XAVIER INSTITUTE OF ENGINEERING

A SISTER INSTITUTION OF ST XAVIER'S COLLEGE

IoT Workshop With Cloud And MSP432

Event Coordinator(s)

1.Prof. Tejal Deshpande

2.Prof. Panil Jain

Time & Place:

9:00 am to 4:00 pm

Xavier Campus, Andheri

Department:

EXTC

No of participants:

25

Details of Resource Person:

Govind Gaundalkar

Working on TT Architectures for Embedded Systems with MSP Architecture from Texas Instruments.

Description of EVENT:

Day 1:

A 5-day workshop on the topic "IoT with Cloud and MSP432" was started on 4th of July, 2022 for the students of EXTC Branch. The students were briefly introduced to the field of IoT, its applications in real life and the importance of C Programming Language and how versatile it is and has efficient resource management that makes it ideal for running on the small microcontroller devices. It was followed by installing all the required softwares like Code Composer Studio (CCS) and dependencies required for getting started with MSP432 board. The students built their very first program for the day which was to blink an onboard LED

Day 2:

The speaker started the session with the "I" of IoT that is by connecting the Board to the Internet using WiFi which is the the important part of the whole IoT system. He also explained certain terminologies pertaining to the WiFi Technology such as Subnet Mask, ShieldIP, Gateway IP, EncryptionType and the ADC. The students also installed the Energia electronics prototyping platform and Integrated Development Environment and used it along with CCS to configure the WiFi module. The speaker also instructed to install Node-Red which allowed the students to create a Dashboard for the system. It is run via the Windows Command Prompt which starts an application on the LocalHost. Where the students created the flow using the nodes in the palette placed one after the other and made the connections.

Day 3:

Day 3 started by learning about Potentiometer and integrating with the help of WiFi which was learnt the day prior where they learned the use of a new Software called as PuTTY. PuTTY is an SSH and telnet client, developed originally by Simon Tatham for the Windows platform. PuTTY is open source software that is used to receive the Serial data transmitted on the COM Ports. The speaker explained the concept of Analog to Digital Converter (ADC) and how to calibrate the Potentiometer and connect it to the MSP432 Board to get the values via the PuTTY Terminal. The importance of JSON was

highlighted which is used for storing and transporting data.JSON is often used when data is sent from a server to a web page. The students with the help of Node-Red programming created a dashboard by connecting the nodes in a flow to show the CPU real time data of performance of each individual core.

Day 4:

For this session the students connected the MSP432 Board to their respective Laptops uploaded the code and started obtaining the digital readings on the PuTTY Terminal on their specific COM Ports and then obtained the corresponding Analog Voltages on the Multimeter in the Excel Sheet to obtain the slope and both intercepts. The boards connected to the WiFi and the students obtained 30 readings from the least to max value using potentiometer and obtained data to perform Regression on the data entered in Excel spreadsheet. By calculating the Slope and the intercepts the respective values were fed into the code to get accurate values using regression. The students also earned about FRED, MQTT Brokers and Subscribers and then sent and received messages.

Day 5:

It was the last day of the workshop where all the knowledge that the students had learnt in the past few days was tested. After writing and building the code they started the PuTTY Terminal to connect to the WiFi Hotspot and linked it with the FRED to create a dashboard wherein they displayed views like A Switch to Toggle the MSP432's onboard LED, a Textview to display the board's name and showcased values like Voltage on the Port 4 Pin 7 using the gauge and the graph of how the values change over time. The students also verified the voltage values on the Dashboard with the actual readings obtained on the MSP432's Pins. To end, the speaker took a small test based on the topics he had taught in the past 5 days to assess how much the students understood and how they applied their knowledge. Based on that a Google form was shared with the students. The speaker gave the time of 1hr to solve 60 MCQ's. After completion he also shared a feedback form based on the entire workshop and took a photograph along with the students and also selected 2 students for the feedback video on the entire workshop.

Conclusion of the Session:

The students got a hands on experience on the MSP432 Boards and got to learn about the various technologies that are available in the market that can be used by the students to their advantage. They learnt about technologies like Node-Red, Energia, PuTTY, wrote various programs using the C Programming Language and also implemented the ADC functionality on MSP432 Board using Node-Red. The students also learned the importance of IoT in today's industry.

Attendance:

Sheet 1 (top-left)

	Name	Date	Sign
7	Jayesh Vijay Bhende	4/07/2022	
6	Rohit Ashish Shemlekar	4/07/2022	
6	Prachet Jayprakash Saul	4/07/2022	P.J.Saul
8	RISHABH JAIPRAKASH TIWARI	4/07/2022	Tiwari
8	Kalpesh Shantaram Tambat	4/07/2022	
9	Atharva Amol Khadye	4/07/2022	Khadye
10	Neerav Desai	4/07/2022	
11	Dhruvil Tailor	4/07/2022	
12	Omkar Wadkar	4/07/2022	
13	Vedang Sawant	4/07/2022	Vedant

Sheet 2 (top-right)

	Name	Date	Sign
14	Mandar G Bavdane	04/07/2022	
15	Aishwarya R Shenvi	04/07/2022	AShenvi
16	Prajakta K Dagade	04/07/2022	Prajakta
17	Shripad K Gaikwad	04/07/2022	
18	Sudesh S. Manjrekar	04/07/2022	S Manjrekar
19	Akash P Chintakindi	04/07/2022	Akash
20	Jyotirmay U. Patil	04/07/2022	Jyotir
21	Sahil Vijay Pawar	04/07/2022	Sahil
22	Piyush Sunil Khatpe	04/07/2022	Piyush
23	Tanmay Gokarn	04/07/2022	

Sheet 3 (bottom-left) — 5/07/22

SR.No.	Name (as per your want on certificate)	Sign	Date
1.	Harshda Bhatu Khairnar	Harshda	5/07/22
2.	Sahil Vijay Pawar	Sahil	5/07/22
3.	Nishant Patil		5/07/22
4.	Rishabh Tiwari	Tiwari	5/07/22
5	Vedangi Rajesh Sawant	Sawant	5/07/22
6.	Atharva Amod Khadye		5/07/22
7.	Prachet Jayprakash Saul	P.J.Saul	5/07/22
8.	Kalpesh Shantaram Tambat	Tambat	5/07/22
9.	Neerav Desai		5/07/22
10.	Shripad Gaikwad		5/07/22
11.	Dhruvil tailor		5/07/22
12	Aishwarya Shenvi	AShenvi	5/07/22
13.	Mandar Bavdane		5/07/22
14.	Prajakta Dagade		5/07/22
15.	Sudesh Manjrekar	SManjrekar	5/07/22
16.	Akash Chintakindi	Akash	5/07/22
17.	Tanmay Gokarn		5/07/22
18.	Jyotirmay Patil		5/07/22
19.	Rohit Shemlekar		5/7/22
21.	piyush khatpe	piyush	5/7/22
22.	Ahsaas Srivastava	Ahsaas	5/7/22
23.	Mohit Patil	MP	5/7/22

Sheet 4 (bottom-right) — 6/07/22

SR. No.	Name (as per)	Sign	Date
1.	Harshda Bhatu Khairnar	Harshda	6/07/2
2.	Sahil Vijay Pawar	Sahil	6/07/22
3.	Nishant Patil		6/07/
4.	Rishabh Tiwari	Tiwari	6/07/2
5.	Prachet Jayprakash Saul	P.J.Saul	6/07/22
6.	Kalpesh Shantaram Tambat	Tambat	6/07/22
7.	Vedangi Rajesh Sawant	Sawant	6/07/22
8.	Atharva Amod Khadye	Khadye	6/07/22
9.	Dhruvil Tailor		6/7/22
10.	Neerav Desai		6/7/22
11.	Shripad K Gaikwad		6/7/22
12.	Aishwarya Shenvi	AShenvi	6/7/22
13.	Mandar Bavdane		6/7/2
14.	Prajakta Dagade	Prajakta	6/7/2
15.	Sudesh Manjrekar	SManjrekar	6/7/22
16.	Akash Chintakindi	Akash	6/7/22
17.	Tanmay Gokarn		6/7/22
18.	Jyotirmay Patil		6/7/22
19.	Rohit Shemlekar		6/7/22
20)	piyush khatpe	piyush	6/7/22
21)	Ahsaas Srivastava	Ahsaas	6/7/22
22)	Mohit Patil	MP	6/8/22

IOT Workshop (Day 4)

Date: 7/7/22

Name	Sign
1) Jyothmay Umesh Patil	J001
2) Rohit Girish Shembekar	R
3) Aishwarya R Shenvi	Aishwarya
4) Mandar Sanju Bawdane	Mandar
5) Tanmay Gokarn	
6) Kalpesh Shantaram Tambvekar	Tambvekar
7) Rachet Jayprakash Saul	Rik
8) Harshala Bhatu Khairnar	Harshala
9) Rishabh Tiwari	Ti. ri
10) Nishant Patil	⊕
11) Ahsaas Srivastava	Ahsaas
12) Sudesh P. Manjrekar	
13) Akash Chintakindi	A kol
14) Sahil Pawar	Sahil
15) Prajakta R. Dagade	Prajakta
16) Piyush Khatpe	Khatpe
17) Shripad R. Gaikwad	
18) Dhruvi Tailor	Dhruvi
19) Neerav Desai	Neerav
20) Omkar Wadkar	Omkar
21) Athasva Khadye	Atmay
22) Mohit Patil	Patil

Second sheet — 8/07/22

Sr No	Name	Sign	Date
1	Harshala Bhatu Khairnar	Harshala	8/07/22
2	Rishabh Jayprakash Tiwari	Tiwari	8/07/22
3	Vedangi Sawant	Sawant	8/07/22
4	Athasva Khadye	Khadye	8/07/2022
5	Rachet Jayprakash Saul	Rik	8/07/2022
6	Kalpesh Shantaram Tambvekar	Tambvekar	8/07/2022
7	Ahsaas Srivastava	Ahsaas	8/07/2022
8	Nishant Patil	⊕	8/07/2022
9	Dhruvi Tailor	Dhruvi	8/07/2022
10	Neerav Desai	Neerav	8/07/2022
11	Omkar Wadkar	Omkar	8/07/2022
12	Mandar S. Bawdane	Mandar	8/07/2022
13	Aishwarya R Shenvi	Aishwarya	8/07/2022
14	Prajakta Dagade	Prajakta	8/07/2022
15	Piyush Khatpe	Khatpe	8/07/2022
16	Shripad Gaikwad	Gaikwad	8/07/2022
17	Sudesh Manjrekar :(	Manjrekar	8/07/2022
18	Aakash Chintakindi	Akash	8/07/2022
19	Rohit Shembekar	R	8/07/2022
20	Jyothmay Patil :)	Patil	8/07/2022
21	Tanmay Gokarn		8/07/2022
22	Sahil Pawar	Sahil	8/07/2022
23	Mohit Patil	Patil	8/7/2022

(Tejal)
(Tejal Deshpande)
Asst. Prof.

Parul Jain
Asst. Prof

H.O.D ExTC
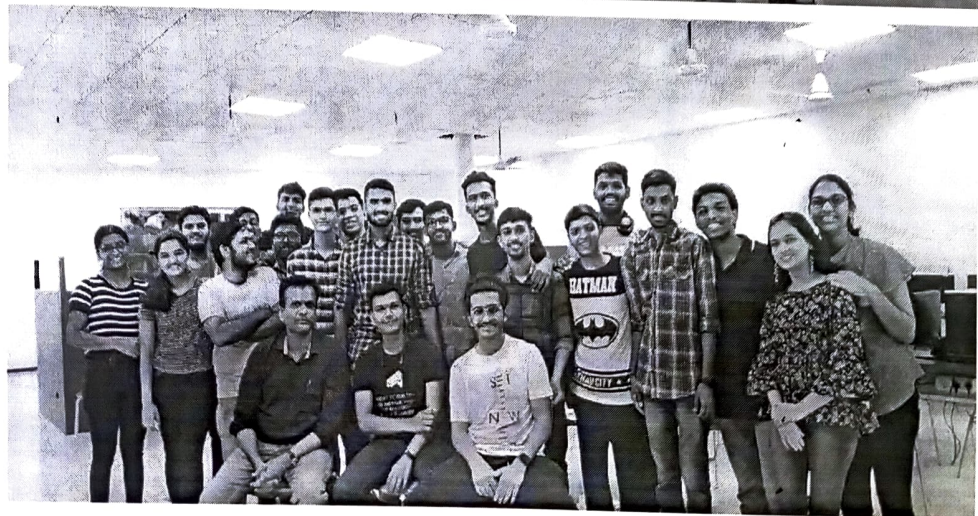
Photographs:

How many steps are there in a 12 bit ADC

- ( ) 256
- (●) 4096
- ( ) None of the above
- ( ) 65536

Which of the following is true

7 points

- ( ) When a JavaScript object arrives at a node , it is available using a variable called msg. The most important data within the object is usually the payload property of the object

- (●) When a JavaScript object arrives at a node , it is available using a variable called payload. The most important data within the object is usually the msg property of the object

MQTT is a

1 point

- (●) Publisher Subscriber protocol
- ( ) Peer to peer protocol
- ( ) Client server protocol

DHCP server is used to_

1 point

- ( ) issue same IP addresses always
- (●) issue unique IP addresses and automatically configure other network information
- ( ) issue MAC addresses
- ( ) None of the options

Whenever there is no node available to achieve a desired functionality you may use the _____ node to create that functionality you desire.

- (●) Function
- ( ) Switch
- ( ) Inject
- ( ) Change

Whenever a flow is modified a blue circle appears on the nodes that are
modified. This conveys to the users that the changes are not deployed to
the server. The user has to deploy every time a change is made by clicking
the Deploy button.

○ False

○ True

If the analog voltage range needs to be from 0 to 3.3V and Vref = 3.3V,then 2 points
the voltage step size for a 12bit ADC is

○ None of the above

○ 8mv

◉ 0.8mV

○ 15.6mV

○ 1.56mv

Clear selection

Select the basic network topologies   1 point

☑ Client server

☑ Peer to peer

☐ Cloud

Select the correct server IP address of the eclipse broker   1 point

○ 198.41.30.241

◉ 198.30.41.241

Clear selection

SSID stands for

1 point

- (●) Service set identifiers(Name of the WiFi network)
- ( ) Service set identifiers(encryption of the WiFi network)
- ( ) Service set identifiers(Number of the WiFi networks)

Clear selection

Protocol suite is a collection of protocols that are designed to work together

1 point

True ▾

To start a section which symbol is used

1 point

- ( ) #
- (●) $
- ( ) /
- ( ) ^

Clear selection

Select all the correct options

2 points

- [ ] Topics connect the publisher and the subscriber.
- [ ] The publisher can choose any topic name.
- [ ] Topic names are case sensitive. They can include space characters.
- [ ] When a message is published on a topic, it is distributed by the broker to connected clients that have subscribed to the topic
- [ ] Topic names are case insensitive. They can include space characters.

JSON is a syntax for

1 point

○ storing and exchanging data.

○ exchanging data.

○ storing data.

◉ storing and exchanging data and formatting data

Clear selection

If Vref=2.5V and analog input voltage Vin = 1.7V then the digital output for an 8-bit ADC is

2 points

○ 10101010

◉ 11111111

○ 10010011

○ None of the above

Clear selection

TCP and UDP is found in which layer of the TCP/IP protocol

1 point

○ Internet

○ Application

○ Link

◉ Transport

Clear selection

What is a protocol?

1 point

- (•) Set of rules on how computers talk to each other on a network

- ( ) Set of rules on how computers are configured for use on the internet

- ( ) Set of rules for IoT communication using cloud

- ( ) Set of rules for arranging the protocol stacks

Clear selection

Which of the statements are true in JSON

2 points

- [ ] Data is in name/value pairs

- [ ] Data is separated by commas

- [ ] Curly braces hold objects

- [x] Square brackets hold arrays

- [ ] Curly braces hold arrays

- [x] Square brackets hold objects

The name of the template language used is

1 point

- (•) JSON

- ( ) Moustache

- ( ) Name/Value

Clear selection

ARP

- ● translates an IP address to a MAC address
- ○ translates a MAC to a physical address
- ○ translates a MAC address to an IP address
- ○ translates a machine IP address to a server IP address

Clear selection

On a local machine Node-RED runs at port

- ○ 1183
- ● 1893
- ○ 1833
- ○ 18833

Clear selection

Multiple nodes when connected together in Node-Red forms

- ● none of the above
- ○ flows
- ○ programs
- ○ application

Clear selection

http input node has to be used along with the http output node

- ( ) True
- ( ) False

Clear selection

How many layers does a TCP/IP protocol suite have?

- ( ) 7
- ( ) 4
- ( ) 2
- ( ) 6

Clear selection

The callback function is used to show received messages

- ( ) True
- ( ) False

Clear selection

In JSON, values must be one of the following data types: 2 points

☐ a string

☐ a number(can be integer or floating type)

☐ an object (JSON object)

☐ an array

☐ a boolean

☐ Null

☐ float

☐ byte

The time taken to convert an analog value to a digital value in a SAR   2 points
conversion method is fixed.

○ False

○ Statement is ridiculous

○ True

To end a section which symbol is used   1 point

○ #

◉ $

○ /

○ ^

Clear selection

Which is a connection oriented protocol?   1 point

(●) TCP/IP

( ) UDP

Clear selection

Node-RED is a browser based editor   1 point

( ) a stand alone IDE

( ) False

(●) True

Clear selection

Which is true?   1 point

( ) JSON is language independent when used in the cloud

(●) JSON is language independent

( ) JSON is language dependent .

Clear selection

Is the following true in MQTT : When the data is published against a topic,   1 point
the subscriber of the topic receives the copy of the message.

( ) Yes

(●) NO

Clear selection

Is the following true in MQTT.In pub sub communication, there is a broker `1 point`
in the middle. The sender. publishes data to the broker against a topic. The
sender is not aware of who is going to consume the data. Anybody who is
interested in receiving the data has to subscribe to that topic.

○ Yes

○ No

The technique used for calibrating the Potentiometer was `1 point`

○ None of the above

○ Mean

○ Linear regression

○ Non-linear regression

What is IoT? `1 point`

⦿ The Internet of Things (IoT) is the network of physical objects accessed through the
internet.

○ The Internet of Things (IoT) is the network of performance intensive computers
accessed through the internet

○ The Internet of Things (IoT) is the network of mobile phones accessed through the
internet.

○ None of the above

Clear selection

```
aJsonObject *root=aJson.createObject();          aJsonObject
*details=aJson.createObject();
 aJson.addItemToObject(root,"details",details);
aJson.addStringToObject(details,"name"."Aditya");
aJson.addNumberToObject(details,"Age",9);   The given code above will
build which of the following JSON string
```

- (●) {"details":{"Name" "Aditya","Age":9}}

- ( ) {{"Name": "Aditya","Age":9}}

- ( ) {"Name":{"details": "Aditya","Age":9}}

<div align="right">Clear selection</div>

The design principles of MQTT are

- ( ) to minimise network bandwidth and device resource requirements whilst also attempting to ensure reliability and some degree of assurance of delivery

- ( ) to maximise network bandwidth and minimise device resource requirements whilst also attempting to ensure reliability and some degree of assurance of delivery

- ( ) to maximise network bandwidth and device resource requirements whilst compromising delivery

- ( ) to minimise network bandwidth and device resource requirements whilst compromising reliability andensuring some degree of assurance of delivery

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Node-RED is

- (●) a powerful tool for building IoT applications. It is a visual programming language with predefined programming blocks called 'nodes'.

- ( ) a powerful tool for building IoT applications. It is a programming language which requires nodes created by the user

<div align="right">Clear selection</div>

To say that a section does not exist the symbol used is

- ⚪ #
- ⚪ $
- ⚪ /
- ⚪ ^

You can control or customize the behavior of the node by adding properties to the objects that are sent to the node.

- ⚪ True
- ⚪ False
- ⚪ Depends on the node being configured

Which of the following port configurations are reserved with IANA for MQTT purposes

- ☑ 1183 and 8883
- ☑ 1883 and 8883
- ☐ 1833 and 8833
- ☐ 1983 and 8333

The template node allows you to create the content that you want to return to the sender, but mark place holders where you want data to be inserted.

- ⚪ False
- ⚪ True
- ⚪ Cant say

Starting from top to bottom:Name the layers in in a TCP/IP protocol

○ Application,Network,Internet,Link

○ Application,Transport,Internet,Link

○ Application,Internet,Transport,Link

○ Application,Internet,Network,Link

Which node routes messages to the output based on their property values.

○ Fuction

○ Switch

○ Change

○ Inject

The given JSON evaluates to JavaScript objects {"name": "Noddy"}

○ True

○ False

JSON stands for

○ Java Script Object Notation

○ Java Script Object Node

○ Java Schemas Object Notation

○ Java Script Object Nomenclature

MQTT stands for

○ Message Queuing Telemetry Transport

○ **Message** Queuing Transport **Telemetry**

○ Message Queuing Transfer Telemetry

○ **Message Queuing Transfer Transport**

In MSP 432 the ADC module function is

○ Secondary module function

○ Tertiary module function

○ Default

○ Primary module function

A red coloured triangle on a node signifies incomplete or erroneous node configuration

○ false

○ true

Results:

Above 90 percentile		
Name	Marks	Percentile
PRACHET JAYPRAKASH SAUL	43 / 60	100
HARSHDA BHATU KHAIRNAR	42 / 60	97.67
AKASH PRAKASH CHINTAKINDI	42 / 60	97.67
SUDESH KISHOR MANJREKAR	42 / 60	97.67
ROHIT GIRISH SHEMBEKAR	42 / 60	97.67
AISHWARYA RAVINDRA SHENVI	41 / 60	95.34
PRAJAKTA RAMESH DAGADE	41 / 60	95.34
DHRUVIL VINESH TAILOR	40 / 60	93.02
NISHANTH DNYANESHWAR PATIL	39 / 60	90.69
OMKAR DEEPAK WADKAR	39 / 60	90.69
ATHARVA AMOD KHADYE	39 / 60	90.69

Above 80 percentile		
Name	Marks	Percentile
KALPESH SHANTARAM TAMHANKAR	38 / 60	88.37
MANDAR SANJU BAVDANE	38 / 60	88.37
RISHABH JAIPRAKASH TIWARI	37 / 60	86.04
NEERAV DESAI	36 / 60	83.72
TANMAY SUHAS GOKARN	36 / 60	83.72

Above 70 percentile		
Name	Marks	Percentile
MOHIT RAJENDRA PATIL	34 / 60	79.06
AHSAAS VIMAL SRIVASTAVA	34 / 60	79.06
PIYUSH SUNIL KHATPE	34 / 60	79.06
SHRIPAD KRISHNA GAIKWAD	34 / 60	79.06
JYOTIRMAY UMESH PATIL	34 / 60	79.06
VEDANGI RAJESH SAWANT	33 / 60	76.74
SAHIL VIJAY PAWAR	32 / 60	74.41