RevMexAA (Serie de Conferencias), **48**, 31–32 (2016)

IV Workshop on Robotic Autonomous Observatories (Torremolinos, Málaga, Spain, September 28- October 2, 2015)
Editors: M. D. Caballero-García, S. B. Pandey, D. Hiriart & A. J. Castro-Tirado

AUTOMATIC ROTATIONAL SKY QUALITY METER (R-SQM) DESIGN AND SOFTWARE FOR ASTRONOMICAL OBSERVATORIES

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RESUMEN

Presentamos el nuevo desarrollo del medidor de la calidad del cielo (SQM) que es un modelo rotacional automático desarrollado (R-SQM) y llevado a cabo por el equipo técnico del Observatorio del Este de Anatolia (DAG). El R-SQM es necesario para determinar los cambios en la calidad de un observatorio astronómico y consiste en 4 monitores SQM montados en una plataforma rotativa con ángulos diversos para escanear todo el cielo. El sistema es controlado por una controladora Raspberry Pi y un motor paso a paso junto con su programa (driver) y un logicial (software) específico.

ABSTRACT

We have presented the new design of Sky Quality Meter (SQM) device that is an automatic rotational model of sky quality meter (R-SQM) carried out by DAG (Eastern Anatolia Observatory) Technical Team. R-SQM is required for determining the long-term changes of sky quality of an astronomical observatory and consists of four SQM devices mounted on a rotating shaft with different angles for scanning all sky. This system is controlled by a Raspberry Pi control card and a step motor with its driver and a special software.

Key Words: atmospheric effects — telescopes

1. MOTOR

The motor specifications of R-SQM project are given in Table 1.

TABLE 1. Motor Specifications

Power Supply Input	230 VAC
Gear Ratio	18
Motor Resolution	1000 P/R
Max. Payload Weight	60 kg
Control Power Supply	24 VDC, 0.5 A

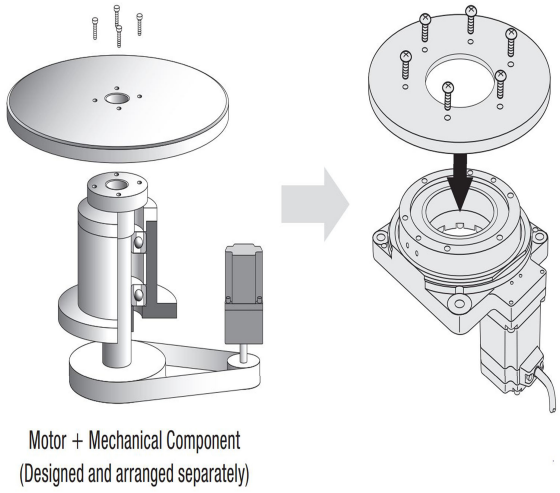

Fig. 1. SQM Motor

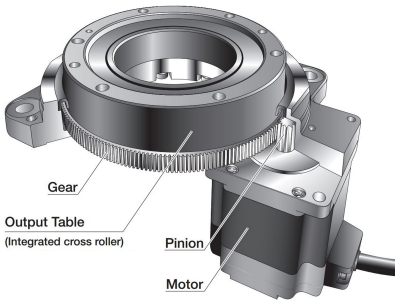

Fig. 2. SQM Motor

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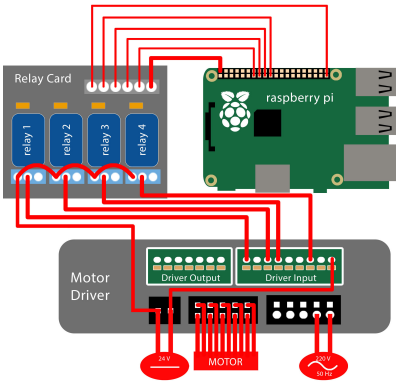

Fig. 3. Schema shows raspberry pi, Relay and motor's card connections

A Raspberry PI card and Relay card added in order to control motor such as turn, stop, emergency stop, home position and reset as shown in Figure 3.

2. FIRST LIGHT

First light obtained from this device in ATA50 telescope site.

The data calibrated with conversion equation below and displayed in graph shown in Figure 4

PG : $ApparentMagnitude$
PA : $InstrumentalMagnitude$
$PG = 7.93 - 5log(10^{4.316-\frac{PA}{5}} + 1)$

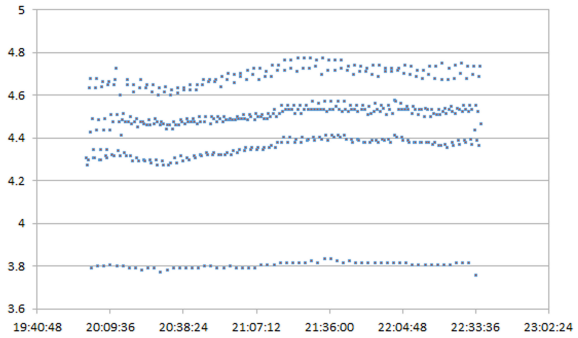

Fig. 4. Graph obtained from device

3. CONCLUSION

The rotational Sky Quality Meter (R-SQM) was designed and developed by the DAG technical team for the atmospherical and astronomical automation studies of DAG site. R-SQM runs automatically in DAG site for determining the sky quality of the DAG site.

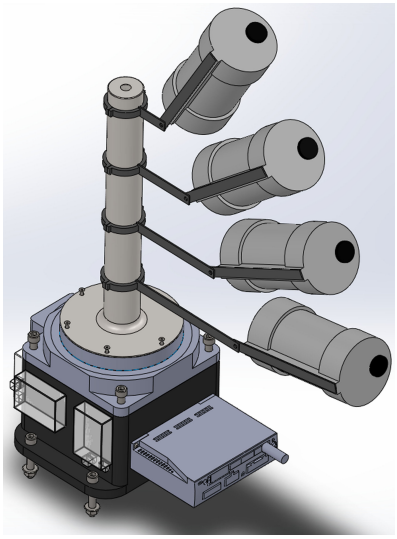

Fig. 5. Device's 3D model

Acknowledgments. DAG Project (Project ID: 2011K120230) is supported by the Ministry of Development of Republic of Turkey and Atatürk Universtiy. Authors are grateful to the Ministry of Development, Atatürk Universtiy and ATASAM for continuous and valuable supports.