, to develop the third model, the B+. Raspberry Pi Trading is responsible for developing the technology while the Foundation is an educational charity to promote the teaching of basic computer science in schools and in developing countries.

**Starting Raspberry Pi:**

Connect power supply, USB Keyboard and Mouse and HDMI display to connectors as shown in figure 9.1. Insert NOOBS (New Out Of the Box Software) preinstalled Micro SD card in Micro SD card slot (Please Note: Micro SD slot is at backside of board).

**Loading NOOBS in SD Card**

1. Using a computer with an SD card reader, visit the www.raspberrypi.org/downloads/ page.
2. Click on the Download ZIP button under ’NOOBS (offline and network install)’, and select a folder to save it to.
3. Extract the files from the zip.
4. Format your SD card.
5. Drag and drop NOOBS files.

**Installing Operating Systems using NOOBS**

Now turn on power supply, Raspberry PI will start with NOOBS to install operating system.

Select Raspbian and click on Install. Please note that default login for Raspbian is username pi with the password **raspberry**. Command to start graphical user interface is **startx**.

**Installing Prerequisite Packages on Raspberry Pi**

1. Update system repositories using following command sudo apt-get update.
2. Installing python development kit using following command sudo apt-get install build-essential python-dev python-openssl.
3. Install Pygame for Camera using following command

**sudo apt-get install python-pygame**

1. Install GPIO Libraries using following commands

wget <http://pypi.python.org/packages/source/R/RPi.GPIO/RPi.GPIO-0.1.0.tar.gz>

tar -xvf Rpi.GPIO-0.1.0.tar.gz

cd Rpi.GPIO-0.1.0

sudo ./setup.py install

**Conclusion:**

We have studied and understood the concepts related to Wireless Sensor Networks and designed our own WSN using the ns2 tool.