

Report on installation of the Second Generation WIMEA-ICT Automatic Weather Station at University of Juba, South Sudan from 15th to 19th December 2016

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1 Introduction

This report shows activities undertaken from 15th to 19th Dec 2016 at the University of Juba during the installation of the Second Generation WIMEA-ICT Automatic Weather Station (AWS) prototype. The activities were performed in teams of two groups. That is, 2 WIMEA-ICT RC3 students, University of Juba(UoJ) team including (project administrators, Technicians, metal fabricators). The AWS prototype is the third of 3 prototypes, two of which were installed in Kampala, Uganda and Dar-es-Salaam, Tanzania.

2.0 Activities

2.1 Finalizing the AWS Stand

The team was finalizing works on fabricating the AWS prototype stand on the 15th December 2016 and as such was able to get input from RC3 students on how to better the design. That included adding a horizontal bar on for the 2m mark from the ground for attaching the 2m node, adding a cage for a gateway and instructions on placement of wind sensors among others.

During the installation of the stand at the weather station, a base was first installed. After a day, after ensuring that it was firm, the upper side of the stand was fastened to the base using screws. The design of separating the stand from the base was to make maintenance easy. For example, when the wind sensors, which are 10m from the ground need replacement



Figure 1 Attaching the 10m Node to the base, already fixed by concrete (1, indicates the cage for the gateway, 2 indicates the base of the stand, 3 shows an interface for attaching the 2m node)

2.2 Installing Nodes on Stand

Since the nodes had already been configured, after confirming that the configuration was done, we installed the nodes on the stand using cable ties and screws for the parts, which had handles fixed.

2.3 Designing the Ground Node Power Supply

The Ground node was missing the power supply system although it had the required cabling. We installed and tested the power supply.

2.4 Configuring Gateway

2.4.1 Setting up Internet connection

We used a USB Modem to connect the AWS prototype to Internet. We configured the raspberry pi to connect through zain, one of mobile network service providers. We however failed to connect using a modem other than that supplied by the same company. Also configured is the possibility of the modem to auto-connect whenever the raspberry pi starts.

Since there was no available public IP on which the AWS prototype could be accessed, we configured the raspberry pi to tunnel (web and ssh) traffic through wimea.mak.ac.ug.

We also connected and configured the RTC Module (DS3231) to the Raspberry Pi to keep the clock up to date and accurate even without either Internet or power.

2.4.2 Setting up the power Supply for the Gateway

The gateway was set up at the station and is powered from the battery, which is recharged by a solar panel.

2.5 Monitoring AWS performance

The AWS was monitored via a web interface I.e www.wimea.mak.ac.ug:9999 and via ssh tunnels on the same IP address on port 7777. We noted that there were no power interruptions. Also, all four nodes collected all their data in the stipulated period.

2.6 Writing an AWS Manual

We drafted a beginner's manual for installing and maintaining the AWS. The manual contains information such as

- Setting up the gateway
- Links to relevant documentation
- Configuring nodes
- Setting up and Configuring the Gateway
- Data Formatting

2.7 Training users

Since there wasn't sufficient time, technicians were part of the installation process and as such learnt a few things related to assembling the AWS. However, no training on operating the AWS and configuring the gateway was provided. In order to get users started, a manual was shared with the users to get started with operating the AWS.

3. Challenges

Below are the challenges faced during and after installing the AWS at UoJ:-

- The available modem failed to work until when we acquired one from zain. The challenge with this is that such modems were out of supply
- Very Slow Mobile Internet. More so, UoJ offices do not have Internet. It therefore becomes a requirement for WIMEA-ICT to provide Internet for downloading or monitoring the status of the AWS
- The technicians willing to take responsibility of maintaining the AWS did not have computers
- The training time was insufficient, given the many things that had to be done in a few days

- Unavailability of power. The university receives power from the generators, which are switched on from 10:00 am to 12:00pm and from 2:00pm to 4:00 PM. That is, only 4 hours a day. The few hours introduced long hours of waiting when it came to performing some activities requiring power

4. Recommendations

- Since Internet is a scarce resource, the AWS may be distributed with the required software packages to avoid downloading of software packages. Also, it may shorten the installation process.
- More training be done for users on how to maintain the AWS
- Equipment like raspberry pi may be acquired by the AWS maintainers to help them practice
- A computer be acquired by the team for monitoring and configuration purposes