

**UNIVERSAL M2M**¹Mr.Narendra mahamuni, ²Prof.Badhe.S.S.¹Student of Master of Engineering (Dept .VLSI & Embedded Systems) Dr D.Y.Patil College Of Engineering,pune.²HOD (Department of Electronics and Telecommunication)Dr D.Y.Patil College Of Engineering,Pune.

Abstract — Universal Machine to Machine (M2M) communication refers to technologies that allow wireless and wired systems to communicate with other devices of the same ability. In this paper we present an overview of standardization activities in the field of M2M communication and M2M services over mobile network based on the Indian market scenario M2M provides 24/7 reliable service for mission-critical applications like SCADA & Telemetry for Utilities, Smart Grid power networks or Transaction networks connecting. Every unit can be configured as GPRS (2G/3G) or Wi-Fi Communication between remote station and central server. In addition, the RS-232/485 serial ports allow you to connect Modbus slave devices. M2M supports external micro SD card to log the timestamp data when there is no connectivity to server. M2M updates all the history data to server whenever controller get healthy connection with server. The Universal M2M controller come with analog inputs, digital inputs, digital outputs, RS-232/485 serial ports to provide users with a versatile communication platform, making these controller ideal for embedded applications. M2M enables remote access to the Internet of things, allowing you to support a wide variety of sensors, RTU and devices for monitoring and control purposes. M2M is a best-in-class GPRS/Wi-Fi based controller, not only in terms of data speed

Keywords- M2M,SCADA,GPRS,WIFI

I. INTRODUCTION

In the field of embedded system design there are various research is done for IOT gateway/ hub but they are not still fully integrated with various communication modules as a use of generalize platform/hardware which can be use in any harsh condition with full ability. So We are proposed the system which can be used in all field like SCADA, TELEMETRY, WATER, OIL, GAS, ELECTRICITY, WEATHER STATION,PUMPING STAION etc. monitoring purpose . till date there are various gateways are developed but as main concern is to maintain communication issue to solve this issue there is not alternative way .we combine wifi,gsm,lora modules to resolve this problem in one hardware with pluggable board as per field need .and also we provide various field communication interface like ADC channels ,DI(digital input's),DO(digital output's),serial port(RS232/485),LAN ,storage device like (EEPROM,SD-CARD)

II .WHY UNIVERSAL M2M PREFERRED?

As current technology need we put all the peripherals in one single pcb with pluggable mini board of(gsm,wifi,lora) so as per application use we can choose the pluggable device and for the we also implement the firmware update through the air means you don't need to connect hardware to pc any more also some feature are as per below .

- 2G/3G GPRS supports
- Wi-Fi enabled
- ARM® 32-bit Cortex®-M4
- 192+4 Kbytes of SRAM
- Up to 32 GB micro SD card
- 1 Software selectable RS-232/485 serial port (as Modbus Master)
- 10/100 Mbps Ethernet (as Modbus Master)
- Built in real-time clock (RTC).
- MQTT (IOT Protocol)

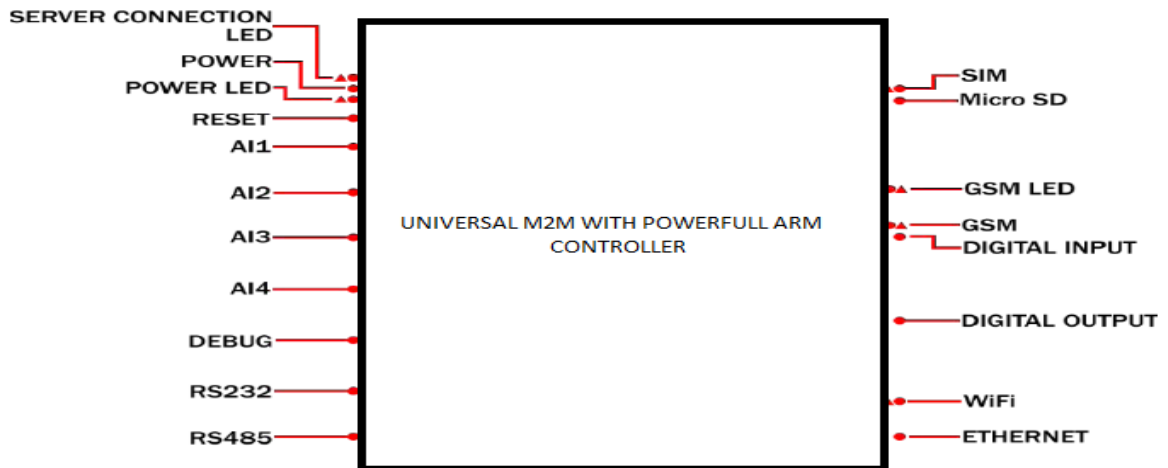


Fig a. Basic Architecture of UNIVERSAL M2M

III. BLOCK DIAGRAM DESCRIPTION.

In Fig a. shows Basic Architecture of UNIVERSAL M2M. With all communication connectivity. Fig b. Shows basic block diagram with power full ARM cortex m4 series microcontroller and all communication protocol we use to communicate .as a firmware part we use powerful KEIL IDE .And we use c programming language to write all needed logic also we use Eclipse Mosquitto is an open source message broker that implements the MQTT protocol versions 3.1 and 3.1.1. Mosquitto is lightweight and is suitable for use on all devices from low power single board computers to full servers.The MQTT protocol provides a lightweight method of carrying out messaging using a publish/subscribe model. This makes it suitable for Internet of Things messaging such as with low power sensors or mobile devices such as phones, embedded computers or microcontrollers. The Mosquitto project also provides a C library for implementing MQTT clients, and the very popular mosquitto_pub and mosquitto_sub command line MQTT clients.Mosquitto is part of the Eclipse Foundation and is an iot.eclipse.org project.

IV. HARDWARE OVERVIEW

We used STM 32F407 Microcontroller .we worked on this phase using EAGLE PCB design software first we draw all schematic and then we decided all placement setup for components and connectors and then we use same tool for routing the board .as shown in Fig c . top,bottom,drill gerber view are shown.

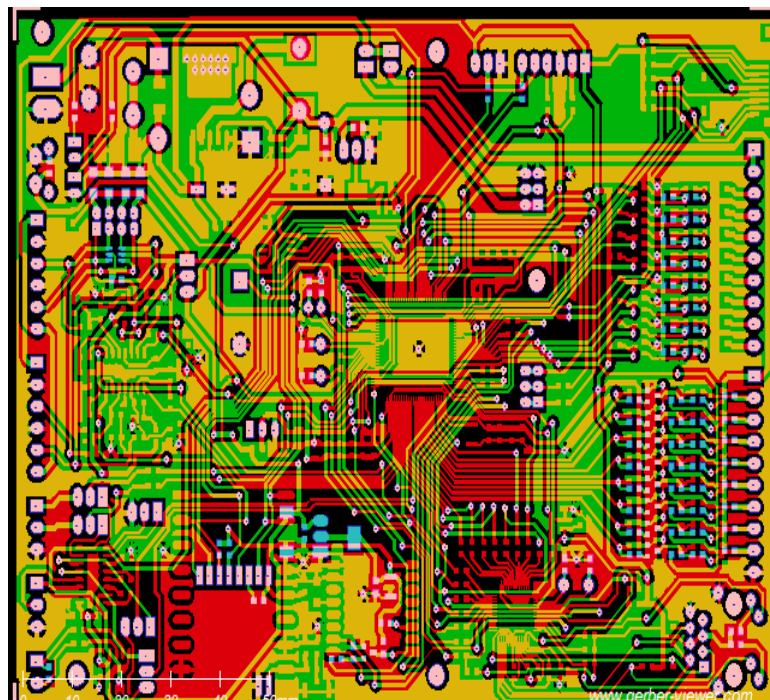


Fig c. Top,Tottom,Drill Gerber view are shown

- Power supply :- this system contains below power supply range .
 - 1) 5 V, 3 AMP:- for gsm and wifi module using lm2576 regulator buck ic.
 - 2) 24 V 3 AMP:- for analog sensor which can be operate using 24v we us XL6009 boost converter .
 - 3) 3.3V:- for microcontroller we use lm1117 fixed voltage regulator circuit.
 - 4)2.5 V:-for the voltage reference of ADC we use lm1117 fixed voltage regulator ic.
- My whole system work on 40watt solar panel, with smart solar charger and 14.8v li-ion battery pack.
- ANALOG INPUT:- we designed AI for 0 to 20 MA signal as well as for the 0 to 10 v source.
- DIGITAL INPUT: - we designed DI up to 100 v source .
- DIGITAL OUTPUT :- Are designed as ULN drive for relay and solenoid as load.
- GSM BOARD:- we use telit gl868 module for gsm interfacing.
- WI-FI:- we use esp07 module to enable wifi communication.
- SD-CARD :- provided up to 32 gb support.
- DEBUG:- RS 232 communication protocol is provided.
- MOD BUS:- standard RS -485 TCP and RTU is provided.

V. SOFT FEATURES

• SERVER COMMUNICATION

Socket communication (Over Wi-Fi and GPRS) using MQTT IOT Protocol Send all DI, DO, AI, Modbus and Controller related parameters (Signal strength, Voltage, battery status, Longitude, Latitude) data to server All Data transmit/receive to/from server with time stamping Data transfer to server on

- Time stamped data Transmission on Change of Status / Report on Exception
- Periodic transmission with configurable interval from 10 Second to 24 hours
- Request from Server (on demand/interrogation)

Store and forward mechanism in the case of communication loss (with time stamp).

• COUNTERS

All digital inputs can be configure as pulse counter

• DATA LOGGER

Time stamped date Storage and Forwarding in case of communication loss Support every minute Data archiving and Forwarding to server.

• DO OPERATION SCHEDULE

Expression based schedule.

- Weekly schedule for each DO operation
- Time based and event based DO operations
- User can define events/ logic using configuration tool
- Manual DO operation from Server

• ALARM

Alarm notification to server.

Digital input and analog input alarm.

Supports SMS Notification for alarm.

• COMMUNICATION PROTOCOL

Modbus RTU (RS 232/485), Modbus TCP

• OVER THE AIR (OTA)

Facility to update the firmware over the AIR (OTA) in case of GPRS or Wi-Fi network

• DEVICE CONFIGURATION TOOL

- Windows based configuration tool
- Local configuration by using RS232 TTL
- Remote configuration Using SMS and MQTT Protocol

• ANALITICAL TRENDS AND REPORTS

- Real time KPIs and Trends.
- Customize trends and reporting.
- Historical trends and reports.

VI. CONCLUSION

M2M market will be significantly driven in the next 10 years by enterprises' need to reduce costs and consumer demand for new services. As per the forecast by ABI Research, the total number of M2M connections worldwide is predicted to increase to as high as 297 million connections by 2014. Future trends indicate that the mix is likely to remain similar over the next 5-6 years. According to Strategy Analytics, the worldwide M2M communications market is estimated to reach close to \$30 Billion USD by 2014. Another change is likely to be in the sectoral distribution of M2M applications. Earlier, most deployments in developed markets have focused on the commercial segment, especially the automotive and transport sectors where the first solutions emerged. The balance is likely to shift considerably during the next 10 years: from developed to emerging markets; from commercial to consumer applications; and a focus on one sector to a much wider spread of applications. There is a likelihood of integrating sophisticated technologies like Unified Communications M2M communications in future - this will provide superior services both for enterprises as well as consumers.

The embedded system is innovative for chicken farming, which changes a traditional farm to a "Smart Farm" or "Intelligent Farm". In addition, the system could work on the application of the smart phones helping the owner to monitor real time environmental contexts such as temperature, humidity, ammonia gas, water level. In this system describes an Integrated Solution for Smart Poultry Monitoring Using WSN (wireless Sensor Network) and GPRS Network. Monitoring environmental parameters in a real time industry are crucial. Various environmental parameters for effective growth of chickens have been identified and defined. It also explains the method of Water Level Control Mechanism and Food Control Mechanism for a poultry farm. Threshold values of temperature, humidity, ammonia gas and water level are monitor and control by the microcontroller. As well as remote monitoring is done and with the help of this facility, the person in-charge can observe the situation of internal structure of poultry by sitting in a one room as data will be display on a web portal. The intelligent system can reduce cost, time, and labor is highly user friendly to the farmers.

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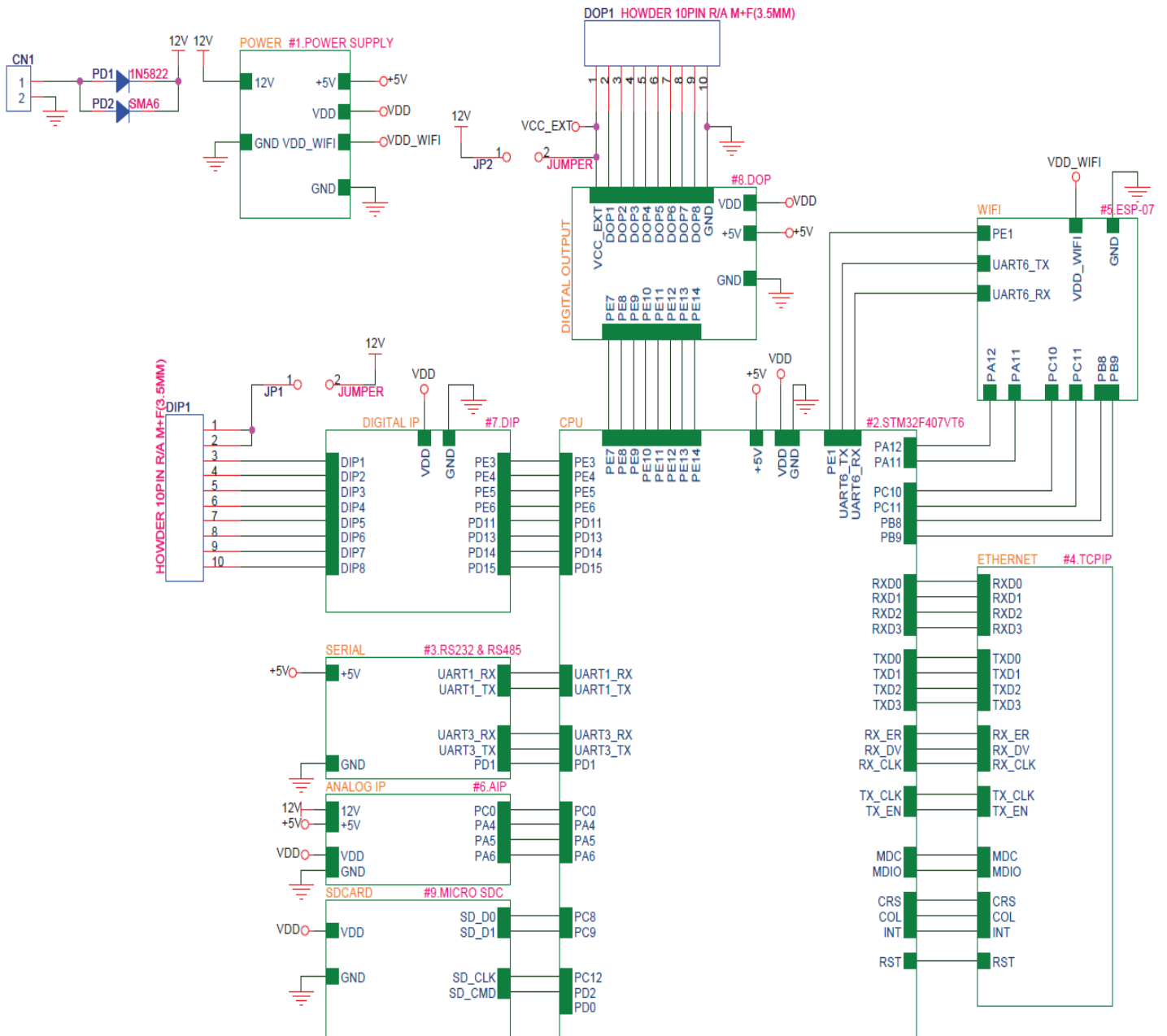


Fig b. block diagram /schematic of UNIVERSAL M2M.