Measuring and Monitoring Battery Status

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Abstract

An embedded computer system is any device that includes a programmable computer but is not itself intended to be a general-purpose computer.

Embedded systems are the most widespread technology today. We may meet these technologies from simple household appliances such as the washing machineand microwave oven to more sophisticated appliances such as aircraft, medical appliances, and automobiles, not to mention mobile phones, TVs and radio receivers, leisure gadgets,etc.

In this project we will deal with a concrete example by introducing a Radio Frequency link in an embedded system.

The base device is a quadrocopter for which we will introduce the embedded system technology to measure the status of the battery used as the energy supplier to the device. Monitoring the status of the battery will happen from the ground when the quadrocopter flies.

This can help the user to monitor the energy consumption and to know when it is possible to land the appliance safely.

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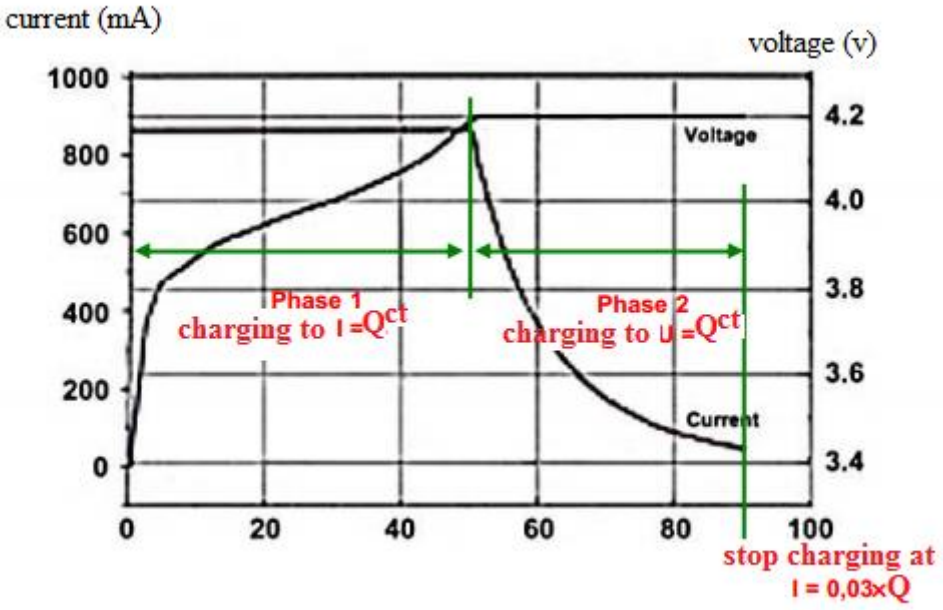
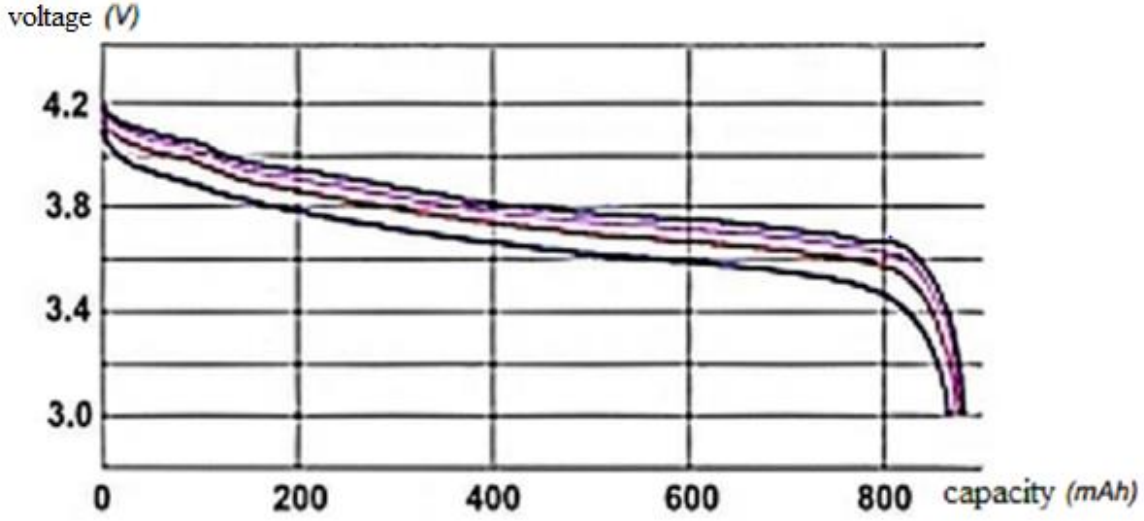


Load profile of Lithium cell of 800 mAh fig. 2



discharge of a lithium cell of 800 mAh, from 160 mA (upper line) to 1.6 A (lower line) fig.3

4.1. Hardware Architecture

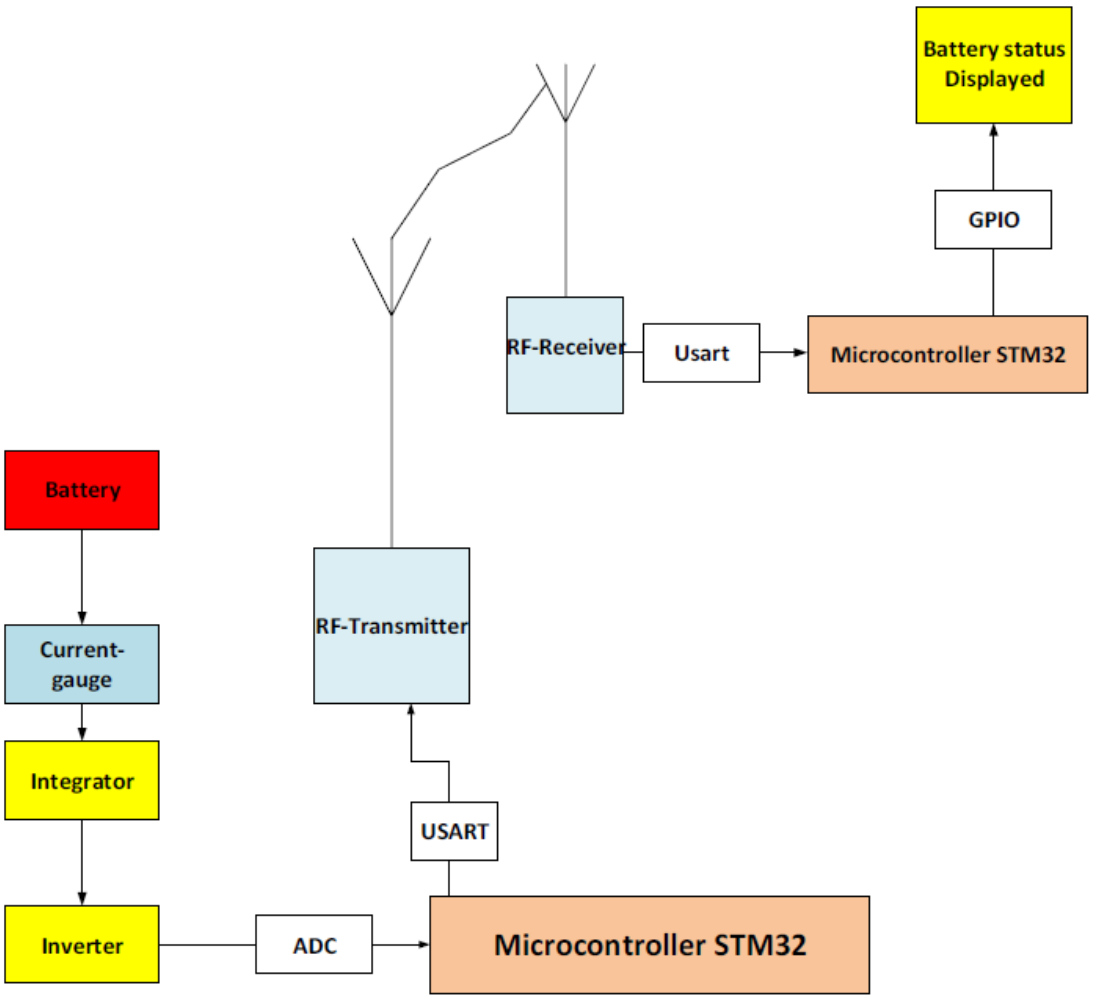


Fig.6 Hardware architecture

- The transistor is **OFF** if $V_{GS} = 0$ .It means that $I_D = 0$

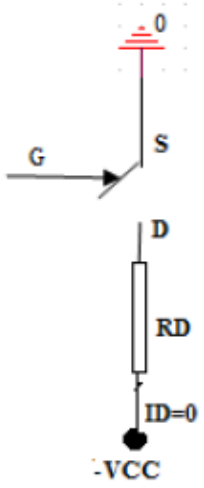


Fig.15 PMOSFET is OFF

When the MOS transistor is **OFF**, the condenser C1 charges with time constant **τ**=R1C1.

- The transistor is **ON** if: $V_{GS} < V_{GS}th$

  $V_{GS}th$ is V_{GS} threshold and $V_{GS}th$ is negative.

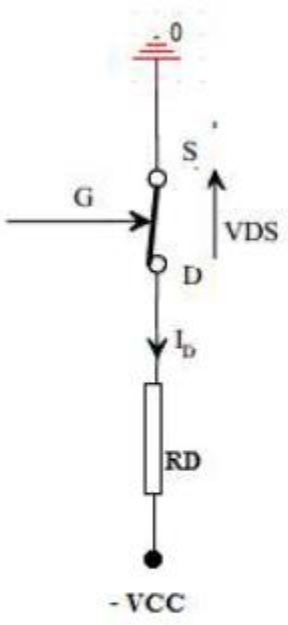


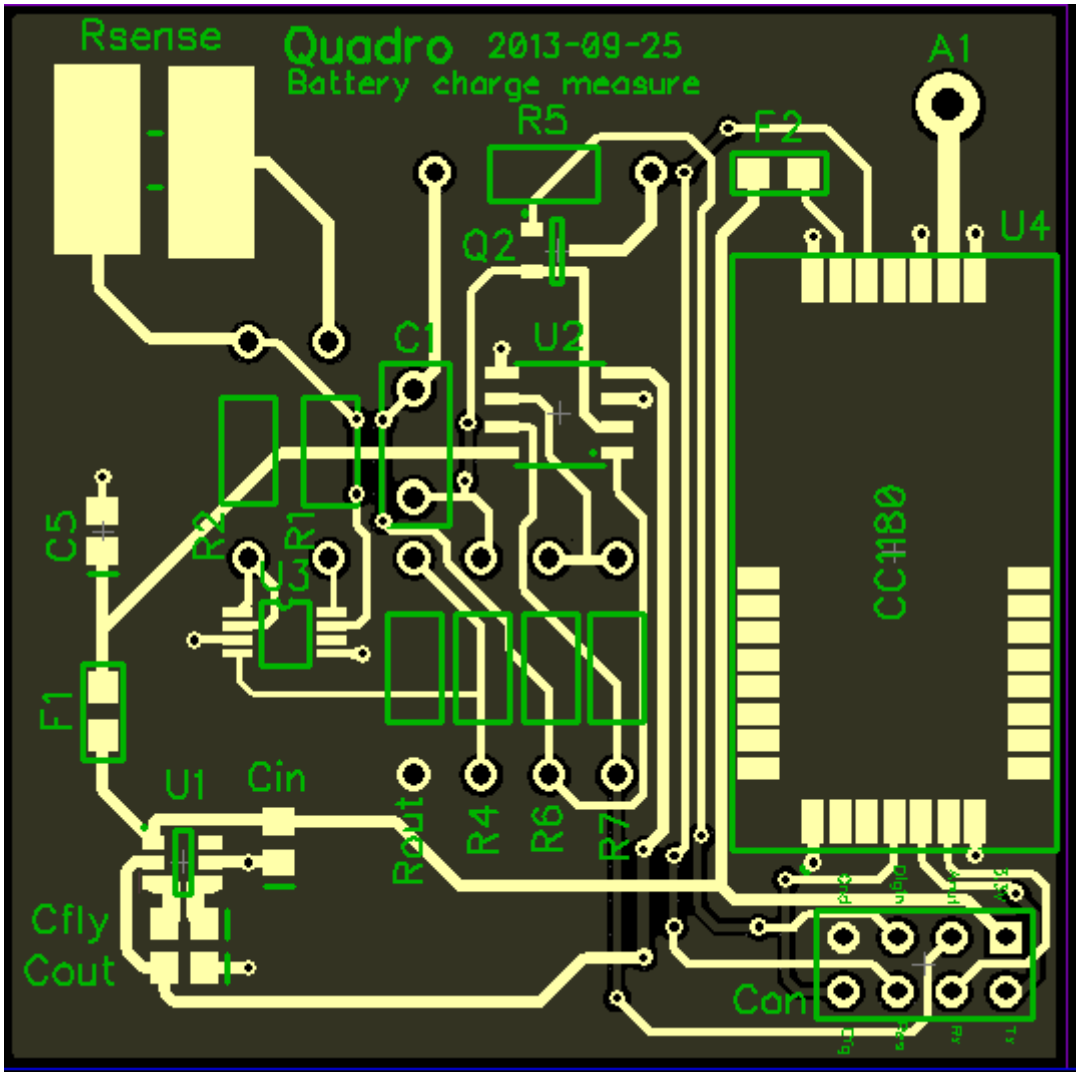
Fig.16 PMOSFET is ON

In general, we will take $V_{GS} = -VCC$ with VCC=3.3Vdc

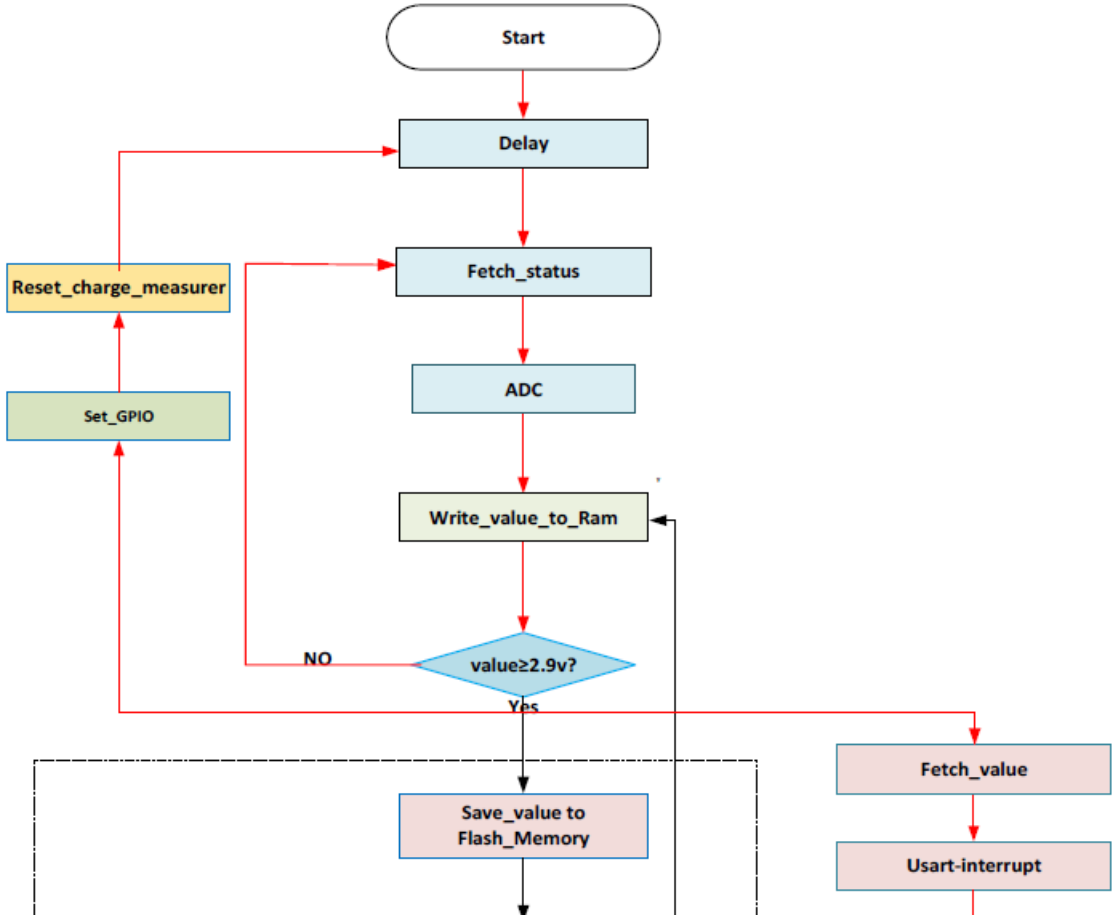
$V_{DS} = V_{DS}sat = 0\text{V}$

$I_D = I_D max$

$V_{CC} = R_D I_D$


Rsense
Quadro 2013-09-25
Battery charge measure
A1
R5
F2
Q2
U4
C1
U2
C5
R2
R1
C3
CC1180
F1
U1
Cin
Rout
R4
R6
R7
Cfly
Cout
Con

8.2. Software architecture



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