

بسم الله الرحمن الرحيم

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Design of Digital Tipping Bucket Rain Gauge

تصميم مقياس مطر رقمي

A Thesis Submitted in Partial fulfillment of the Requirements of
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Dedications

This thesis dedicated

To

To all of my cares away, or was soon to you.....

All my appreciation

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First of all, I would like to thank Allah, for the blessing, especially the grace of reason and science and to reconcile.

Successful completion of this work will never be one man's task. It requires hard work in right direction. There are many who have helped to make my experience as a student a rewarding one.

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ABSTRACT

Rainfall is the amount of rain that falls in a particular area during a particular period of time. Rainfall has a massive effect on the planet and life, it represents major source of water.

The rain gauge is equipment that used in weather stations to measure cumulative rainfall at a given location and given time. Rain gauge also known as udometer or pluviometer consists of main part can collect water fall from funnel above it, and outer case to protect the inner can. The new design of rain gauge gives more accurate reading and has many advantage such as observer can observe rainfall remotely, the measure of rainfall is according to tip drop not only looking at the water level, the digital reading can be easy taken.

Tipping bucket rain gauge is a new device that has all advantage of the criteria above. This rain gauge is using two small buckets acting like see-saw, when one of the buckets fills with water it will spill because of the unbalance of see-saw. Then the other bucket will fill with water and repeat the same action like the first bucket and keep repeating until the rain stop.

In this dissertation the digital rain gauge is build with the combination of the microcontroller, magnet sensor and PC. This digital device when tested it measure rain fall with precise readings. It's very cheap when compared with the market cost.

خلاصة البحث

معدل هطول الامطار هو كمية الامطار التي تسقط في فترة معينة خلال فترة معينة من الزمن حيث ان كمية الامطار المتساقطة لها تاثير كبير علي كوكب الارض و الحياة فيه لانها تمثل المصدر الرئيسي للمياه.

مقياس المطر هو الاداة المستخدمة في محطات الارصاد الجوية لقياس المعدل التراكمي لهطول الامطار في الزمان والمكان المحددين يسمى مقياس المطر ايضا بالادوميتر او البلفوميتر.

الاجزاء الرئيسية التي يتكون منها المقياس تشمل القمع وهو مسئول عن تجميع مياه الامطار ويكون فوق جسم المقياس. جسم المقياس الخارجي مهمته حماية الاجزاء الداخلية وحمل القمع.

التصاميم الحديثة لمقياس المطر لها العديد من المزايا والافضليات مقارنة بالاقدم من حيث دقة القراءة وامكانية القراءة عن بعد بدون الحاجة للذهاب الي مكان تواجد المقياس, ايضا القراءة لمقاس معدل هطول المطر لا تعتمد علي الطريقة التقليدية بالنظر لمستوي المياه في المقياس , ولكن علي مقدار كل دفقة مياه من احد كفتي المقياس.

مقياس المطر ذو الكفتين المتارجحتين او الدلو المتارجح هو عبارة عن التصميم الحديث لمقاييس المطر التقليدية يتضمن جميع المعايير المذكورة اعلاه . يتكون المقياس من كفتين صغيرتين محمولتين علي محور (عمود) يتحرك حول محور ثابت (محمل كروي) و قمع لتجميع مياه الامطار عموديا فوق احي كفتي الميزان, عند امتلاء احد الكفتين بالماء ونتيجة لعدم الاتزان مع الكفة الاخرى الفارغة تتحرك الكفة الممتلئة نحو الاسفل مما يؤدي الي تدفق الماء منها, ونتيجة لذلك تصبح الكفة الاخرى الفارغة في مواجهة فتحة القمع مما يؤدي الي امتلائها ثم تدفق الماء منها بنفس الطريقة السابقة ويتكرر الامر حتي توقف سقوط المطر.

في هذا المشروع مقياس المطر الرقمي هو عبارة عن عدة مكونات تشتمل علي متحكم دقيق (مايكروكنترولر) و حساس مغناطيسي وجهاز كمبيوتر لعرض القراءات. ان هذه المنظومة الرقمية تشكل اداة تعطي قراءات دقيقة عند اختبارها لقياس معدل تساقط الامطار, ايضا تكلفة تصميمها اقل مقارنة مع التكلفة للاجهزة الموجودة بالاسواق.

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