A Model of Smart Agriculture Monitoring System

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Abstract— In this communication, we have designed a novel and smart IoT agriculture monitoring system. In this design we have provided an internet to six advanced sensor's using communication module which will help to upload the sensors data in to the cloud for further processing. Overall the communication module and sensors are interface with the controller with 1GHz clock frequency. In this proposed system, for physical data acquisition overall four sensors i.e. Temperature sensor range from -55^0C to 150^0C, flow sensor range from 1-30lit/min, pressure sensor range from 300-1100hpa and ph sensor range from 0-14Ph are used. A Wi-Fi module is used as a communication device to provide the internet to sensors and its operating frequency is 2.4GHz with IEEE 802.11b/g/n standard. The Wi-Fi module can transmit and receive the data with 115200 baud rate. Here, http protocol is used to establish the channel between the IoT system and the database in the cloud. In cloud to store the data in the respective fields we have used a php technique, html should provide the runtime environment for deployment tools and application.

Keywords—*Internet Protocols, IoT, Sensors, Communication Modules, Cloud Computing.*

I. INTRODUCTION

IoT concept was firstly followed by MIT AUTO-ID Labs. Whereas it also investigation there proposed by the use of a wireless sensor network and radio frequency identification technology to accomplish object localization. In 2005 international Telecommunication union they gave a final report [2]. It defines that IoT is the collection of objects that are connect with each other through network. The IoT analysis can be fit for the some particular departments (i.e. urban administration, health monitoring, industrial monitoring, enterprise services, infrastructure formation, public protection, smart homes. By 2025 we are hoped-for IoT nodes are communicate most of the things, plenty of them are necessary in our daily life. Key technologies that drive the long run IoT is associated with smart sensor technologies together wireless detector the nanotechnology and miniaturization of the sensing device. It's planning to potential to watch the health conditions and thought IoTs of not solely human or animals but collectively of assorted engineering structures. Right now it has reaches almost 50% of society, most of the internet users is increased day by day in our world.

Water Quality Monitoring System, Sensors: pH Sensor-Water Level Sensor-Temperature Sensor-Carbon Dioxide Sensor-Turbidity Sensor, Controller: FPGA, Communication Module: Zigbee [3]. Air Quality Monitoring System, Sensors: PMS5005 sensor-Humidity Sensor-Temperature Sensor, Controller: ARM, Communication Module: LPWA Transmitter Module and Power Module-USRP B210, Internet Protocol: http Protocol [4]. Three Wireless sensor for environment monitoring, Sensor: BLE Sensors, Controller: PSoC3, Communication Module: Local area unit (LAN) [RN-131C/G], Internet Protocol: UDP-HTTP [13].

Real time Iot systems style needs totally different transducers (Sensors, actuators) to convert mechanical signal to electrical signal and electrical signal to mechanical. Sensors could also be active or passive sort, active sensor won't need extra power provide for conversion, however passive sensor need external provide for conversion. These entire passive sensors area unit classified as resistive and inductive and capacitive sort. These all sensor can convert physical parameters (pressure, speed force, flow, humidity and temperature) in to electrical parameters. The sensor can provide minute voltage with noise contamination, thus signal processing block can amplify the signal and

removes the noise. Digitalization block can convert the analog signals to digital signal, so the controller will simply method he incoming information. The Data need to upload the cloud using wireless module through Internet protocols. Finally the entire modules area unit interfaced to a controller. This will control the operation based on the algorithm rule.

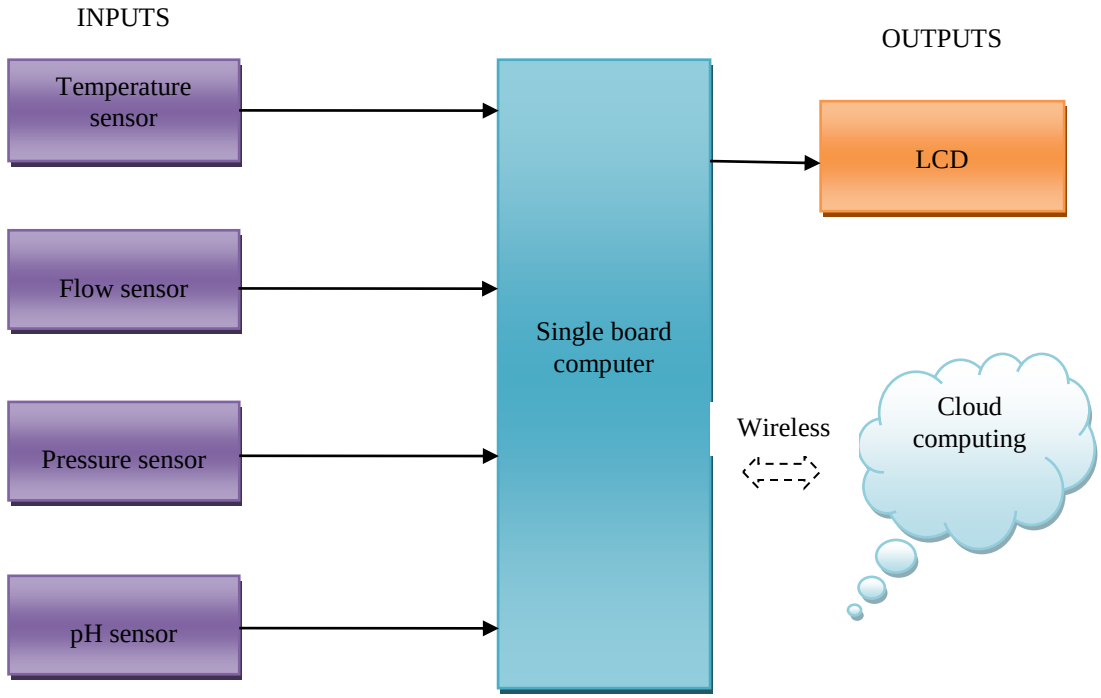

Figure 1: Basic block diagram for the monitor and controlling system

II. PROPOSED SYSTEM

In "A Model of Smart Agriculture Monitoring system", this includes Resistive type of pressure sensor, IC based Temperature sensor, inductive type of a flow sensor and pH sensor. These sensors are connected a ARM processor and send the data to wireless data Trans receiver module. This wireless data trans-receiver module will be sending the data to cloud continuously and update the values. It will show the monitoring of the climate changes observed for crops.

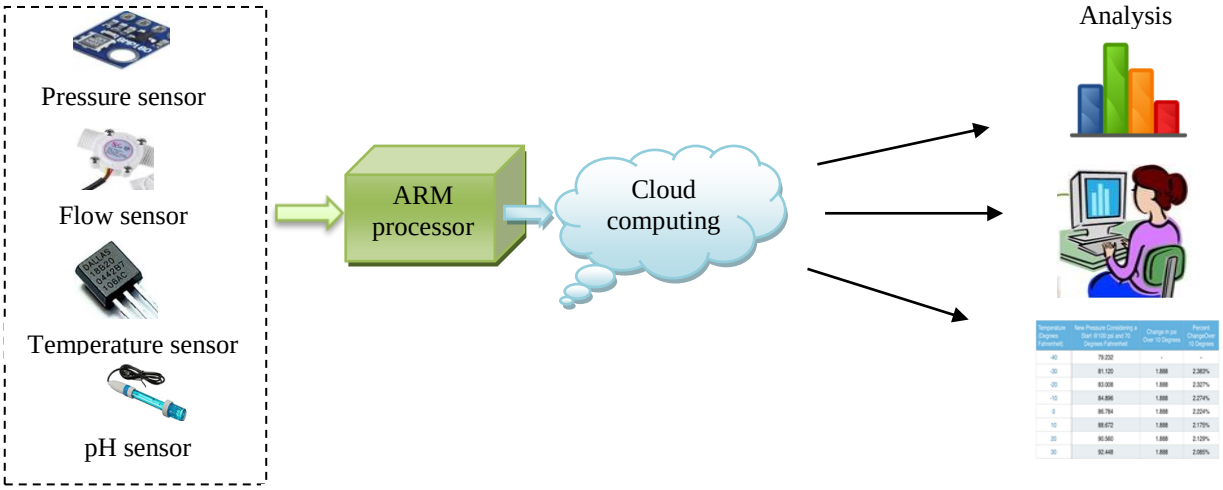

Figure 2: General diagram for smart agriculture monitoring

III. THEORETICAL ANALYSIS

A. *Temperature Sensor:*

Temperature sensing element could be a device it evaluates the warmness and coolness. It's accustomed to sense the temp range. Here we are using IC based temperature sensor that which gives temperature values accurately. Compare to thermocouples it provides a best results. Main aim of the IC based temperature sensor is to measure the temperature. It provides associate electrical output once there's a temperature changes. Operational temperature vary is -55^{0}C to150^{0}C. The temperature device encompasses an output current is 10MA, Supply Voltage is -0.2(max) – 35V (max), Output voltage (-1(min) to 6V (max)). This sensor gives an analog output, and it's a temperature slope is 10mV/^{0}C.

B. *Pressure sensor:*

Pressure sensor is a digital type of sensor. This sensor operating output voltage is 1.3v - 3.6v and it can be operated temperature at 40^{0}C – 80^{0}C. It can be operating supply voltage is 3.3.v – 5.5.v. Pressure sensor is resistive type.

C. *Flow sensor:*

It is a digital type of sensor. Its working voltage is 5 – 18v and operating temperature range is -25 _ 80^{0}C. It can be designed by using 5v TTL logic. This sensor is inductive type. Its flow rate is 1 to 30 lit/min and its accuracy range is ± 10%.

D. *pH sensor*

A pH meter is known as a "scientific instrument", which measures the hydrogen-ion activity in water based solutions to indicate its acidity and alkalinity expressed in terms of pH. pH stands for potential hydrogen, where pH scale is used to allot the acidity or basicity of any substances of hydrogen ion activity. pH is a measurement of how acid or alkaline is. Usually, the range from 0-14, pHs from 0-7 indicates acidity, whereas 7-14 indicates base and 7 will be neutral.

E. *HTTP protocol:*

HTTP means hype r text transfer protocol it is a client server model they opening a connection to make a request. HTTP protocol is stateless protocol which means it doesn't establish any two connections at a time. By using HTTP protocol designed a SQL database. SQL allows to communication by standard HTTP Protocol. Since tunnelling, we designed my SQL database protocol, by utilizing the HTTP protocol as the transport layer.

Wi-Fi provides the information rates-impractically up to 600 Mb/s for the oftentimes used 802.11 b/g/n model managed by Wi-Fi Connections. Various methods are accessible with

various operating frequencies and thought puts. Right now mostly used current method is 802.11b/g/n. Which is suitable with advanced gadgets, although lesser speed. In market currently applicable version is 802.11ac, it's gives high speed, and conjointly helps older devices. The gap amendment on implementation, however it will carry up to 200m. Wi-Fi is general in house networking application. In ESP8266 the data packets are transfer in UDP and TCP Protocols. In this module interfacing between the microcontroller and peripheral devices.

F. Cloud computing:

Cloud computing has appeared as a current technology which gives huge volume of computing and data storage capability. It purpose is to defeat numerous issues appeared from the quick development of enterprises and therefore the development of their documents. Literally the accessible space for the preserver the data on own computer cannot meet the at this time desires. Most of them also create the use of data exchanging processes like Microsoft and Google drive, SAP.

Here the information will be send to cloud through a HTTP protocol. The cloud is the combination of clusters and grids. Cloud allows designing, configuring, and customizing application Online. User can access database resource through internet from anywhere. It provide the four services (i.e. Public cloud, Private cloud, Community cloud , Hybrid cloud) public network means it is simply approachable to the general public and it have a less secure. Private cloud is accessible within organization and it has high security. Community cloud is accessible by a group of organization.

RESULTS

In this IoT system we have advanced four sensor's i.e Resistive type of pressure sensor, IC based Temperature sensor, inductive type of a flow sensor and pH sensors are connected a ARM processor By this process we are getting these particular graphs. After getting the results from ARM processor, then processor is connected to Wi-Fi module. A Wi-Fi module is employed as a communication device to produce the internet to sensors and its operative frequency is 2.4GHz with IEEE 802.11b/g/n customary. The Wi-Fi module will transmit and receive the information with 115200 baud. An indication can also be given by the microcontroller if any values of any parameter changes beyond the threshold values. By this process we get these particular graphs.

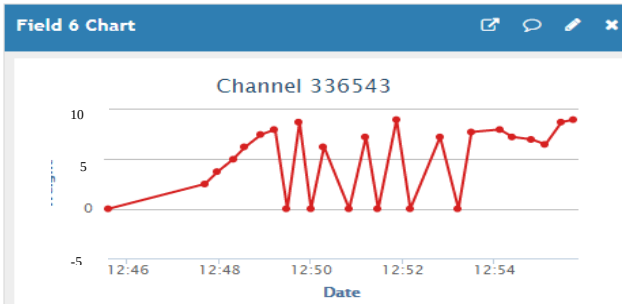

Figure 3: pH Sensor Data Uploaded in Cloud

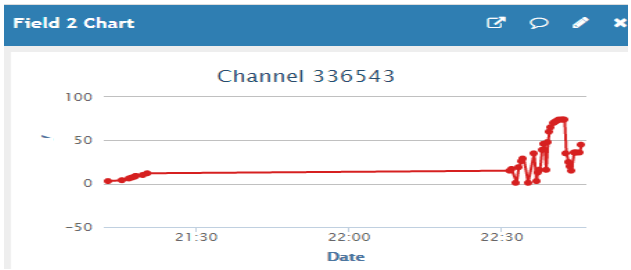

Figure 4: Flow Sensor Data Uploaded in Cloud

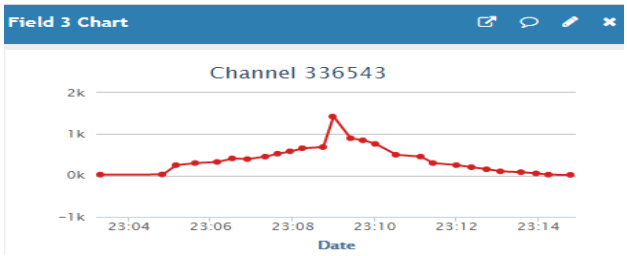

Figure 5: Pressure Sensor Data Uploaded in Cloud

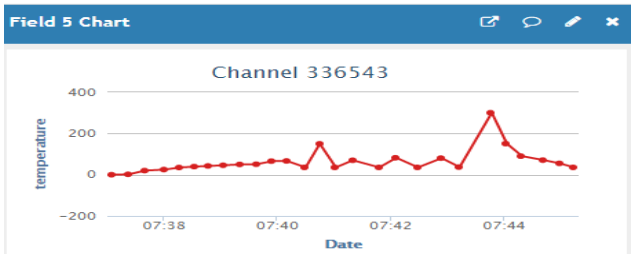

Figure 6: Temperature Sensor Data Uploaded in Cloud

IV.CONCLUSION

In this design we have provided an internet to six sensors using communication module which will help to upload the sensors data in to the cloud for the further processing. Sensors and communication modules are interface with the controller with16 MHz clock frequency. In this system overall 6 sensors are used i.e. UV ray's based pulse detecting sensor, Electrodes based ECG, Strain Gauge based Load Cell, IC based Temperature Sensor, Capacitive based Humidity Sensor,

Resistive based Gas Sensor. Operating frequency is 2.4GHz of Wi-Fi module is used for the communication device to provide the internet to sensors. The Wi-Fi module can transmit and receive the data with 115200 baud rate. TCP protocol was establishing the channel between the IoT system and the database in the cloud. In cloud we store the information within the various fields.

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