

Executive Summary of **SmartAVC™** Automatic Volume Control

Value Starmark's **SmartAVC™** automatic volume control technology could add tremendous perceived value with minimal delta cost to mobile-phone and mobile-device product lines, leading directly to an expanded customer base for vendors of phone handsets and other audio devices.

Problem Addressed **SmartAVC™** tackles a universal problem with all portable audio devices: All too often, mobile devices are used in noisy backgrounds – in crowded spaces, cars, and outdoors. In these noisy environments, users can't consistently hear and understand clearly.

Solution U. S. patents have just been issued to Starmark on what is by far the world's most advanced automatic volume control. Starmark's **SmartAVC™** automatically adjusts loudness of mobile devices to make them better heard and understood above background noise in cars, public places, and outdoors. By analyzing the noise background 40 times per second in both the frequency domain and the time domain, and smoothly adjusting the volume to compensate only for noise that interferes with intelligibility of speech, **SmartAVC™** overcomes the loss of clarity and other problems that make conventional automatic volume controls either ineffective or annoying and unpleasant to use.

Benefits The benefits of **SmartAVC™**, all of which could lead to an expanded customer base, are:

- Enhanced user experience
- Increased customer satisfaction
- Easier hearing
- Improved intelligibility

Competitive Advantage **SmartAVC™** will transform the mobile communications mar-

ket space by preserving intelligibility of speech and making phone calls possible even in challenging noise environments. Early licensees will enjoy an immediate competitive advantage through increased customer satisfaction and an enhanced user experience. Their mobile-device and car-audio customers will consistently be able to hear and understand clearly and easily in noisy environments.

Objectives Our goal in five years is to have **SmartAVC™** licensed on most of the more than billion mobile phones sold every year, at a cost to consumers of pennies per phone. Our ultimate objective is to have **SmartAVC™** implemented as a standard 'default-on' feature in all mobile phones, mobile audio devices, and on all other audio platforms used where it could get noisy.

Market Since Starmark is a systems R&D company, our plan is to achieve these objectives by strategic partnerships and joint ventures and by licensing **SmartAVC™** technology to qualified developers and manufacturers of:

- Mobile-phone and smartphone handsets
- Multimedia handsets
- Personal media players
- Tablets
- Wireless headsets/earpieces
- Car radios and audio systems
- All other audio platforms that operate in changing background noise
- Chips for all of the applications above
- And to service providers and carrier partners for the applications above
- And to developers of platform-specific software for the applications above.

Ease of Implementation **SmartAVC™** can be implemented on mobile phones and any

other audio devices equipped with a speaker and microphone, as hardware at the chipset level, or on a DSP, at negligible cost. No change to handset hardware is needed. Implemented in hardware, the **SmartAVC™** processing demand in MHz is negligible. (Implemented in software in Java on an Android phone, the algorithms run well within the 25-ms processing cycle.)

Licensing and Demos As of Sep. 2011, the status of **SmartAVC™** technology is:

- **SmartAVC™** licenses are available now!
 - U.S. Patent 7,760,893, “Automatic Volume Control to Compensate for Speech Interference Noise,” was issued to Starmark on July 20, 2010.
 - U.S. CIP Patent 7,908,134, “Automatic Volume Control to Compensate for Speech Interference Noise,” was issued to Starmark on March 15, 2011.
- International patents are pending.
 - The patents cover **SmartAVC™** algorithms and implementation in mobile phones and other audio devices.
 - Exhibited and technical presentation made at the 34th IEEE Sarnoff Symposium in Princeton, NJ, May 2011.
 - Technical presentation to the IEEE Communications and Signal Processing Societies made in San Diego, May 2011.
 - An Android software app demonstrates how **SmartAVC™** smoothly and gracefully compensates for the user’s own noise to preserve speech intelligibility.
 - A Windows program for PCs gives a real-time visual interactive demonstration of **SmartAVC™**.
 - An interactive A-B breadboard demonstrates the advantages of **SmartAVC™** over conventional AVCs.

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STARMARK
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SmartAVC™
The World's Smartest
Automatic Volume ControlSM

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- Details on **SmartAVC™** are available at our website:
<http://www.StarmarkTechnologies.com>
- **SmartAVC™** technical paper published in Proc. 34th IEEE Sarnoff Symposium, May 2011:
<http://arxiv.org/abs/1104.3544>
- **SmartAVC™** technical presentation to IEEE Communications and Signal Processing Societies:
http://s3.amazonaws.com/sdieee/163-IEEE_Felber_5-26-11.pdf
- **SmartAVC™** Android demo app, downloadable free from Google Android Market:
https://market.android.com/details?id=com.starmarktechnologies.smartavc&feature=search_result
- **SmartAVC™** Windows PC audio-visual demo program, downloadable from:
<http://www.starmarktechnologies.com/SmartAVC-Audio-Demonstration/index.html>
- **SmartAVC™** U.S. Patent 7,908,134, downloadable free from USPTO.gov:
<http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnethtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PTXT&s1=7908134&OS=7908134&RS=7908134>