ASSIGNMENT NUMBER: A1

TITLE Study of Raspberry- Pi, Beagle board, Arduino and other micro controller.

PROBLEM STATEMENT /DEFINITION Study of Raspberry-Pi, Beagle board, Arduino and other micro controller (History & Elevation)

OBJECTIVE

 To understand fundamentals of IoT and embedded system including essence, basic design strategy and process modelling.

 To develop comprehensive approach towards building small low cost embedded IoT.

S/W PACKAGES AND HARDWARE APPARATUS USED Raspberry-pi, Beagle board, PC with the configuration as Latest Version of 64 bit Operating Systems, Open Source Fedora-GHz. 8 G.B. RAM, 500 G.B. HDD, 15"Color Monitor, Keyboard, Mouse

Aim: Study of Raspberry-Pi, Beagle board, Arduino and other micro controller

(History & Elevation).

Pre-requisite:

Basic knowledge of embedded system and IOT

Learning Objectives:

 To develop comprehensive approach towards building small low cost embedded IoT system.

Learning Outcomes:

The students will be able to

 Able to perform the connectivity with Raspberry-Pi, Beagle board, Arduino and other micro controller

 Implement an architectural design for IoT for specified requirement.

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 the 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 does not include peripherals (such as keyboards, mice and cases). However, some accessories have been included in several official and unofficial bundles. According to the Raspberry Pi Foundation, over 5 million Raspberry Pis were sold by February 2015, making it the best-selling British computer. By November 2016 they had sold 11 million units and 12.5m by March 2017, making it the third best-selling "general purpose computer" In July 2017, sales reached nearly 15 million.

Beagle Board:

The Beagle Board is a low-power open-source single-board computer produced by Texas Instruments in association with Digi-Key and Newark element14. The Beagle Board was also designed with open source software development in mind, and as a way of demonstrating the Texas Instrument's OMAP3530 system-on-a-chip. The board was developed by a small team of engineers as an educational board that could be used in colleges around the world to teach open source hardware and software capabilities. It is also sold to the public under the Creative Commons share-alike license. The board was designed using Cadence OrCAD for schematics and Cadence Allegro for PCB manufacturing; no simulation software was used.

Arduino:

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world.

The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself (DIY) kits. Arduino board designs use a variety of microprocessors and controllers.

The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.

The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers.

The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

The Arduino project started in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators.

Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors.

The name Arduino comes from a bar in Ivrea, Italy, where some of the founders of the project used to meet. The bar was named after Arduin of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014.

Program structure:

A minimal Arduino C/C++ program consist of only two functions:

 setup (): This function is called once when a sketch starts after power-up or reset. It is used to initialize variables, input and output pin modes, and other libraries needed in the sketch.

 loop (): After setup() has been called, function loop() is executed repeatedly in the main program. It controls the board until the board is powered off or is reset.

Applications:

 Arduboy, a handheld game console based on Arduino

 Arduino Motion Control Rig.

 Arduinome, a MIDI controller device that mimics the Monome.

 ArduinoPhone, a do-it-yourself cellphone.

 Ardupilot, drone software and hardware.

 ArduSat, a cubesat based on Arduino.

 Automatic titration system based on Arduino and stepper motor.

 C-STEM Studio, a platform for hands-on integrated learning of computing, science, technology, engineering, and mathematics (C-STEM) with robotics.

 DC motor control using Arduino and H-Bridge.

 Data loggers for scientific research.

 Gameduino, an Arduino shield to create retro 2D video games.

 Homemade CNC using Arduino and DC motors with close loop control by Homofaciens.

Conclusion: Hence Experiment was successfully.