



Average Accuracy within 0.1 mph, Calls Out Speeds, Tracks Results

SmartPitch is a father-son dream come true.

But before sharing that story, here's the pay-off for SmartPitch users:

UNIQUE FEATURES:

- Turns the phone in your pocket into a precision baseball speed gun
- Uses smartphone video camera, no messing with hardware sensors
- Accuracy to tenths of a mph
- As accurate as \$1,000+ pro scout radar guns, for 2% of the price
- Calls out the pitch speed on the phone's speaker
- Can use it during game in dugout, in foul territory, in the stands
- Saves pitch speeds in a database for use in training
- Multiple Sports now: Baseball & Cricket
- 2017 goal to add: Tennis, Soccer, American Football
- Has Regular mode and Pro-Level options

HOW SMARTPITCH CAME TO BE

A video summary of the SmartPitch Story is at: <https://youtu.be/0Y3thHUJg3w>

Dexter is our son, a lefty pitcher who has been passionate about baseball since he was 8 years old. He pitched in Little League, JV, High School, college and now men's leagues. Dexter is also a wonderfully talented geek, a software engineer who loves coding connected devices and Internet of Things (IoT) devices.

Back in 2009 we were counting frames in videos of his pitching to measure speed. By 2013 we had built programs to speed up this manual counting and speed measurement.



Dexter, Winning Pitcher, 2nd from left, Score 11-1, High School Team 2008

Pitcher for SUNY WCC Community College Team 2010



I am a retired data scientist with a PhD in Quantitative Business Analysis, and also love doing baseball things with Dexter. That includes being his bullpen catcher, and his partner in co-creating SmartPitch.

Our baseball connection goes way back. Dexter wrote a short essay in the 10th grade, "My Journey into Baseball", about how important baseball became to him. You can see it by scrolling to the bottom of the [Home section](#) at the SmartPitch website.



Selfie After a Bullpen Session at Stony Brook Univ 2013

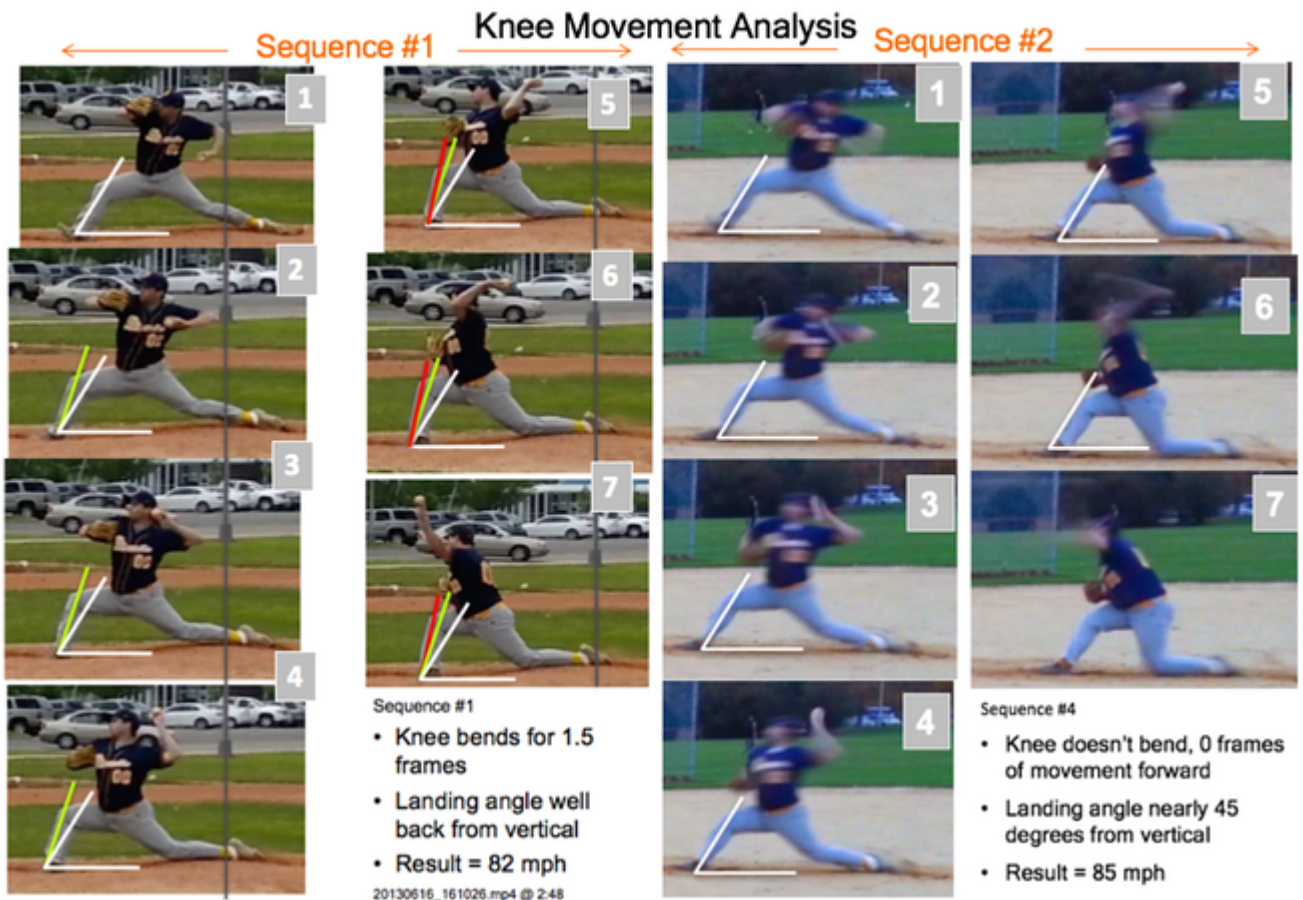
Written 10 years ago about Dexter's first time at a major league baseball game when he was 8, it ends with: "The important part was that my dad and I had discovered a new passion, something that would bring us endless joy and fun in the future!" More than 10 years later, together we discovered that studying his delivery in detail, frame-by-frame in those videos was a big help in improving his delivery. A by-product was that we also developed a way to measure his pitch speed.

In the early days of developing our speed calculations methods, we measured the ball's travel in each video frame on a desktop computer, using manually operated scale calibration and measurement software.

But by 2014, as Dexter was graduating from Stony Brook University with a degree in computer science, he came up with a critical breakthrough.

He created ingenious computer code that automated the video image capture and analysis of video files of his pitching sessions. Our testing of the outputs from his code showed great promise in its ability to identify the ball in the video image while filtering out the noise of movement in the background. It also proved the accuracy of the data that his code captured from the video.

The raw data from the video analysis becomes the input to the math algorithms that I had written and fine-tuned. These mathematical factors allow you to use SmartPitch from many locations on the field, including from the dugout, in foul territory or in the stands. This is a breakthrough versus radar guns that force you to stand behind home plate.



Analysis of Effect of Knee Angle on Speed 2013

See the User Location Freedom diagram below.

SmartPitch is far more useful in real-life baseball situations than other apps that must be placed on the infield and can't be used during a ball game.

The final component required was the smartphone user interface (UI). We designed it based on many experiments and trial and error and came up with the minimum number of user inputs for really fast set-up, which takes about 15 seconds.

That discovery confirmed the viability of one of the three essential components for the SmartPitch app - the math I had developed. It also fired us up with the possibility that we could build a smartphone app based on our method for determining speed very precisely from live, automated video analysis of pitching.

The "big moment" came this April when Dexter did the tricky C++ / Objective C coding to combine these three components: the UI + the live video feed capture and analysis + the math algorithms.



SmartPitch Prototype In Use September 2016

29.33
F 16/18

Frame	1	2	3	4	Arm
1140	1372	1290	1196	1108	1419
1606	1378	1233	1376	1273	1403
2130	1428	1333	1244	-	1396
2640	1414	1321	1234	1152	1384
3134	1507(?)	1372	1267	1169	1507
4480	1427	1317	1216	1122	1406
6054	1342	1240	1145	1056	1438
7152	1480(?)	1368	1260	1160	1401
7890	1457(?)	1358	1264	-	1363(?)
8898	1445/6	1338	1237	1143	1396
10168	1405	1316	1232	-	1348(?)
11242	1343	1247	1140	1046	1140(?)

20 = base threshold
test 10

Second frame

first frame

if rel. to the left of 1st ball we 1st diff arm blob instead

Early Manual Data Tabulation from Dexter's Video Analysis Software 2014

Now the crucial test remained: would it run fast enough to work on a typical smartphone in real time?

In bullpen sessions, a pitcher throws a pitch every 15 - 20 seconds. Also, the app uses the live video feed from the smartphone camera. A new video frame is created every 1/30th of a second, and the video analysis software had to be *faster* than that analyzing each frame, not to fall behind the pace of the constantly incoming streaming video data.

The major challenge was to assure that the thousands of lines of code and math analysis we had written had to finish processing in less than 1/30th of a second.

So in April when we loaded that combined code onto an iPhone 5s, after much debugging, we had the enormous father and son thrill of celebrating years of working on our method together.

It worked!!!!



Dexter & Chuck

After Successful Test of SmartPitch vs Radar Gun

We had our essential breakthrough. We tested it rigorously with live pitching and proved that it analyzes the real time streaming video feed with precision, and fast enough to work in live pitching situations.

That was the green light we needed for our smartphone speed gun Proof of Concept (POC) hands-free app you can use almost anywhere on the field, SmartPitch!!!!

Our side-by-side comparisons of SmartPitch speeds speed to a Stalker radar gun have verified its accuracy. SmartPitch matches professional radar to tenths of a mile per hour for a \$20 price, 2% of the Jugs and Stalker radars' price.

For a video of a SmartPitch - Stalker face-off see: <https://youtu.be/0Y3thHUJg3w>

Part of the math magic inside in the app is that it performs 13 precision adjustments and uses 8 regression and data models to achieve its impressive decimal point accuracy and to enable it to be used almost anywhere.

SmartPitch does its magic using very precise measurements of the movements in just a few pixels out of the nearly 1 million pixels in each image from the live video feed. That means that the camera cannot also move, and your smartphone must be mounted on a tripod. If you don't already have a tripod, some of our Reward options include a tripod and camera holding bracket.

A double benefit of having a tripod is that hand-held videos of sports events are really hard to watch. All the shaking and jiggling you get is really hard on the eyes. Using a tripod to film sports gives you professional-looking videos to watch and share! Anyone at all serious about filming sports should be using a tripod.

Conversion of POC to Production App

We are now turning the SmartPitch Proof of Concept of our revolutionary baseball speed gun, SmartPitch, into a production level app. We will:

- Build a great user interface with the input from Beta Testers
- Deliver SmartPitch across many iPhone and Android devices
- Add a built-in tracking database with stats and charts for multiple pitchers

After we have delivered SmartPitch to our pre-production customers, we will submit SmartPitch to the App Store and Google Play store in 2017.

We would love to see SmartPitch in use on neighborhood and school baseball fields everywhere!! Unlike the \$1,000+ radar guns, SmartPitch can be used by everyone who enjoys playing, watching and coaching baseball!!!

SmartPitch breaks the speed gun price barrier. You can be a trend setter and help us break the speed barrier!!!



"I Helped Break the Speed Barrier" SmartPitch Cap

SmartPitch is the affordable future of speed measurement!!!

ADVANTAGES OVER RADAR GUNS & OTHER APPS

- SmartPitch is completely automatic. After set-up, it captures the speed and records all pitches automatically, unattended, untouched.
- It picks up actual Release Speed out of the hand, which the radar guns in use are unable to do consistently. A pitch loses 10% or more of its speed by the time it reaches home plate. Some radar guns don't pick up the ball until it's halfway to home and the pitch has lost 5% of its speed!
- Unlike radar gun owners, smartphone users will get future new features
- It has better set-up than radar guns. SmartPitch is used in foul territory or in the dugout, or at 1st or 3rd base, not behind home, which radar requires, or two tiny mandatory spots on the infield as in other apps.

FREEDOM OF LOCATION

We call SmartPitch the "Use Anywhere" speed gun because it gives you freedom to use it where you would normally watch the game, all the green areas in this chart. So, you can't use it literally anywhere, but compared to where you can use a radar gun and some other apps, you have full Freedom of Location.

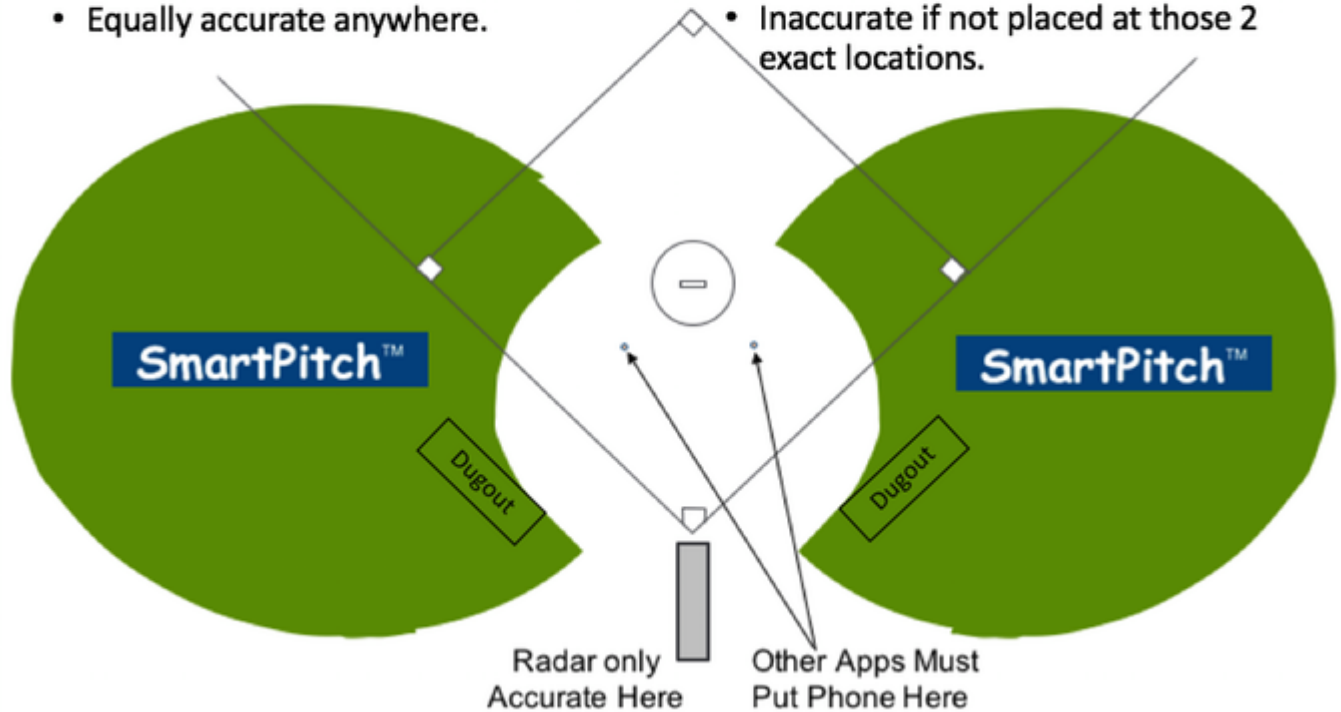
SmartPitch™ User Location Freedom

SmartPitch

- Freedom to use where you sit to watch the game – green areas below.
- Can use during a game & in dugout.
- Equally accurate anywhere.

With Other Apps

- Cannot use in a game!!
- Can only use in 2 tiny spots on INFIELD.
- Inaccurate if not placed at those 2 exact locations.



SmartPitch Freedom of Location Breakthrough

Given the way scouts all scrunch up together behind home plate, we've had some fun captioning some examples of scouts and their radar guns.

JOIN THE **SMARTPITCH** REVOLUTION: FREEDOM OF LOCATION!!!!



Do you guys go
EVERYWHERE
together??!!

SmartPitch Abolishes Scouts Scrunch

THE "SCOUTS SCRUNCH"

Radar Users Squeezed Into Narrow Line Behind Home Plate
SmartPitch™ Freedom to Use Where You are Sitting,
with Equal Accuracy

Hey, can you
take off your
hat??!!



JOIN THE **SMARTPITCH** REVOLUTION: FREEDOM OF LOCATION!!!!

WHO'S IT FOR

- Baseball and Cricket players, "out of the box"
- iPhone and Android
- Our goal is to add Tennis, Soccer and Football in early 2017. Pre-production customers receive all sports we can add within the timeline.
- Great for college and high school coaches, and adult leagues.
- New way to gauge pitcher tryouts and to track training progress.
- Perfect for parents and baseball fans, too!

COOL HIGH TECH TOOL

- Patent Pending, trademark application in progress
- No additional radar hardware required, uses video analysis
- 4 years to develop, 1000's of hours field testing
- To achieve its impressive decimal point accuracy:
 - Automatically performs 13 precision adjustments
 - Automatically uses physics & optics factors from 8 data models
- Over 10,000 lines of code
- Don't be fooled by the "stop watch" apps out there that require you to tap the screen when the ball is released and caught. A pitch takes only 0.5 seconds or less to reach home, so tapping the screen twice with those apps is inherently very inaccurate.

TIMELINE

Our best estimates of our key milestones are:

- October - November 2016. During the 2016 World Series, we will complete SmartPitch professional App and Website Design and User Interface. Beta Test Partners will help us arrive at the best designs.
- November 2016. Build Android version of the SmartPitch app. Beta Test Partners will help test the Android version.
- November 2016. Build SmartPitch pitch database and charting, with features for tracking multiple players.
- December 2016. Final field testing and enhancements of SmartPitch with Beta Test Partners. We're counting on some mild days in December for this!!
- February 2017. Deliver professional iPhone and Android SmartPitch to all pre-production app customers, in time for Spring Training!!
- Later in 2017. Provide SmartPitch on App Store & Google Play Store.

SMARTPITCH CONFIGURATIONS

SmartPitch™ Backers



\$10+

SmartPitch™ App



\$24.95

SmartPitch™ App with bracket

\$30.90



SmartPitch™ App Beta Test Partner w/ tripod & bracket*

\$99.95



* Baseball & Cricket

SmartPitch™ App w/ tripod & bracket

\$56.85



SmartPitch™ App In-Person Session

\$249.95



We meet you at a NYC area ball field for pitching with SmartPitch