Embedded IoT Application for Remote System Monitoring Using the Renesas Synergy Platform

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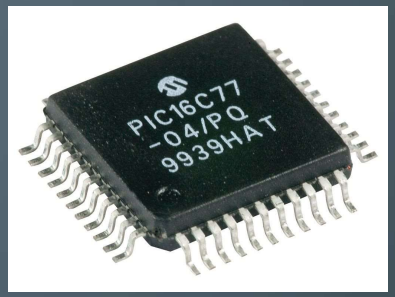
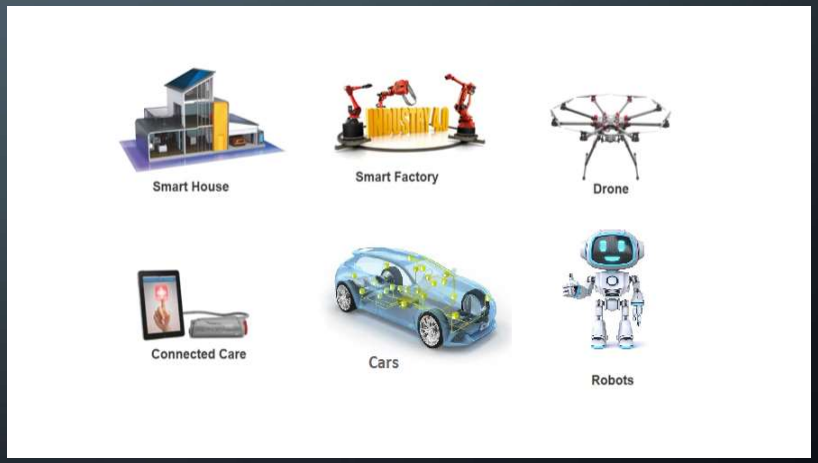
Internet of Things

- Networks of devices that exchange data, usually through the internet.
- Sensors, actuators, computer devices, servers etc.
- Enables processing of data on the cloud.
- Nearly every industry is affected by the IoT.

Microcontrollers

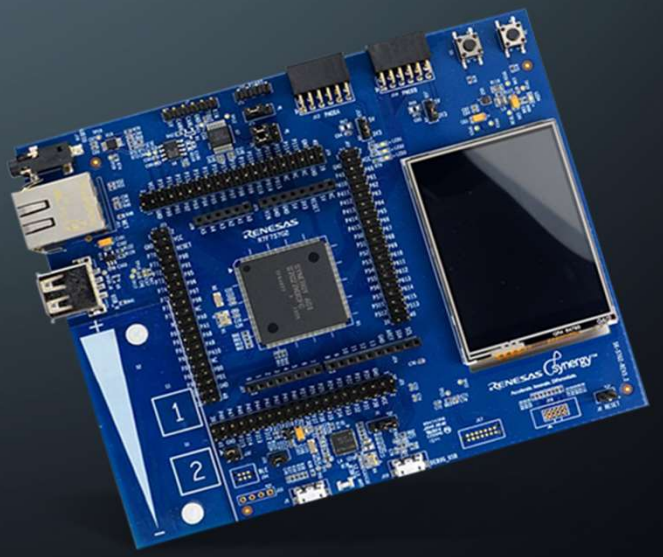
- Microprocessor that contains programmable peripheral devices (GPIO, ADC, Timers/Counters, etc).
- Autonomy, low power consumption, low cost.
- Applications:
  - Industrial
  - Automotive
  - Medical
  - Consumer Electronics (Smart devices)
  - etc





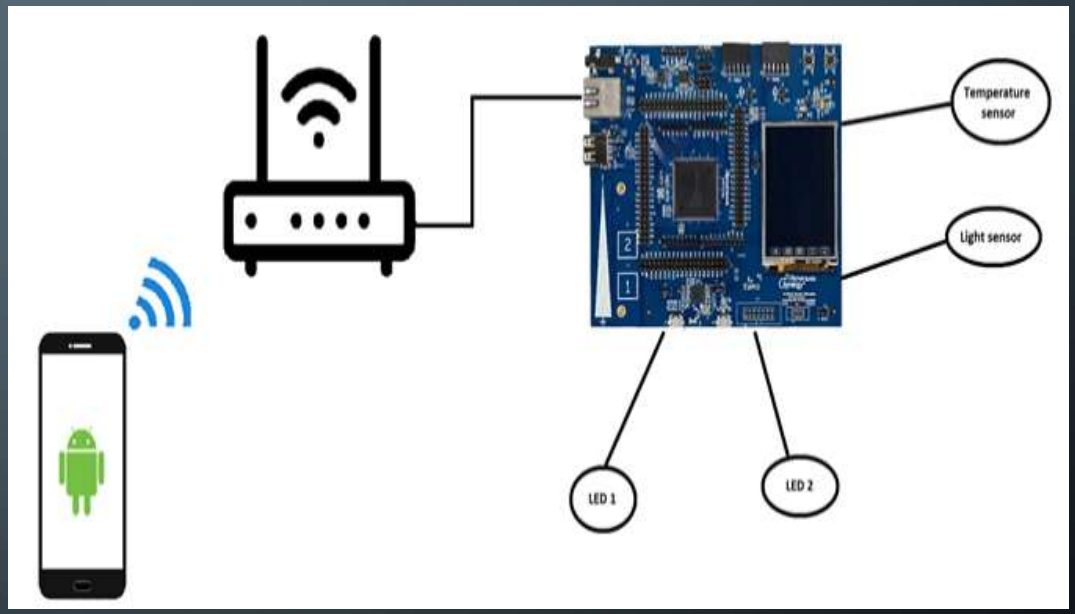
Renesas Synergy Platform

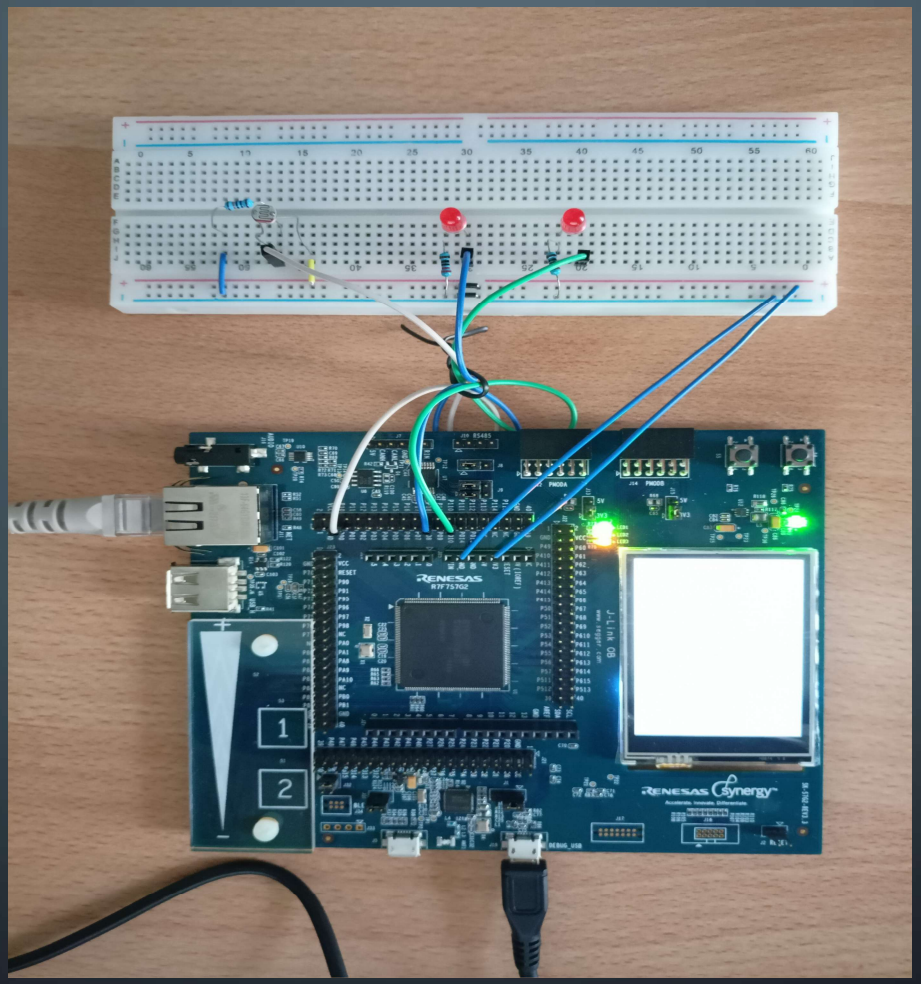
- Family of microcontrollers and the software that supports them.
- Abstraction layers make application development faster and easier.
- This application uses the SK-S7G2 development board (32-bit MCU @240 MHz, 640 KB SRAM, 4 MB Flash).



Application: Overview

- Android Device and microcontroller connect to each other through LAN.
- Microcontroller collects data from sensors and hosts HTTP server.
- Android Device requests sensor data and controls devices (LEDs).




RENESAS
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RENESAS synergy
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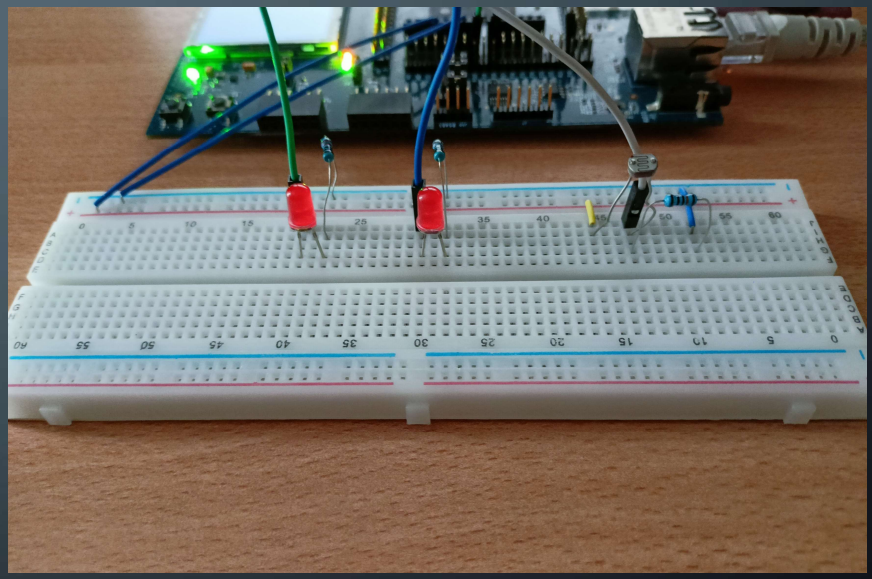
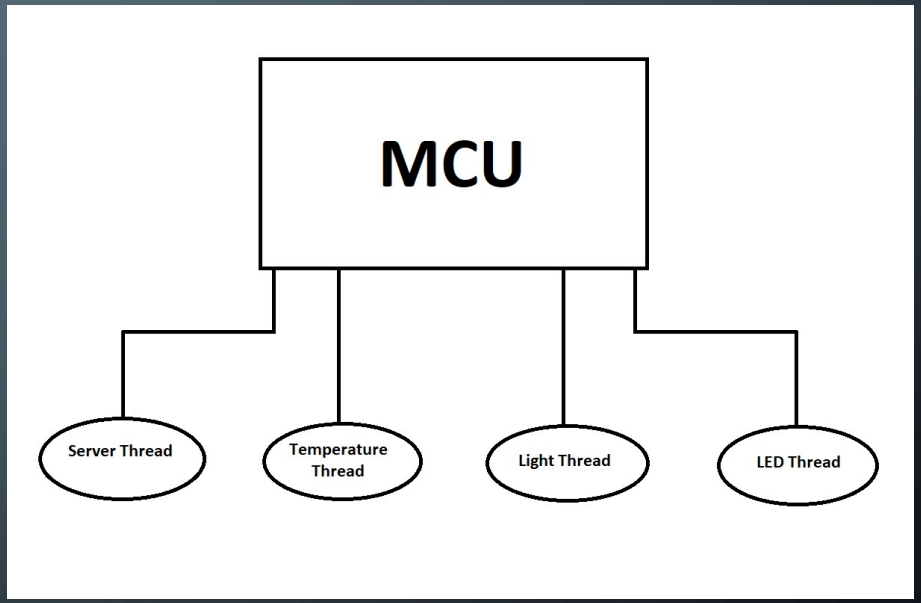
Application: Sensors and Devices

- Analog temperature sensor (on board). Requires ADC and linear interpolation.
- Light sensor (LDR) in voltage divider arrangement. Requires ADC.
- 2 LEDs that act as proxies for relays or other devices.



Application: Microcontroller

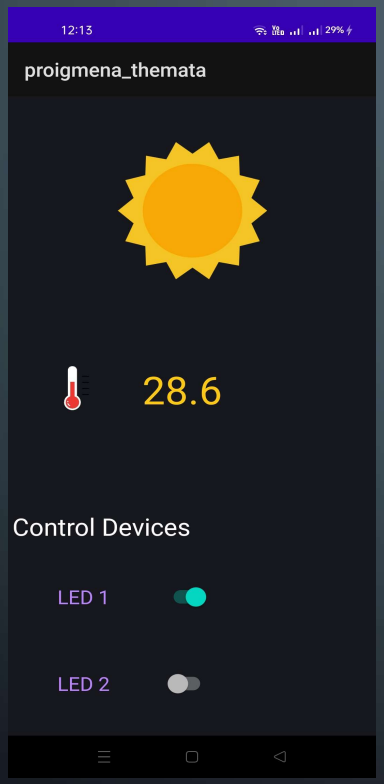
- Uses a RTOS and creates threads to manage the different tasks.
- Periodically collects data from sensors.
- Uses the NetX tool to create and run a Http server. NetX provides TCP/IP stack and low-level drivers.
- Upon client request, a callback function is called that responds with the requested resource.

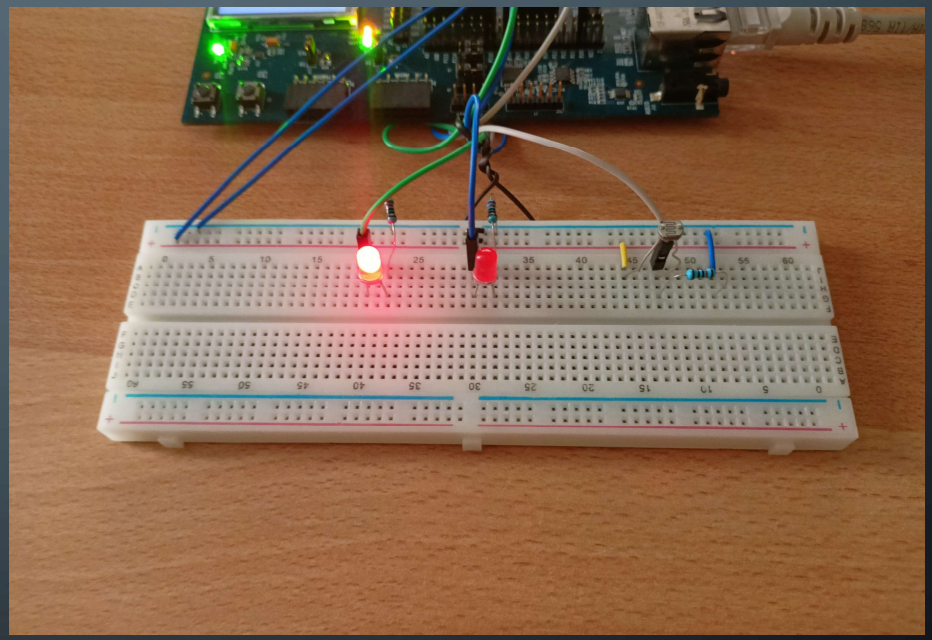


Application: Android

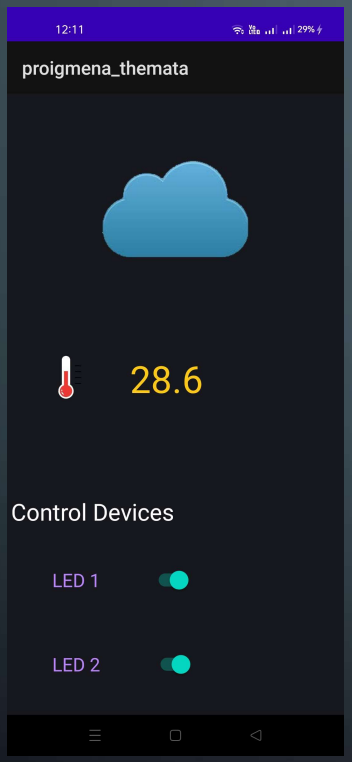
- UI elements:
  - ImageView for light levels.
  - TextView for temperature readings.
  - Switches for the LEDs.
- Creates background tasks for making requests to the http server.
- Acquires data and updates UI.
- Repeats this process every second.
- Creates “Listeners” for the switches.

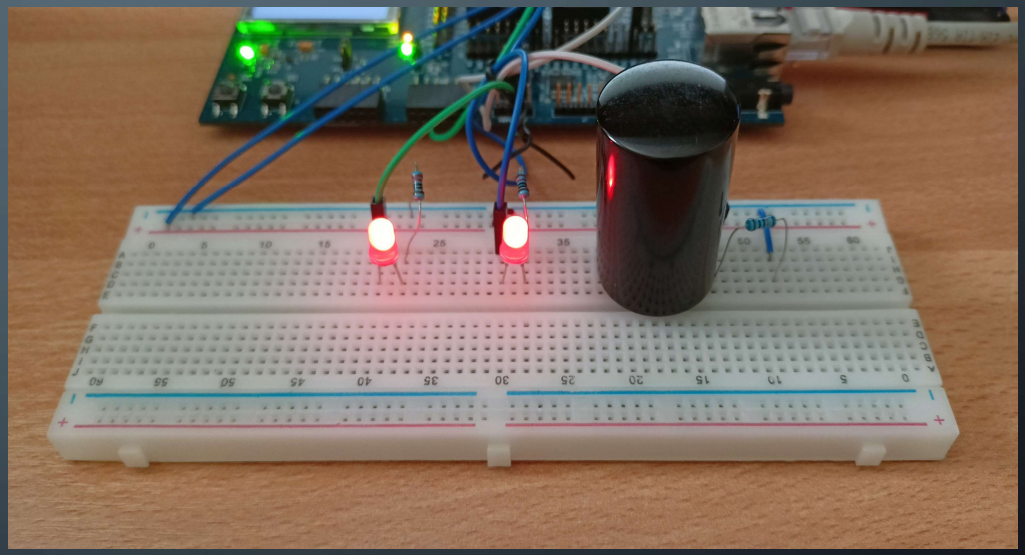
Example





Example





THANK YOU!