

# MSCS Mess

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11 November 2011  
Volume 40, No 9

## This Week's Colloquium

<b>Title:</b> 3D Models From Photos
<b>Speaker:</b> Olaf Hall Holt
<b>Date:</b> Thursday, November 17
<b>Time:</b> 2:30pm
<b>Location:</b> RNS 310

### About the Talk:

The number of photographs available on-line is increasing by perhaps hundreds of millions each week. Understanding the content of these photos is often easy for human beings, yet challenging for computers. This colloquium will describe some current approaches to producing 3D models from sets of photographs. The typical stages of this computation include choosing a coordinate system, locating the cameras within this coordinate system, finding patterns of pixels that are shared in two or more photographs, and putting these patterns together into a single geometric structure. If there is time, we will also consider extensions to 3D video.

## Millennium Prize Problems

The Millennium Prize Problems is a set of 7 problems put forth by the Clay Mathematics Institute in 2000. They released this list of problems to celebrate the fact that while some non mathematicians may believe that we have solved everything in mathematics, we are expanding the frontiers of our knowledge and creating new and exciting fields of mathematics every year.. The solutions to each of these problems comes with a \$1 million prize, and only one of the seven has been solved. These problems are decades old (and in some cases over a century old) and range in subject from applied mathematics (such as Navier-Stokes existence and smoothness) to algebraic geometry (such as the Hodge Conjecture). This first article of the series will focus on the Riemann hypothesis.

This conjecture was first formulated by Bernhard Riemann (creator of the famous Riemann integral) and addresses the location of the zeros of the Riemann zeta function:

$$\zeta(s) = \sum_{n=1}^{\infty} \frac{1}{n^s}$$

Where  $s$  is a complex number. Note that this is defined for all complex numbers where  $s \neq 1$ . You may recognize this notation from the **Basel problem** (the proof of which done by Euler shows that  $\zeta(2) = \frac{\pi^2}{6}$

The Riemann zeta function has applications in many fields, and has been studied extensively. The hypothesis states that all non-trivial zeros of the zeta function are complex numbers with real part 0.5. The trivial zeros are defined as all  $s = -2k$ , where  $k$  is an integer. This has been proven through brute force with the first 10 trillion zeros, but a complete proof has evaded mathematicians for more than a century. An interesting consequence of this proven in 1917 by Hardy and Littlewood is that primes  $3 \pmod{4}$  are more common than primes  $1 \pmod{4}$ . A proof of the Riemann Hypothesis could help solve the mystery behind the distribution of primes. For more information on Millennium Prize Problems and the CMI, please visit <http://www.claymath.org/>.

### Be a MathPath Camp Counselor

Are you a math major who does not know what to do with your time away from St. Olaf this summer? Then you should consider being a MathPath Camp Counselor! As a counselor, you will get to spend July with teenage math students (11 – 14) while making money and learning more math. This summer, the camp will be held between June 24 to July 22 at Mount Holyoke College, South Hadley, Massachusetts. Counselors receive a \$3000 salary with meals, a single room on campus, **and** reimbursement of reasonable travel expenses. Math students who are US citizens, resident aliens, or foreign students with work permits for summer employment are eligible. If you wish to apply, please see the Counselor

section of the Faculty and Staff page at <http://www.mathpath.org/>. The application deadline is January 31, 2012.

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*If you would like to submit an article or math event to be published in the Math Mess, e-mail [jacobsoj@stolaf.edu](mailto:jacobsoj@stolaf.edu).*