San Agustin Water Crisis

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Abstract

A total of 37 production wells drilled to 3,000 feet with 20 inch casings, had raised tension state wide. After an unknown Italian man proposed his plans to drill these wells on the San Agustin Plains, thousands of protests flooded the state engineer's office. The motion claims that the wells will move large quantities of water per year and this has locals concerned about their future on the San Agustin Plains, and also their water supply. Since the amount of water in the aquifer is unknown, the amount of time it would take to drain the aquifer cannot be determined, however we do know that it can be drained.

Problem

The problem that we are trying to investigate is the possible effects of Augustine Ranch LLC. water grab. The plan is to pump and pipe water from the San Augustine Plains Aquifer to the Rio Grande Basin. They want to pump 54,000 per acre-feet of water per year with 37 production wells at 3000 ft. deep, with 20 in. pipe at 2000 gallons per minute. Keep in mind one acre foot of water equals 325 851.429 US gallons. How long would this plan be sustainable before household wells and agricultural wells are affected?

Hypothesis

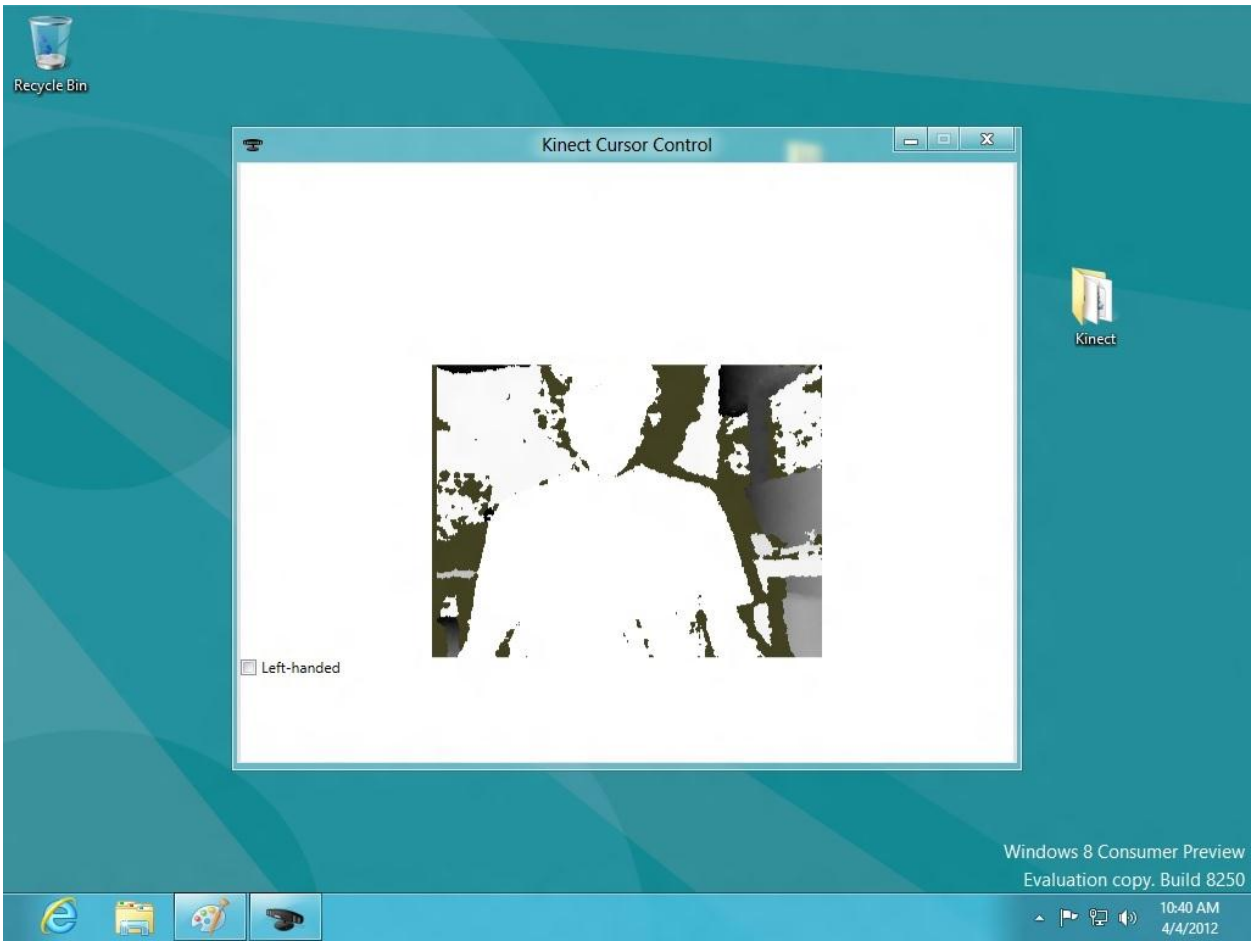
It is known that the aquifer can be drained. We believe that if the wells are drilled, within a five year period most domestic wells will not be usable. In addition, we believe that Windows 8 will provide a nice environment to build a friendly user environment. The Kinect will provide an easy user input device and allow users to work with the environment.

Procedure

To find the equation for the model, first we found how many gallons of water that will be pumped in a 2 year period, which is 17 billion. When we converted it to acre feet it became 54,000 acre feet of water. 54,000 feet divided by 364.25(the number of days in a year) comes out to148.24982841455. Now we can make an equation from this number to find the amount of water pumped for any given day. The equation is y=148.25x, with x being the number of days and y being the amount of water.

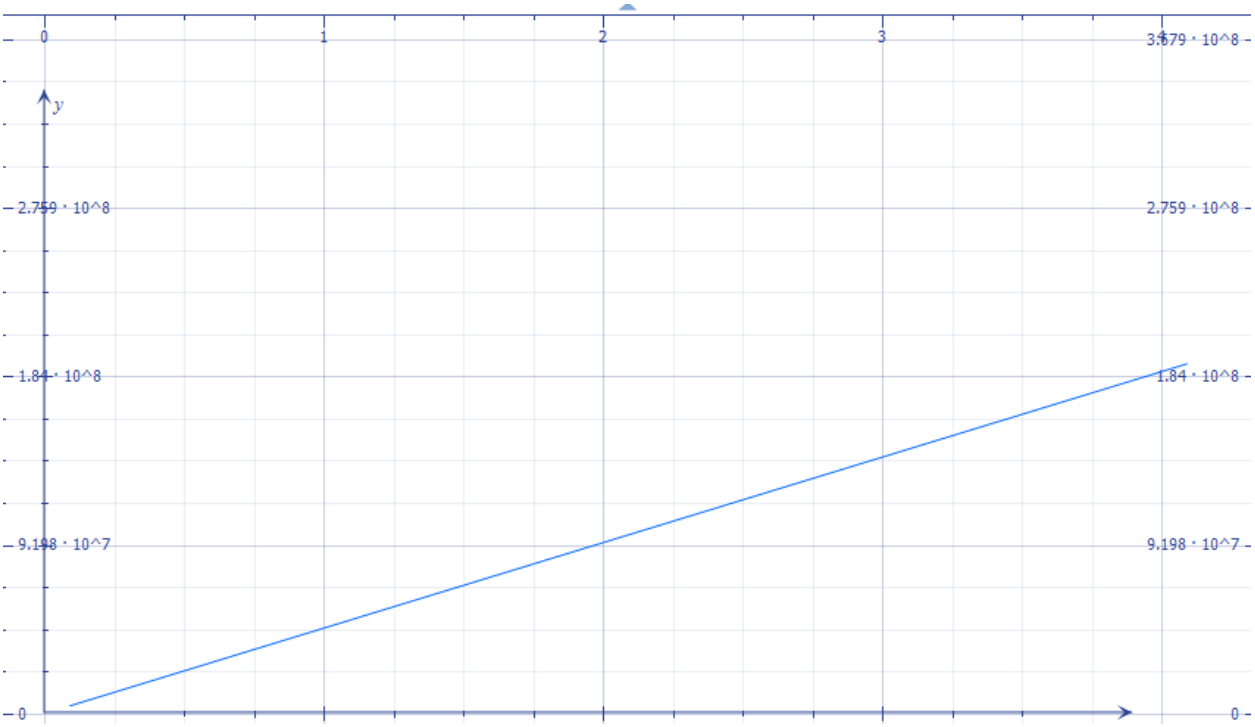
Since programming the Kinect Mouse Driver and Trackers took a lot of code, a brief description would better fit. To begin with, one must have Microsoft Visual Studio 2010 and Visual Studio 11 Bata. These two applications should be installed on a computer that runs an operating system no later than Windows 7. In addition, a web server, and Windows 8 is needed. Install Windows 8 on a separate computer and establish a file transfer protocol (FTP) connection on the web server. The FTP server will be used to transfer application data. The Kinect Mouse Driver may be the most complicated aspect of this project. Drivers that work on Windows 7 may not work on Windows 8. XML and C++ were to two main programming languages used in the making of the driver. The mouse driver converts data that is collected from the Kinect and turns it into input data Windows looks at as a mouse. The Kinect sends

data to the tracking code. This code was programmed from C++, XML, and Java. The tracking code takes data that is collected by the Kinect and converts it into useful data that is then converted into input signal by the mouse driver. After large amounts of programming along with trial and error, a program that uses the Kinect as a mouse driver was successfully made. A screenshot has been taken:



Data

Much of the data collected came from the Kinect itself which is in RAW format and is not usable. However, there was also data collected that shows with 37 wells, 20 in. casings, pumping 2,000 GPM, the water loss would increase without mercy. MatLab and Microsoft Mathematics were used to create graphs to simulate the rate of water loss.



The graph above shows the rate of water loss per day for a year.

In addition to simulation data, data collected from the Kinect (not considering RAW data) was collected. The Kinect provides pages and pages of data including detected body coordinates, press functions, and environmental information. The environmental information is used to configure the Kinect to the users' environment.

Results

The data collected such as the gallons of water taken out of the aquifer per day was calculated and clear data on how much water would be removed from the aquifer per year in acre-feet was collected and presented to community members. An in-person meeting was arranged and their reaction sparked motivation to continue searching for more information that could lead into a better result.

Conclusion

Unfortunately, since the amount of water stored in the aquifer is unknown, a clear conclusion cannot be made. However, the data collected, such as the gallons of water taken out of the aquifer per day, was calculated and clear data on how much water would be removed from the aquifer per year in acre-feet was collected and presented to community members. This report was created to inform the community on the water project and to help them better communicate the facts with the state engineer. In result, the state engineer has rejected the current proposal made by the earlier mentioned unknown Italian. As a result, the wells will not be made for now.

Achievements

Although the ultimate goal to determine the results of the 37 wells was not achieved, we accomplished other goals. We all gained leadership skills, creative writing skills, and communication skills. In addition, we feel that our biggest achievement was presenting the data we had collected to the community and hopefully provided facts that enhanced their communication with the state engineer resulting his executive decision to deny the proposal to drill 37 wells at 3,000 feet with 20 in. casings. We feel as if this has benefited the entire community. Without the community, this project would have never been possible.

Acknowledgments

We would like to give a special thanks to our mentor Tim Angelus! He provided all the support we needed both physically and mentally. This project was never easy and we underestimated the difficulty from the very beginning. In addition, we would like to thank Mrs. Nicole Sanders for the useful information on the well proposal, our teachers for giving us time to work on this project when the time frame became tight, and the community for taking time to view out data and giving us the feedback we needed.

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References

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Microsoft DreamSpark (https://www.dreamspark.com/)

MatLab (http://goo.gl/ka0ZA)

Visual Studio 11 Download (http://goo.gl/jQrCT)

Windows 8 Consumer Preview Download (http://goo.gl/oLIf7)

Adobe Master Suite (http://goo.gl/Ziu14)