

Arduino Yún Microcontroller Application

Application Note

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4/3/2015

Abstract: A microcontroller is a single-chip compact computer that has memory and I/O functions. It can be used in automatically controlled devices and products. The microcontroller is used everywhere because they can focus on slower controlled tasks. We will be utilizing this technology to power our Servo Motor in our Security Gate Design for ArcelorMittal.

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Keywords

Arduino Yún, Microcontroller, Wi-Fi, Linux, Python, Moto

OBJECTIVE

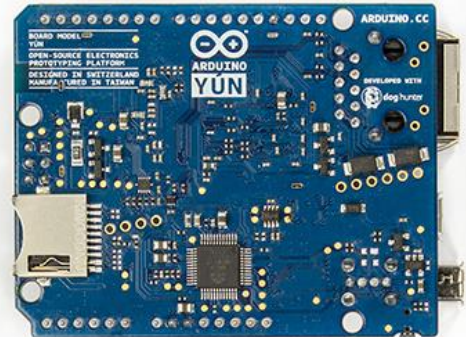
The objective of this application note is to provide a brief overview of the Arduino Yún microcontroller and how it is applicable to the new Gate Security design for ArcelorMittal.

INTRODUCTION

The Arduino Yún is a go to platform for engineering students. It is a microcontroller that runs off a Linux based Operating System (OS) which is open source [1]. Since the operating system is very versatile, programs can be written in multiple programming languages (C#, Python, C++, etc.). This makes the device extremely user friendly and robust because users can write their own shell and python scripts. The Arduino Yún has an additional processor that features built-in Ethernet and Wi-Fi support. Since the Arduino has built in buses on the top of the microcontroller, it will allow for ports to be used and data to be extracted easily. This microcontroller will serve as a great power source for a working prototype of the new Security Gate design for ArcelorMittal.



Arduino Yún Front



Arduino Yún Rear

Figure1: Arduino Yún

DESIGN

BACKGROUND

The Arduino Yún is based heavily off the Arduino Leonardo-specification board. It has the same features of the Arduino Leonardo including the ATmega32u4 processor with an additional processor called Atheros AR9331. The problem with many Arduinos was the lack of internet connectivity. The Arduino Yun solved that problem by adding the Atheros AR9331 processor which has built-in Wi-Fi that uses a lightweight version of Linux and is preinstalled with Python software.

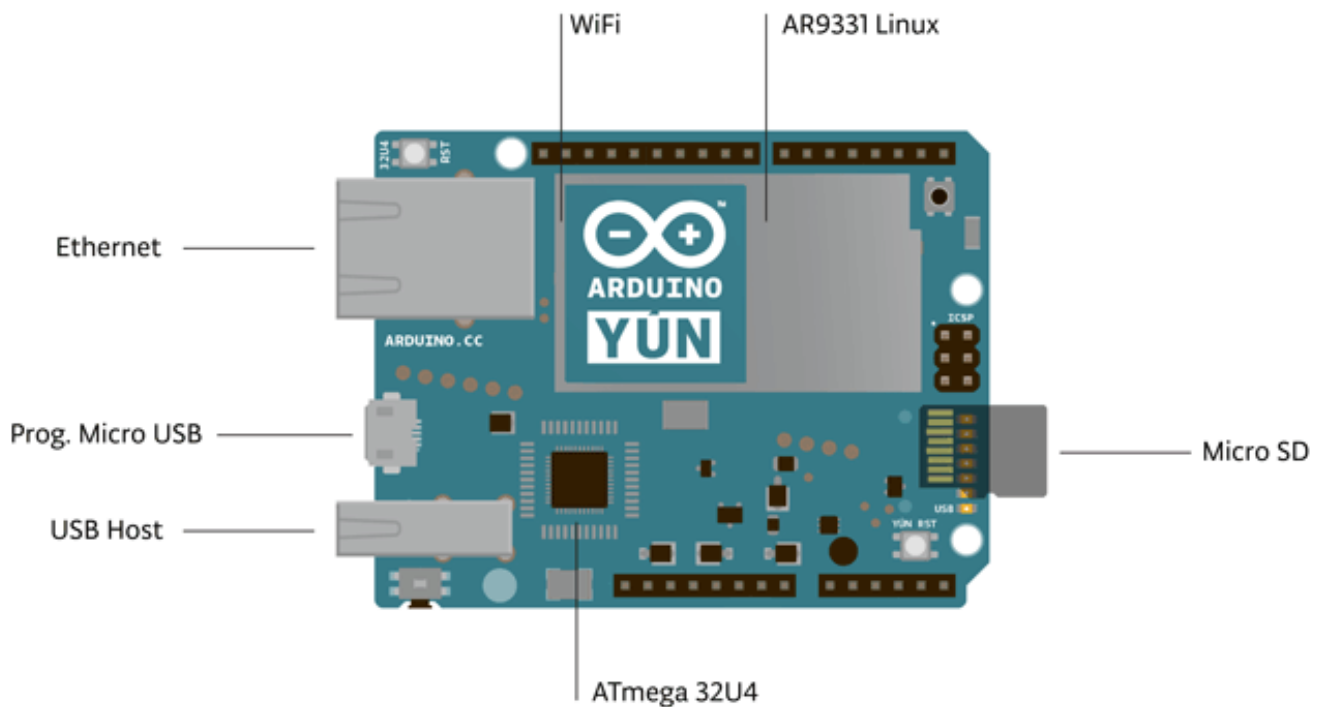


Figure2: Arduino Yún Components

COMPONENTS:

- ATmega32u4 - Chip that controls the pins
- Atheros AR9331 - Linux and Wi-Fi chip
- Three Ports - a standard USB, a micro USB, and an Ethernet port
- Three "RESET" Buttons
- Micro SD Slot

BRIDGE LIBRARY

The Bridge Library is used to simplify the communication between the ATmega32u4 and Atheros AR9331 processors. It allows communication in both directions, as it acts like an interface to the Linux command line [2]. The bridge library also allows the Arduino to interface with the USB Host port and Micro SD as well as run scripts and communicate with web services [3].

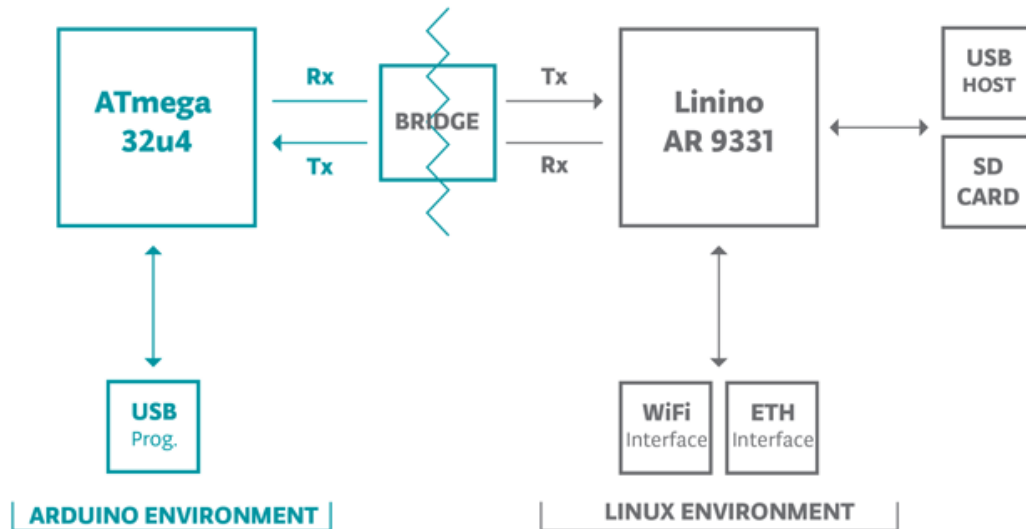


Figure3: Bridge Library

APPLICATION

The Arduino Yún can be used to control a number of small devices. This microcontroller can be programmed with the Arduino software and new written codes can be uploaded to the device without the use of an external hardware programmer [4]. This makes the application extremely convenient to use. One device that the Arduino Yún is compatible with is the Servo Motor. The servo motor is the best device to use for a security gate that is meant to go up and down. By powering the motor with the Arduino Yún, the security gate will move efficiently. The Arduino Yún will extract the data from a card reader, and decide whether or not to power the server motor depending on if the data matches what is already in a database.

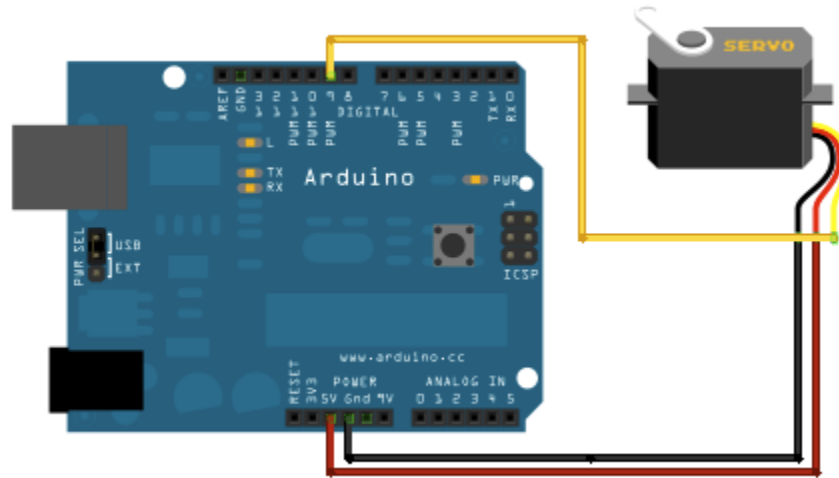


Figure4: Arduino/Servo Pin Connection

CONCLUSION

This application note demonstrates the components of the Arduino Yún microcontroller and its advantages as well as how it applies to the new Gate Security design for ArcelorMittal. The Arduino Yún is a groundbreaking microcontroller that makes it simple to connect to complex Web services directly from the Arduino platform. It is very user friendly, which makes it easy to run commands and it can be used as an Ethernet and Wi-Fi interface. The Arduino Yún's Wi-Fi access makes it convenient for the new Gate Security system to use the microcontroller to go into a server to check to see if it should turn on the motor of the gate.

REFERENCES

- [1] <http://arduino.cc/en/Guide/Introduction>
- [2] <http://arduino.cc/en/Main/ArduinoBoardYun>
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