Network Security

Security Analysis of Github

Sean Smith, Kyle Holzinger, Amalia Safer

Cookies

A session cookie called `user_session` is stored which contains a seemingly random nonce. When a get request is made to `https://github.com`, the cookie is sent and the database is queried to see if the cookie is valid. If the cookie is valid it will return user data as if the user is logged in. There are two more cookies of importance

Ads

- Improvements in hardware and battery technology make it feasible for the first time to fly for extended periods of time in small spaces.
- The algorithms and software needed to fly indoors largely doesn't exist as most autonomous flight is guided by a human or guided by satellites which do not work indoors
- We are on the cutting edge of research into autonomous indoor flight and it will be largely done in approximately 5 years.

Build

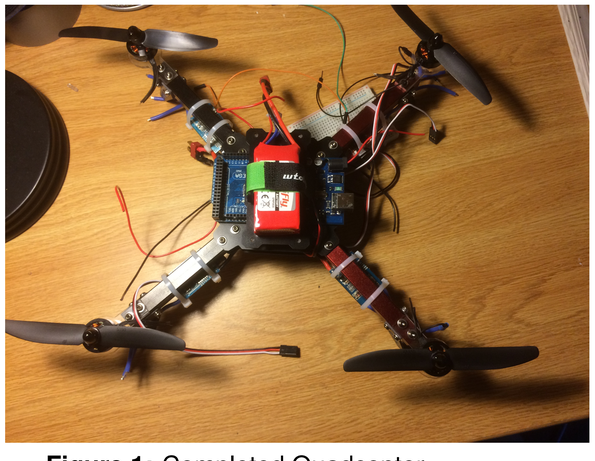

Figure 1: Completed Quadcopter

- Built out of Aluminum and Glass Fiber. The light materials contribute to a low overall weight of 385 grams.
- Custom designed motor mounts made out of PMMA plastic
- The quadcopter is 10″x10″ and fills a space of 15″x15″ when the spinning propellors are factored in. Its small size makes in maneuverable in doorways and hallways.

Control Sequence

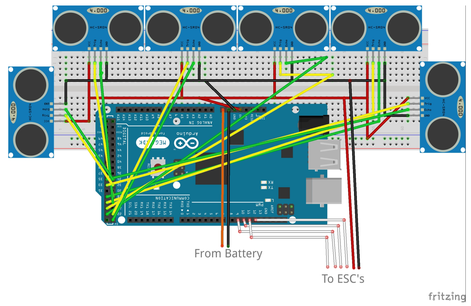

Figure 2: Wiring Schematic

- A KK2 Board runs through the PID loop while an Arduino Mega does the Sonar calculations
- Abstracting the control loop out onto its own board mitigates the overhead causes by running a PID loop as well as checking six sonar inputs
- The sonar loop is very simple, it first gets to a stable hover at $\approx$ 5cm. Then it enters into the navigation loop.
- The navigation loop runs the difference algorithm and sends it the KK2 board.
  - Takes the path array h
  - i is the waypoint counter (initialized to zero)
  - Find the current waypoint $h[i]$
  - w is the current sonar input
  - r is the range of the controller (0-90 for most controllers)
  - Sets o to the square of the difference between $h[i]$ and w divided by r

$$o = \frac{(w - h[i])^2}{r}$$

function MAIN(h)
  $stableHover()$
  $flying \leftarrow true$
  $i \leftarrow 0$
  while $flying$ **do**
    $w \leftarrow getSonarInput()$
    $o \leftarrow \frac{(w-h[i])^2}{r}$
    $flying \leftarrow sendDifference(o)$
  end while
end function

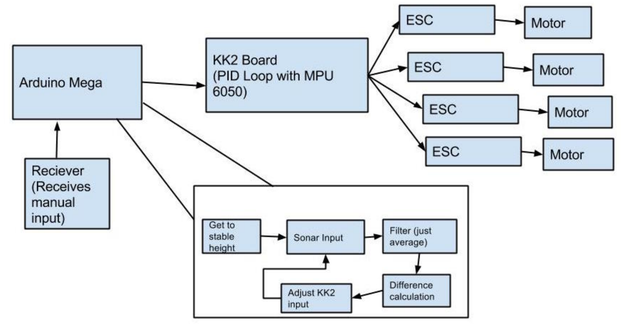

Figure 3: System Architecture

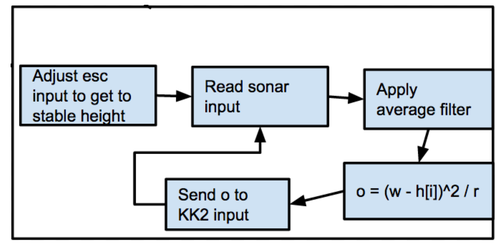

Figure 4: Code Architecture

Significance

- Since the drone can fly in tight spaces with no outside input it makes sense as a mapping tool or data collection platform for situations that put humans at risk
- This can be used in situations that put humans at risk.
- In the future this will run on Rich West's Quest operating system.

Project Website: *http://cs-people.bu.edu/swsmith/iap15.pdf*
Quest Website: *http://www.questos.org*

Advisor: Sharon Goldberg