

March 2019

# GEORGIAPATHWAYS

Computer Science In G.A.  
*A new way?*

Unlocking Doors

Private Colleges -  
Public Good



# Introduction to Digital Technology

## CAPACiTY Summer Professional Development



CULTURALLY AUTHENTIC PRACTICE TO  
ADVANCE COMPUTATIONAL THINKING IN YOUTH

CAPACiTY is a new curriculum for the Introduction to Digital Technology (IDT) course, developed by Georgia Tech with funding from the National Science Foundation, that enables students to develop digital technology and programming skills as they research and design solutions for a problem of their choice. (See reverse side for details of the course curriculum.)

### Come learn how to implement CAPACiTY in your classroom!

#### WHAT:

40 total hours of professional development

- 10 hours online prior to course
- 30 hours face-to-face on GT's campus

#### WHEN:

- **Online:** 10 hours between June 3<sup>rd</sup> – July 21<sup>st</sup>
- **In Person:** July 22-26, 2019\*, 9 a.m. – 3:30 p.m.

WHERE: Georgia Tech

\*Lunch Included

#### COMPENSATION:

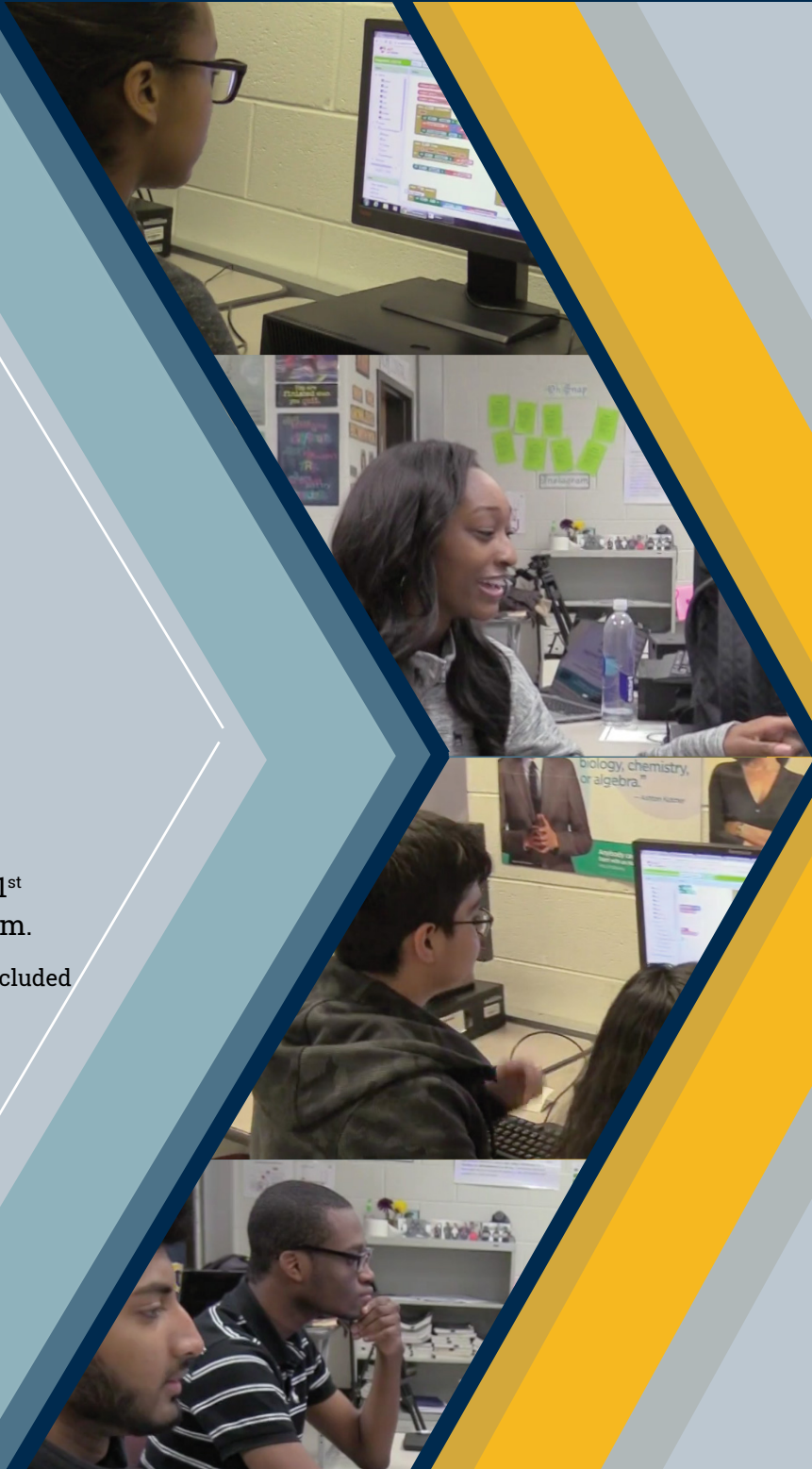
Teachers receive **\$800 stipend** for course completion

#### TO APPLY

Send Email Inquiry to [Capacity@gatech.edu](mailto:Capacity@gatech.edu)

Include name, school, and school district.

**SPACE LIMITED**



CULTURALLY AUTHENTIC PRACTICE TO  
ADVANCE COMPUTATIONAL THINKING IN YOUTH



NSF# 1639946



# Open the door to increased teacher effectiveness

OUT TEACH IS EQUIPPING SCHOOL DISTRICTS ACROSS THE COUNTRY TO UNLOCK STUDENT PERFORMANCE



The highly effective, teacher-centered approach for bringing outdoor experiential learning to your district.







**Geoff Duncan**  
Lt. Governor  
State of Georgia

“First, thank you to the Technology Association of Georgia – and their Education Division – for their time and monetary investments in Georgia’s students.

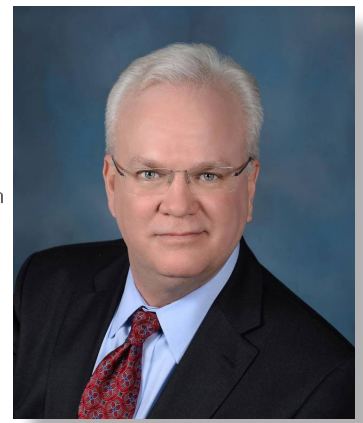
I am excited about the position that our state is in. We’re the Silicon Valley of the South and our tech sectors continue to grow. This year, the Senate passed SB 108 to ensure that every middle and high school is offering computer science courses for their students.

My goal is for our state to be recognized as the Technology Capital of the entire East Coast. For that to occur, we must continue to enhance technological education. SB 108 is critically important and – as Lt. Governor – I will continue to prioritize technology and technological education in Georgia.”

Geoff Duncan  
Lt. Governor  
State of Georgia



Welcome to our latest edition of Georgia Pathways™ STEM Magazine.



This year has already delivered notable and encouraging news around STEM education funding and opportunities nationally.

Major federal STEM education programs maintained or increased their funding levels for fiscal year 2019 and Congress turned back proposals to eliminate funding for several U.S. Department of Education grant programs and for education offices at NASA and the National Oceanic and Atmospheric Administration. Meanwhile, Congress gave a significant boost to the National Defense Education Program, which is building a foundation for the future workforce needs of the U.S. Department of Defense.

In fact, NASA just got its best budget in decades. Congress recently increased NASA's STEM Engagement budget to \$110M in FY2019. These vital funding streams, grants and increases mean one key thing to students – future jobs.

STEM education is becoming increasingly entrenched as a powerful economic development tool and the ideal way of building a robust talent pipeline for a multitude of industries and for our own federal government.

As educators and students begin to prepare for the end of another school year, summer learning opportunities and internships become an essential piece of that pipeline.

Each year, the TAG Education Collaborative, a nonprofit focused on STEM education opportunities, hosts an in-depth internship program. It is not too late to become involved!

It is also never too late to use this publication as a launching point, an educational assistant and even, simply, an idea generator for the kind of opportunities and experiences that can often be a first spark for a bright, new career path.

Inside this edition you will find great stories, timely information and interesting tidbits that we hope will inspire and inform you.

I hope you will find just what you are looking for among these pages. Thanks for your support!

**Larry K. Williams**  
President  
TAG-Ed

Larry K. Williams serves as the President and CEO of the Technology Association of Georgia (TAG) and President of the TAG Education Collaborative (TAG-Ed). TAG-Ed's mission is to strengthen Georgia's future workforce by providing students with relevant, hands-on STEM learning opportunities by connecting Technology Association of Georgia (TAG) resources with leading STEM education initiatives.



The Technology Association of Georgia Education Collaborative (TAG-Ed) strengthens the future workforce by providing students with relevant, hands-on STEM learning opportunities and connecting them to Technology Association of Georgia (TAG) resources. Formerly the TAG Foundation, TAG-Ed is a 501(C)(3) non-profit organization formed by TAG in 2002. Later, the organization's name was re-branded to TAG Education Collaborative to facilitate our role as the leaders for K-12 STEM education in Georgia.

PRESIDENT/CEO  
Larry K. Williams

EXECUTIVE DIRECTOR/EDITOR  
Errika Moore

PUBLISHER  
Wayne Carley

CONTRIBUTORS  
Mary Kay Boler, TAG-Ed Staff  
Shanice Saunders, TAG-Ed Staff

The Technology Association of Georgia (TAG) and  
TAG Education Collaborative  
75 5th Street, Suite 625 Atlanta, GA 30308

<http://www.tagedonline.org>

This magazine services the STEM education industry needs of the state of Georgia. This magazine is viewed by the consumer with the understanding that the information presented is from various sources from which there can be no warranty or responsibility by the Technology Association of Georgia, the Technology Association of Georgia Education Collaborative and/or their affiliates as to legality, completeness or accuracy.



**Computer Science Standards**  
**Bryan Cox**

**Unlocking Doors**  
**Lesley Grady**

**Private Colleges / Public Good**  
**Kina S. Mallard, Ph.D.**

**The Heart of STEM**  
**Wayne Carley**





### From the Executive Director

March is Women's History month and as a part of the month's celebrations many around the world celebrate International Women's Day specifically.

As an organization that uplifts and supports all students, we are energized by all cultural celebrations. And for this month we honor the celebration of women and our contributions to our society. As a female engineer, this is a month that's very personal for me because it's also an opportunity to celebrate Women in STEM who have made significant strides, created pathways and have allowed professionals like me to follow in their footsteps.

In March 2018 the National Girls Collaborative Project produced the following [overview](#) that identifies the State of Girls and Women in STEM based on data collected through 2017 from various sources like the National Science Foundation (NSF).

Due to the current state and the opportunities that still exist to encourage, engage and empower more young girls in STEM (and to retain female professionals in STEM) many organizations collaborate and share data encouraging all of us to lean in and make a resounding difference. If you're seeking ways to make a difference, below are a few national organizations that are great resources in terms of content, data, professional leaders and/or subject matter experts:

- [Million Women Mentors](#)
- [IT Senior Management Forum](#) (ITSMF) EMERGE Academy
- [National Center for Women and Information Technology](#) (NCWIT)
- [Society of Women Engineers](#) (SWE)
- [National Girls Collaborative Project](#) (NGCP)
- [Association for Women in Science](#) (AWIS)

But as Women's History Month 2019 comes to a close I'd like to highlight a very successful collaboration between business, community and education that just made history. Because this collaboration is creating new STEM opportunities and educational experiences for young women.

Just recently Atlanta Public Schools announced that one of their schools,



the Coretta Scott King Young Women's Leadership Academy (CSKYWLA), became the first [grades 6-12, all girls] AdvancEd Science, Technology, Engineering and Math (STEM) certified school in the state of Georgia. Through partnerships with businesses and organizations like STEM Atlanta Women, their primary Community STEM Partner, they are building the next generation of STEM leaders.

We commend Principal Washington, her team and all of their supporters for their efforts in bringing this to fruition. Your success represents success for the Georgia STEM Ecosystem as well.

As always, thank you for your time and your commitment to reading, sharing and/or distributing Georgia Pathways™ STEM Magazine.

Sincerely,



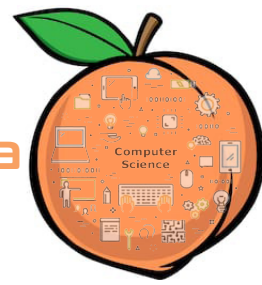
Executive Director, TAG Education  
Collaborative (TAG-Ed)





# New Computer Science Standards for Georgia

By Bryan Cox



Welcome to the new K-12 education.

The personal computer has been a significant part of our society for nearly 50 years. In that time, it has destabilized, disrupted, and revolutionized nearly every industry. Transportation, healthcare, manufacturing, entertainment – it seems no industry or organization is exempt from the innovation and transformation brought on by computing devices, and that includes public schools.

Education has typically been slow to adopt sweeping changes. Many of the fundamental concepts taught in schools such as reading, writing, mathematics, social studies, and science, haven't changed much in the last hundred years. But as our society undergoes a rapid digital transformation, our education system will need to add a new dimension to prepare our students to enter new fields of work.

Graduates will need a revised method of solving problems to address our current global and societal challenges. Enter computer science (CS) as a K-12 discipline.

CS is a new conceptual frontier, and the process of adding a new discipline to education is novel for us as educators. The Georgia Department of Education (GaDOE) is taking measured steps toward incorporating CS in public schools.



Computer Science in Georgia developed as a high school elective, with most courses offered through Career, Technical, and Agricultural Education (CTAE). There are also two Advanced Placement (AP) and two International Baccalaureate (IB) CS courses, all at the high school level.

In 2017, GaDOE undertook the task of expanding these offerings by establishing K-8 standards for computer science.



K-8 educators from different parts of the state, as well as other CS instructors and industry professionals, came together to develop a set of standards that would prepare students to participate safely and effectively in our digital society.

The standards were developed using a rigorous process including input from a CS advisory committee, feedback from an academic review committee, and a public review that garnered more than 500 responses from around the state. In addition to positive feedback, there were concerns raised regarding implementation. How will the standards be rolled out? Who will teach them? Where will the extra time in the day come from? Will the burden fall squarely on classroom teachers? These and other challenges will need to be addressed.

If the standards are adopted by the State Board of Education, the next phase will be to gather a team of K-8 teachers, instructional designers, administrators, and other K-8 CS stakeholders to serve on an implementation team. This group will organize the approach, supports, and time frame to roll out and implement the new standards.

The group will include teachers to keep us mindful of the concerns of classroom professionals.

It will include K-8 administrators to make sure we are aware of the challenges of adding instruction to an already full school day. It will include K-5 specialists to attend to the developmental guidelines of working with young students. Instructional designers will look at the variety of instructional methodologies for incorporating and introducing concepts in the most effective manner.



Computational thinking educational researchers will explore ways to integrate CS into other disciplines via existing lessons. These standards should serve as an enhancement rather than a burden.

All of this will take time to develop, but the ultimate benefit will be to our students. Many of our students will dive in deeply and follow specific pathways all the way through high school and higher education to become programmers,



but all our students need to become cyber secure and digitally aware and literate. These standards are designed for all students and the implementation plan will keep this in mind. We strive to enhance and enliven their experience and to give them the tools they will need to be successful in this ever-evolving society.

Computational thinking and computer science, one a problem-solving thought process and the other a study of computing devices and their impacts on society, are the new tools.

Welcome to the new school.



Bryan Cox is the Computer Science Program Specialist at the Georgia DOE. At the GaDOE, Bryan is responsible for bridging the gap between CS elective courses offered through CTAE and building a K-12 CS discipline. Prior to working for the GaDOE, Bryan spent 8 years as a High School STEM teacher, teaching math, computer science, and engineering courses, mostly within the Career, Technical, and Agricultural Education department. He is currently pursuing a PhD in Instructional Technology from Georgia State University with a research focus in online learning for computational thinking.



# The of **POWER** Unlocking Doors Through Education



by Lesley Grady

1984, Philadelphia, Pennsylvania. Caught in one of the city's epic snow storms, I stood in front of my sister's empty home, seeking entry. After 30 frigid minutes twisting, jamming (and finally striking) my key into the lock, I was denied entry; unbeknownst to me, my sister had changed her locks. Two hours later, I arrived at my warm home, having learned a critical life lesson. Keys are only as good as the locks for which they are intended.

At the Community Foundation for Greater Atlanta, we often use the phrase, "Education unlocks the doors of opportunity." This belief is commonly shared, as America's dominant

message has always been that, with the right amount of effort, intelligence and skills, any child should be able to climb the economic ladder, regardless of his or her background. Yet for more than 25 million children in the U.S. born to low-income and less-educated parents, access to opportunity is becoming less and less attainable. Instead, parental wealth and education have become greater predictors for economic success than hard work or talent. If we agree that our educational institutions shape the "keys" to opportunity for students, I believe philanthropy has a responsibility to ensure that the locks for those keys remain in working order.

Philanthropy has long supported programs aimed at improving educational outcomes.

In fact, the Southeastern Council on Foundations reports that in 2016, \$384 million in private funding was earmarked to education in Georgia. For example, at the Community Foundation we manage more than 25 scholarship programs sponsored by generous donors; participate in education policy action coalitions; and award grants to effective youth development organiza-





action to ensure that all children are accessing quality education. Working with eight superintendents of metro Atlanta school systems and committed leaders representing diverse sectors, L4L facilitates agreement on shared priorities, lifts promising and proven practices and engages in active learning and discovery.

tions. These investments have helped to test, expand and deepen innovative and proven strategies to accelerate and stabilize learning, and increasingly supported capacity building, evaluation and leadership development for educational organizations and staff.

However, increasing educational achievement for metro Atlanta's children who are being locked out – 60% of whom are not reading on grade level by third grade and 73% of whom will not attain post-secondary credentials after graduation – will require much more than money.

Fueling their success will require active, sustained partnerships between philanthropy, social/civic organizations, business and our public and private educational systems.

This is why the Community Foundation is a proud partner of Learn4Life, an ambitious effort to mobilize civic

Philanthropy has a unique ability to keep its eye on all of the interconnected systems and players that impact achievement and ensure equitable access for all students. Through partnerships such as Learn4Life, there is no higher calling than to ensure that the keys we provide our students will indeed unlock the doors to opportunity they deserve.

For more information about the Community Foundation's investments in education, visit [here](#).

*Lesley* Grady is senior vice president, Community, of the Community Foundation for Greater Atlanta. She has decades of experience helping nonprofits and philanthropists move from strategy to implementation by leveraging relationships and knowledge to spark innovation and achieve impact. Lesley serves on the Learn4Life core design team.



# Georgia Independent Colleges:





# 'Private Colleges. Public Good.'

By Kina S. Mallard, Ph.D.

Revelations of scandal have rocked higher education this week as some educational consultants, families, administrators and coaches have been caught using fraudulent methods to circumvent admissions policies.

Those of us who have invested our lives and careers in higher education are stunned. As president of Reinhardt University and chair of the Georgia Independent College Association (GICA), I am especially sensitive to this news. Many of us are concerned that alleged criminals have cast doubts on the integrity of the college admission process for many years to come.

Our institutions – the 25 member institutions that make up GICA – exist to educate, nurture and help develop students into who they can become. I can attest that Georgia's private colleges and universities do exactly that and do it for public good.

Independent colleges and universities are vital to producing graduates in fields that have been deemed important

by Georgia's Department of Labor.

Our schools meet these needs in impressive ways, including the recent equipping of 6,100 health professions-related graduates, almost 700 of whom are nurses. In fact, since 2013, GICA institutions have implemented more than 30 new health professional-related programs. They include more than a dozen nursing degree offerings, ranging from associate degrees to doctorates, as well as service areas that include healthcare administration, both physical and occupational therapy and mental health counseling.

In business and commerce, some 1,900 business administration majors, including accountants and marketers are filling roles across the state. And, perhaps most significantly for our collective future, we have produced more than 500 teachers and special education professionals for classrooms, while providing advanced education to hundreds of educators throughout Georgia.

Our member schools represent a





diverse group of institutions serving more than 70,000 students, graduating 14,866 total graduates during academic year 2017-18. Ninety percent of those in our combined student body received financial aid in 2016-17 (the latest year on record) and GICA schools invested more than \$211 million in total amount of assistance awarded to first time, full time freshmen.

There is a great delight in partnering with scores of foundations, innumerable donors and dedicated public officials who appreciate the opportunity to effect change at both the micro and macro levels. We are committed to keeping private higher education affordable, as demonstrated by the fact that our member schools award an average of \$17,783 to first time, full time students each year.

We also seek to be good stewards of support made possible through state dollars, including the \$40 million in HOPE and Zell Miller scholarship funds that were awarded to more than 10,000 students at member schools last year.

Private institution administrators bristle at the perception that our schools are elitist or exclusionary because large numbers of underprivileged students work diligently through our courses and programs to positively alter their futures forever. Slightly more than half (53 percent) of non-traditional undergraduates who apply for financial aid at GICA-affiliated institutions earn less than \$20,000 per year.

Our schools are committed to serving common public good while focusing on those for whom we primarily exist: **students**. I encourage families to look closely at independent institutions for several reasons, not the least of which is our unique ability to incubate leadership and preparation.

GICA institutions focus on preparing students to be employment-ready. For example, at Reinhardt, our “Enrollment to Employment” initiative is a normative, four-year program that commences before school starts.

From orientation to graduation, students learn personal growth exercises



that foster self-awareness and help them make wise choices that match their gifts with career aspirations. The First Year Seminar explores personality, values, skills, and interests while introducing freshmen to advisors, professionals and resume building techniques. Sophomores engage with campus life and get their first taste of innovative leadership opportunities, while juniors and seniors matriculate to job readiness through interview preparation, internships, work-study opportunities and other practical work experiences.

The objective of each GICA member college and university is to serve students and the common good in keeping with its unique mission. To learn more about our association, our work and our institutions, please visit GICA online at [georgiacolleges.org](http://georgiacolleges.org) for more information and a listing of schools.

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### About Kina S. Mallard-

Kina S. Mallard, Ph.D., is the 20th president of Reinhardt University, chair of the Georgia Independent College Association and as a member of the Board of Trustees of the Southern Association of Colleges and Schools Commission on Colleges.

### About the Georgia Independent College Association (GICA)

The Georgia Independent College Association (GICA) is an association of Georgia's private (independent), not-for-profit colleges and universities. Through partnerships with institutions, businesses, and community leaders, GICA supports private higher education in Georgia in the areas of public policy, research, fundraising for student financial aid, and collaborative programs. GICA counts among its members 24 four-year institutions and one two-year institution across the state of Georgia. These institutions serve over 79000 students and provide a 6.26 billion dollar economic impact on their communities in Georgia. GICA is dedicated to educating tomorrow's leaders and meeting the state of Georgia's current and future workforce needs.

### About Reinhardt University

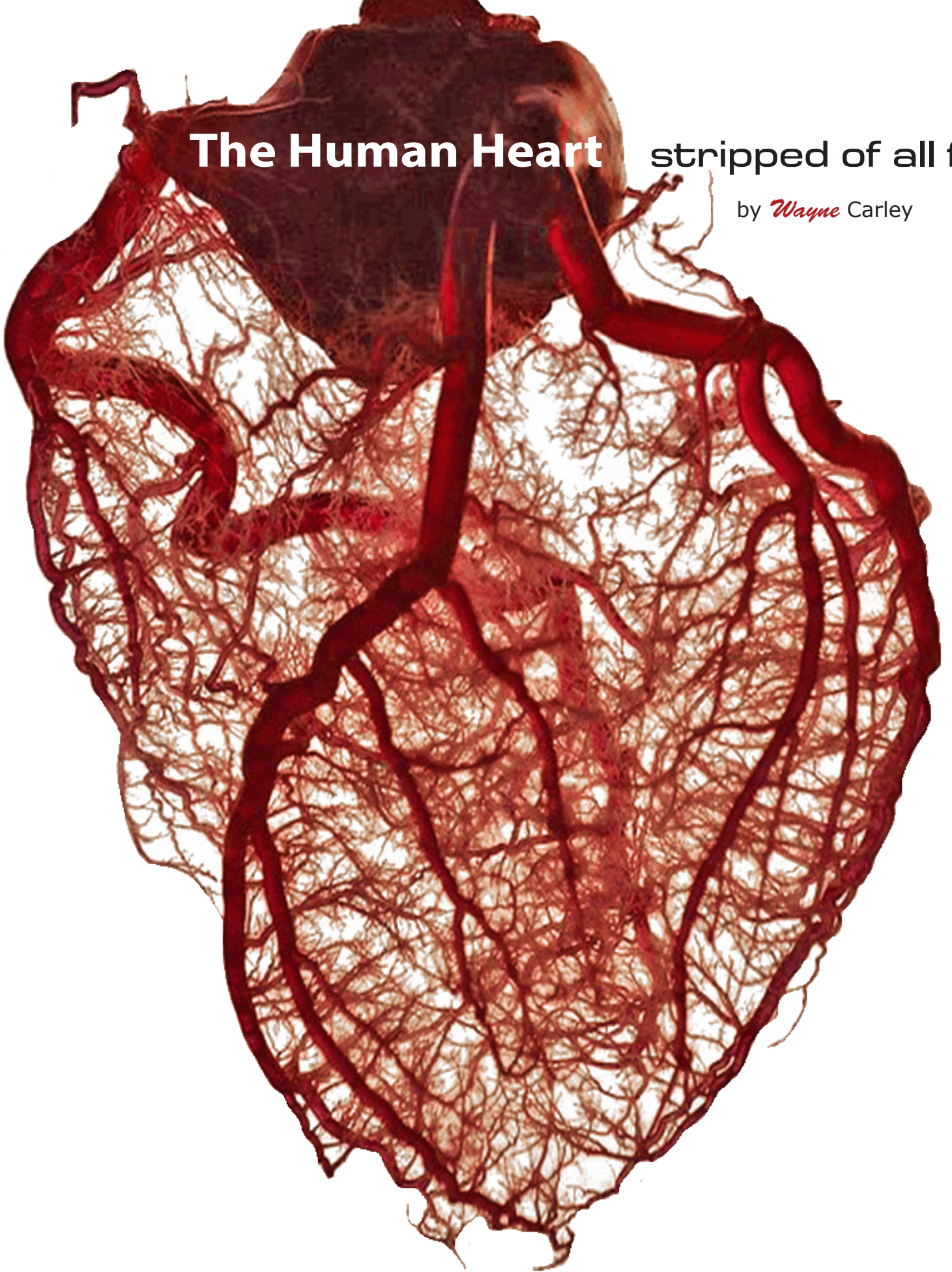
Founded in 1883, Reinhardt University is a private, comprehensive institution grounded in the liberal arts and affiliated with the United Methodist Church. Reinhardt offers more than 40 graduate and undergraduate programs online and on campus, ranging from business and education to music and theatre. Reinhardt also offers programs in other centers in the North Georgia region. Reinhardt's main 525-acre campus is ideally located in Waleska in the heart of Georgia's high country and nearby the great international city of Atlanta.



# The Human Heart

stripped of all fat

by *Wayne* Carley





and muscle with just the *angel veins* exposed.

## *Amazing*

Every day your heart beats about 100,000 times, sending 2,000 gallons of blood surging through your body. Although it's no bigger than your fist, your heart has the mighty job of keeping blood flowing through the 60,000 miles of blood vessels that feed your organs and tissues. Any damage to the heart or its valves can reduce that pumping power, forcing the heart to work harder just to keep up with the body's demand for blood.

When it comes to matters of the heart, men and women definitely aren't created equal. For instance, a man's heart weighs about 10 ounces, while a woman's heart weighs approximately 8 ounces.

Health experts now have proof that laughter is good medicine. A good belly laugh can send 20% more blood flowing through your entire body. One study found that when people watched a funny movie, their blood flow increased. That's why laughter might just be the perfect antidote to stress.



When you laugh, the lining of your blood vessel walls relaxes and expands, so have a good giggle. Your heart will thank you.

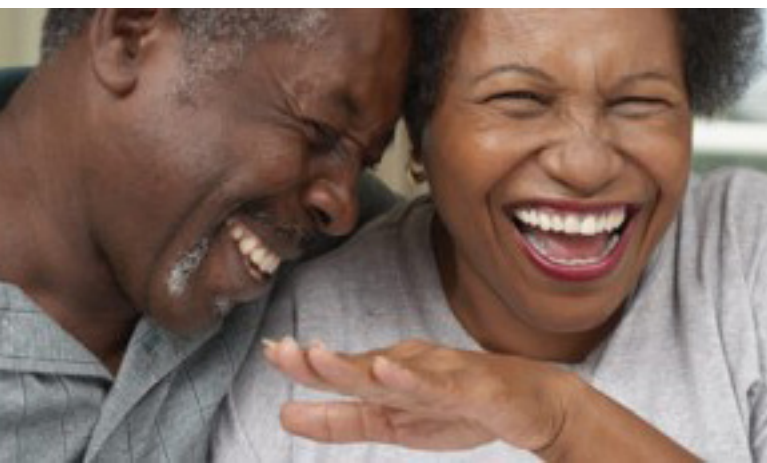


The heart, vessels and entire circulation system in your body is called the Cardiovascular System. We all know how important it is for life, and a healthy Cardiovascular System leads to a long and healthy life.

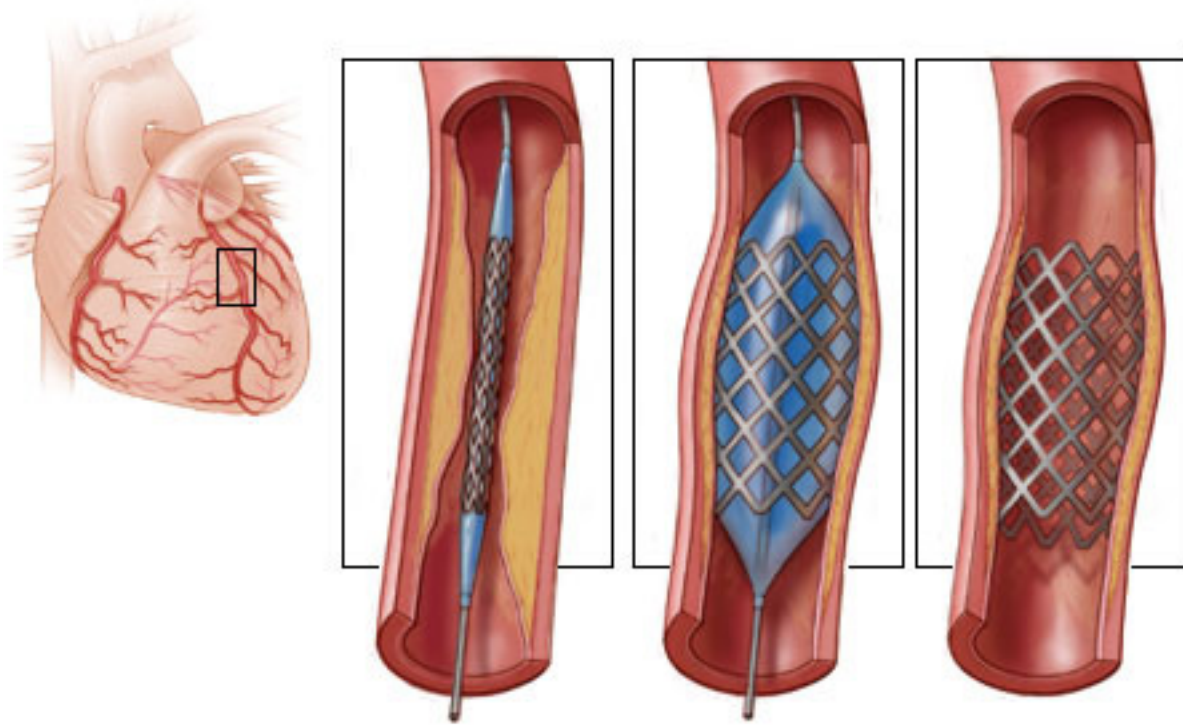
Let's consider possible careers that deal with the Cardiovascular System and how they are STEM careers. From a student nurse to a heart surgeon, the choices are vast and the amount of education required is vast also, but very interesting and challenging.

## *Cardiovascular System*

**Cardiologists** (heart doctors) play a leading role in combating diseases and conditions of the cardiovascular system. They monitor, diagnose and treat heart conditions through a variety of non-surgical means, including medications and management of lifestyle factors. Some cardiologists also perform non-surgical procedures such as angioplasties and stent insertion (tubes and small balloons to open up the blood vessel), using tiny instruments inserted through a catheter into the patient's blood vessels and then threaded through the body to the trouble area.







**Stent:** *a small, expandable tube used for inserting in a blocked vessel or other part.*  
(science, technology, engineering and math; all necessary for the Stent)

Although medication and other treatments can slow the progress of heart disease, some patients require surgery to repair or limit damage to the heart and its supporting network of blood vessels. This is the work of cardiac and vascular surgeons. They perform bypasses and open-heart surgery, as well as valve repairs, and other less-invasive (non-cutting) forms of therapy.

### ***Imaging Professionals***

Cardiologists and cardiac surgeons often rely on the work of imaging technologists to provide them with diagnostic insights. These are not doctors, but high school graduates who have

attended a special school, from 1 year to 4 years to learn the operation of the Magnetic resonance imaging (MRI) and ultrasound technology that both provide useful images of the heart in operation, and ultrasound can help diagnose blockages in the veins and arteries by measuring blood flow.

Radiologists, who are doctors, review these images and advise their fellow physicians on their importance when it comes to deciding (engineering) the best treatment based on the pictures of the heart.





## **One type of MRI machine**

*(Magnetic resonance. Taking photos inside you using magnetism)*

### **Education**

At minimum, becoming an MRI tech requires completion of an associate's degree in radiologic technology or a related field, followed by 1-2 years of additional study in an MRI technology certificate program.

### **Training**

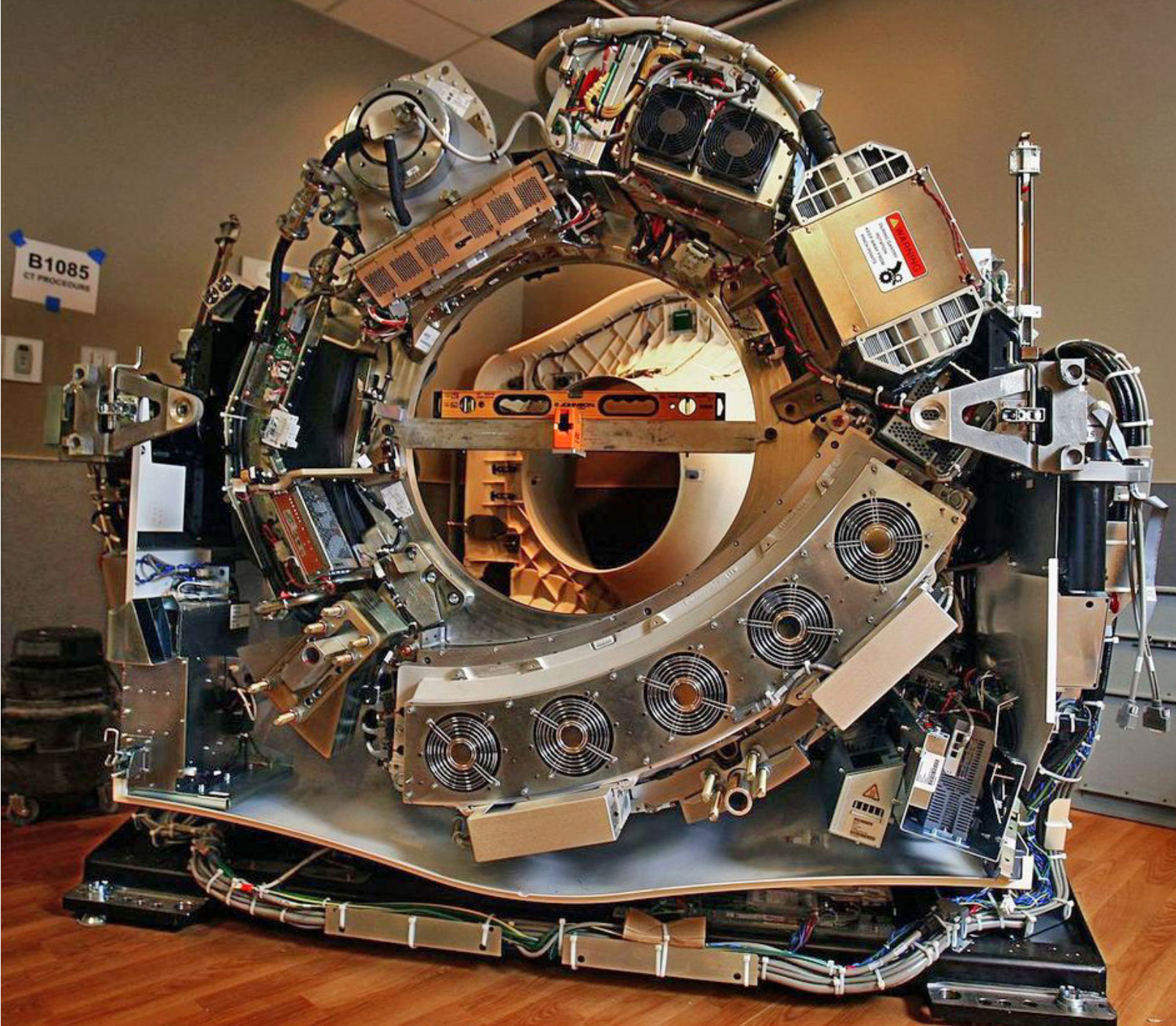
MRI certificate programs include

extensive hands-on training in a variety of clinical settings. Newly hired technicians complete a period of on-the-job training during which they shadow an experienced mentor.

### ***Interested?***

This 13 Ton MRI Machine has a magnetic field 30,000 times stronger than earth's.





*Inside workings of an MRI machine*

### **Someone has to design and build this!**

There are about 25 different STEM jobs required to build what you see. *Does anything look interesting?*

Not all heart care is provided through scheduled appointments and office visits. Often, a heart attack or other critical event is the patient's first

indication of a problem. Stabilizing patients and getting them to the hospital for treatment is the work of emergency medical technicians and paramedics. They're trained to administer medications, monitor the patient's condition, and, if necessary, to restore a heartbeat with a controlled electrical shock, or defibrillation.



Eating healthy is always good for the heart, but many believe that exercise is the key. The heart is one of the most important organs in your body. This powerful, compact muscle can fit in the palm of your hand but controls many of your body's vital functions, so good heart health is essential for a long, independent life.

It's important at every age to be proactive and pay attention to your heart. Making a commitment to regular exercise or playing hard, especially as you get older, can bring positive benefits that last well into your life. Regular physical activity can help you build strength and endurance, lower harmful ingredients in your blood, like too much fat (triglycerides) and keep the blood pressure of your heart within a healthy range. Vigorous exercise can also increase good ingredients in your blood, fight diabetes and keep your body weight down to normal.

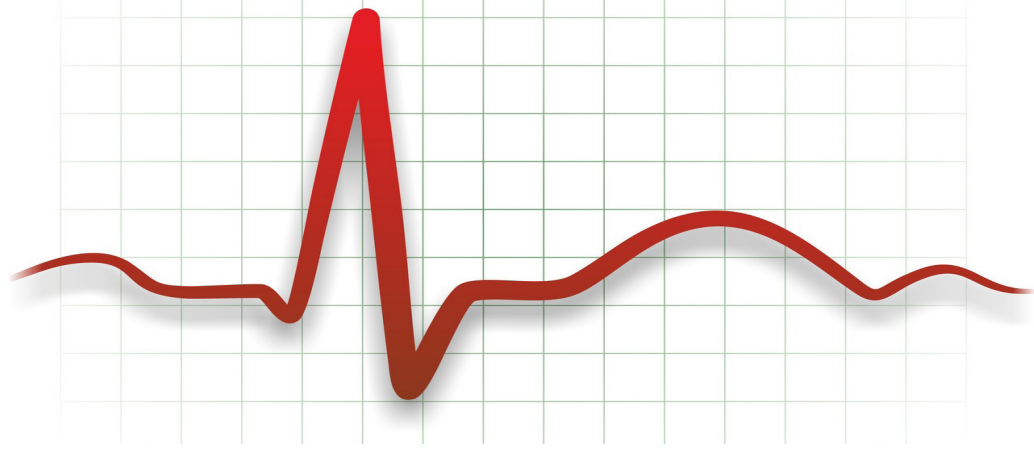
### *The STEM of heart careers*

The **science** of heart careers (research, study, jobs that directly help heart health), the **technology** of heart careers such as using the MRI, X-Ray and heart monitoring equipment to name a few electronic devices. The heart **engineering** jobs (the engineering method that helps make important decisions about how to treat the heart or replace it), and the **math** of the heart that determines amounts of medication, stress levels, your correct weight for your height, how fast your heart should beat per minute of exercise and so much more.

The world needs you in the cardiovascular field. It is great demand and offers dozens of fascinating career paths with a wide variety of salaries and levels of education. Check it out and give it your whole **HEART!**

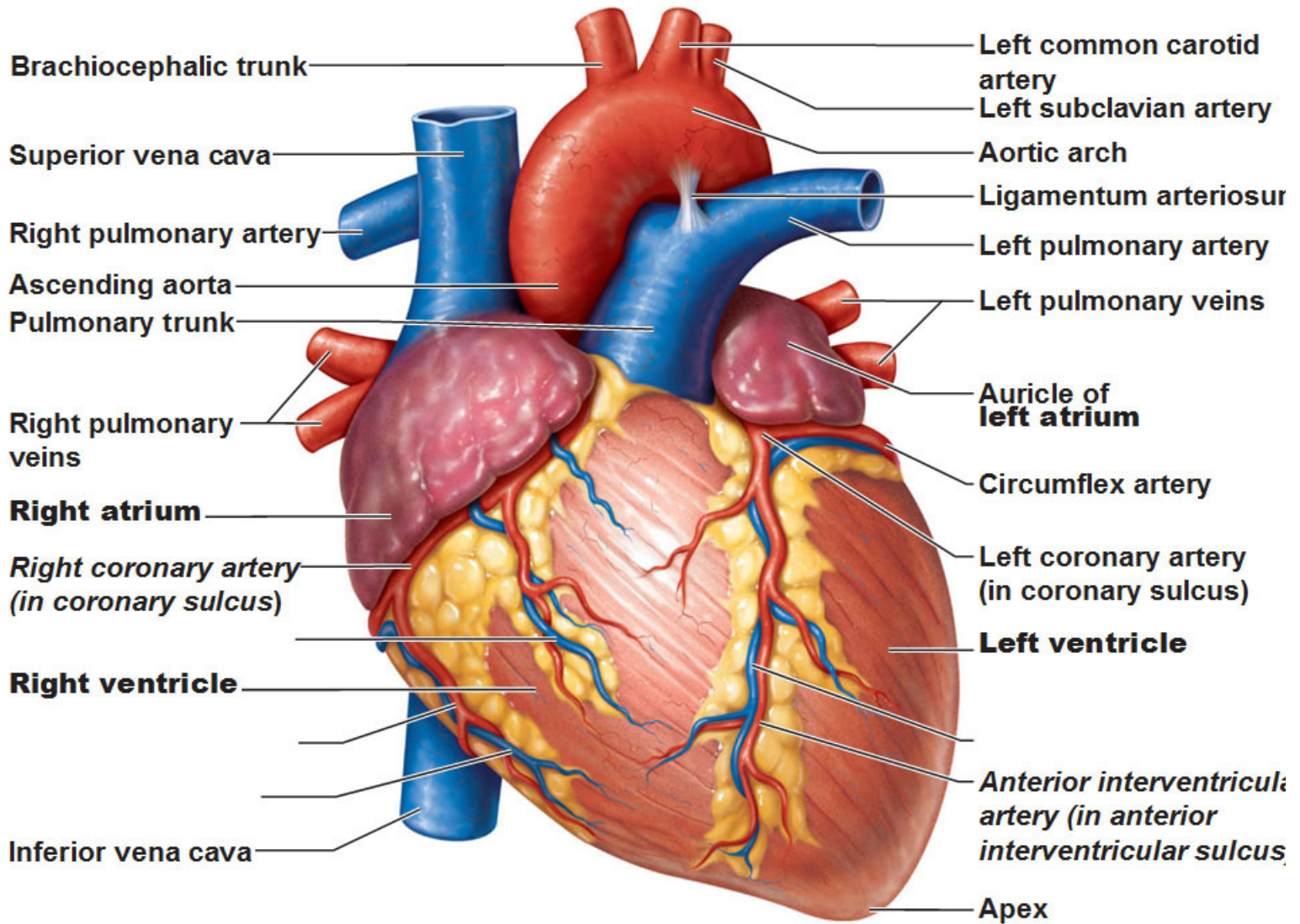






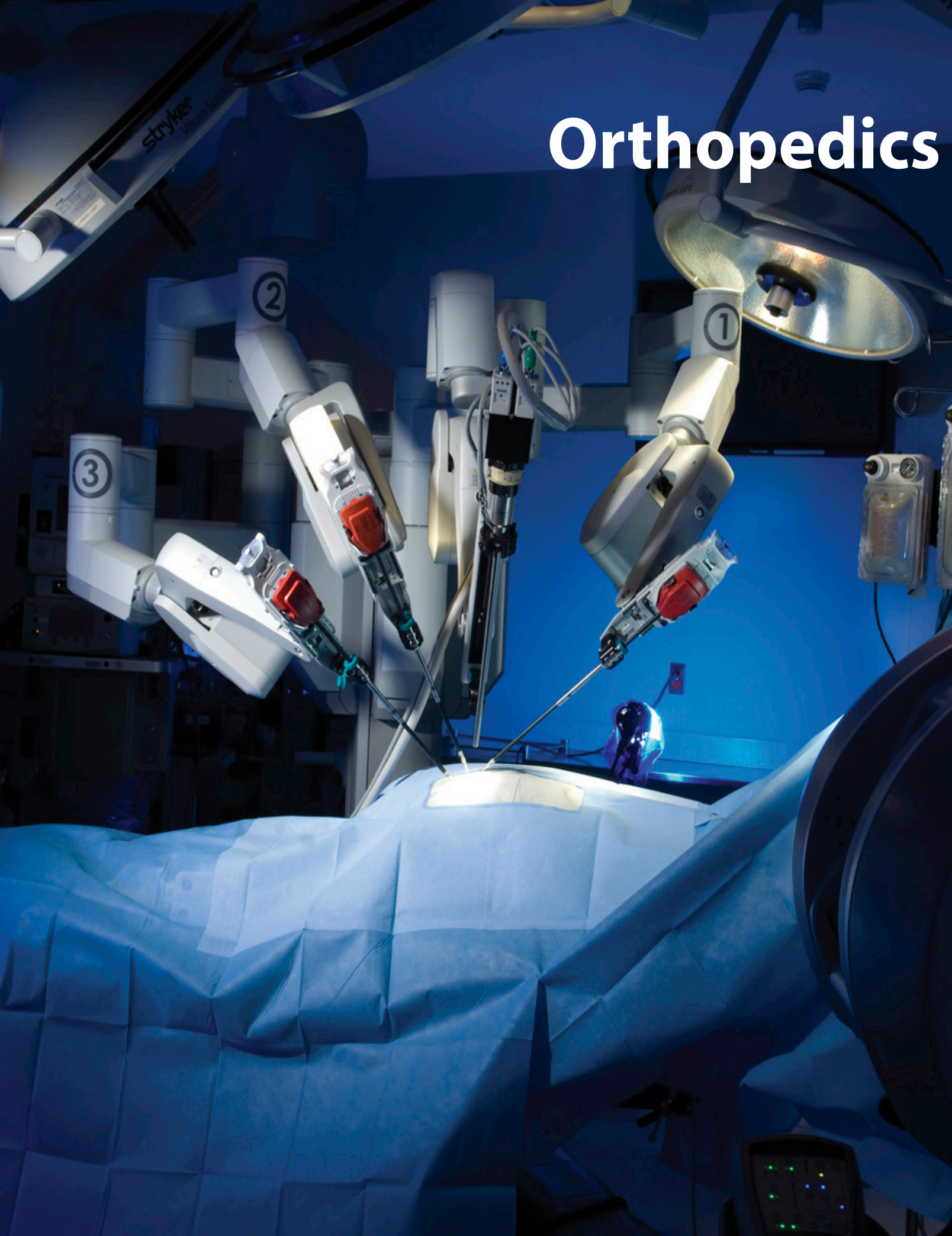
# Gross Anatomy of the Heart

**Anterior view**





# Orthopedics





# ....a Georgia **STEM** Career

## Surgical Innovations and Robotics

*Exciting STEM Careers*



**or·tho·pe·dics** [awr-thuh-pee-diks] noun

*( used with a singular verb ) the medical specialty concerned with correction of deformities or functional impairments of the skeletal system, especially the extremities and the spine, and associated structures, as muscles and ligaments.*



There are about 350 joints in the human body. A joint is best defined as the point where 2 bones meet. Damage to joint can occur for many reasons, but we can relate to sports related injuries easily.

Most athletes that participate in athletic activities will experience injuries from time to time. We are going to discuss the most common types of athletic injuries, the areas the injuries affect, symptoms of these injuries, and the treatment and prevention of the most frequent injuries experienced by athletes.

Here is a list of the most common types of athletic injuries athletes may experience and the area of the body that will be affected. Notice that most of the injuries athletes will experience will be to the extremities of the body.

- **Carpal Tunnel Syndrome** - Wrist  
A condition characterized by pain and tingling in the fingers, caused by pressure on a nerve as it passes under the ligament situated across the front of the wrist
- **Tennis Elbow** - Outside of the Elbow  
A painful inflammation of the tissue surrounding the elbow, caused by strain from playing tennis and other sports.

- **Rotator Cuff Tendinitis** - Shoulder  
Athletes playing sports that require extending the arm over the head commonly develop rotator cuff tendinitis. This is why the condition may also be referred to as swimmer's shoulder, pitcher's shoulder, or tennis shoulder.

- **Chondromalacia Patella** - Knee  
The cartilage under your kneecap is a natural shock absorber. Overuse, injury or other factors may lead to a condition known as chondromalacia patella (kon-droh-muh-LAY-shuh puh-TEL-uh) — a general term indicating damage to the cartilage under your kneecap.

- **Iliotibial Band Friction (ITBF) Syndrome** - Knee  
Iliotibial band friction syndrome (ITBFS) is an overuse injury. It happens in the soft tissues in the lower thigh near the outside of the knee. The iliotibial band (ITB) is a thick band of fibrous tissue. It runs from the hip down the outside of the thigh and attaches to the tibia. The tibia is the large bone of the lower leg.

- **Shin Splints** - Front of lower leg, along tibia bone  
A painful condition of the front lower leg, associated with tendinitis, stress fractures, or muscle strain, often occurring as a result of running or other strenuous athletic activity, especially on a non-resilient surface.



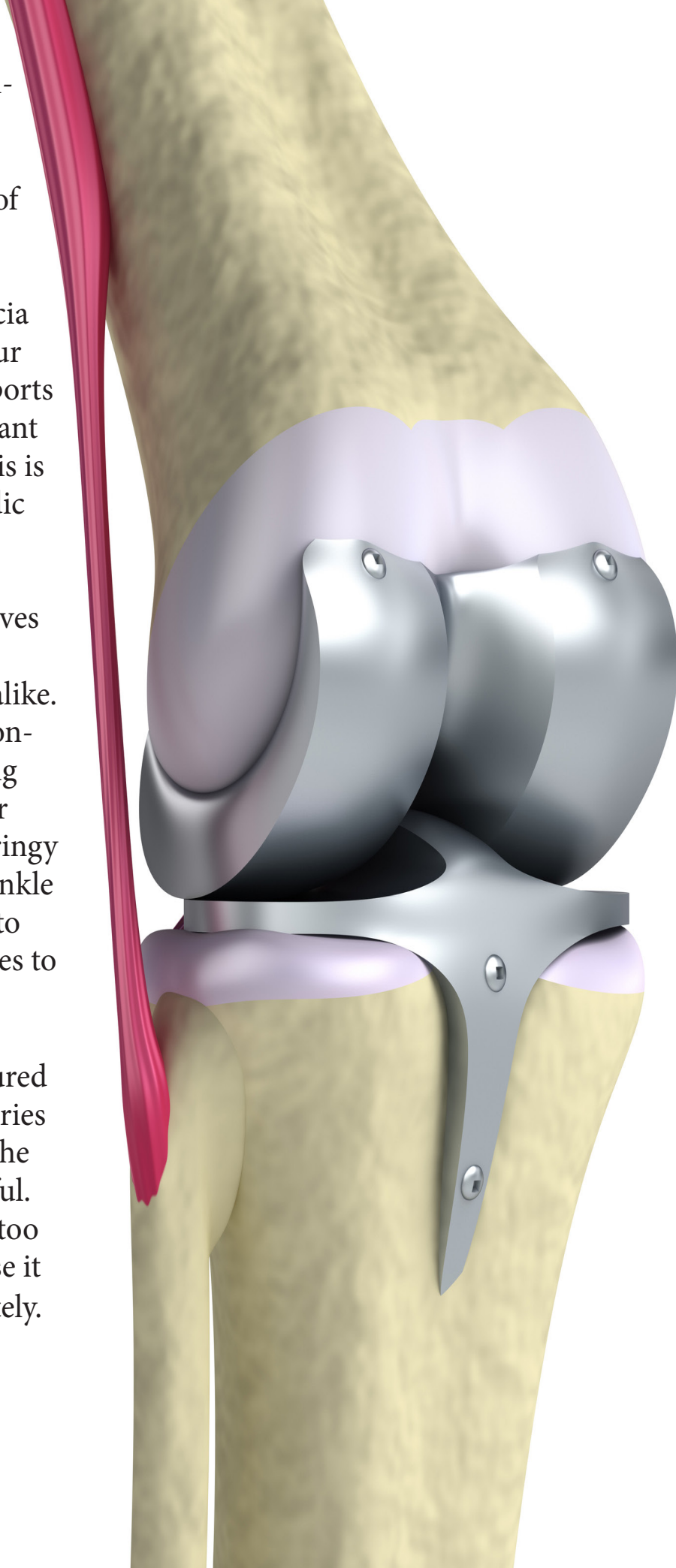
Many sports requires excessive running.

- **Plantar Fasciitis** - Heel, bottom of foot.

Plantar fasciitis causes pain in the bottom of the heel. The plantar fascia is a thin ligament that connects your heel to the front of your foot. It supports the arch in your foot and is important in helping you walk. Plantar fasciitis is one of the most common orthopedic complaints.

- **Achilles Tendinitis** - Heel and calves
- An Achilles tendon injury affects professional and amateur athletes alike. The Achilles tendon is one of the longer tendons in your body, stretching from the bones of your heel to your calf muscles. You can feel it -- a springy band of tissue at the back of your ankle and above your heel. It allows you to extend your foot and point your toes to the floor.

Unfortunately, it's a commonly injured tendon. Many Achilles tendon injuries are caused by tendinitis, in which the tendon becomes swollen and painful. In a severe Achilles tendon injury, too much force on the tendon can cause it to tear partially or rupture completely.











Careers in medical technology are changing by the day. New innovations in surgical procedures that seem like science fiction now will be antiques by the time you graduate and create the latest approaches to treating and healing patients.

Not all of these opportunities require college degrees, but you have to have the interest and curiosity to explore the possibilities. That starts NOW.



Concussions are becoming more and more of a problem but do not fall under the realm of Orthopedics.

With so many joints and so many people injuring them, orthopedic jobs will always be in demand. Having to cut into the human body to get to the joints presents a long list of problems for infections, healing times, damage to nerves, blood vessels and more. Here is where new technologies can really make a difference.

Orthopedic jobs encompass an array of specialties including surgery, podiatry (foot doctor), chiropractic care and veterinarian care. While each of these pinpoints a specific orthopedic specialty, other careers that do not require a medical degree may also be classified as orthopedic jobs.

A few of these include an occupational therapist, an orthopedic nurse or an orthopedic physician's assistant. All jobs within the scope of orthopedics, however, require varying degrees of medical training emphasizing musculoskeletal care.

One of the most common types of orthopedic specialties is the orthopedic physician. These are doctors who specialize in the care and treatment of musculoskeletal injuries or damage to the muscles, tendons and tissue surrounding the joint.

Many physicians working within this field choose to become orthopedic surgeons who specialize in performing surgeries to correct these problems.

Other specialties relevant to orthopedic jobs for physicians include working with elderly adults in geriatric orthopedics and working with children in pediatric orthopedics.

Orthopedic specialties in podiatry are also commonly pursued by physicians and others interested in corrective medicine. Podiatrists may work in general practice and many frequently work with orthopedic physicians and surgeons when necessary. Some podiatrists, however, also specialize in orthopedics. Individuals working in these types of orthopedic jobs are commonly found to work in sports medicine or in pediatric orthopedics.

Some occupational therapists also specialize in orthopedics. Many work in hospital settings or in clinics. Individuals working within these particular orthopedic jobs frequently work with athletes, as well as aging populations. As a sub-specialty, occupational therapists specializing in orthopedics help patients regain strength, balance and coordination, while also working with doctors to correct other musculoskeletal dysfunctions.





additional training or experience in orthopedics.

Not all orthopedic jobs focus on the human musculoskeletal system, however. An orthopedic vet, for instance, is a veterinarian who specializes in the care and rehabilitation of animals with congenital birth defects, diseases or those that have sustained injury due to an accident. As with doctors who work with humans, vets specializing in this genre of medicine must also undergo extensive orthopedic training before being able to work in this particular field.

Chiropractors frequently specialize in orthopedic jobs. Many work in orthopedic hospitals and in rehabilitation facilities. While all legitimate chiropractors are trained in elements of orthopedic medicine, some decide to solely focus on this specialty in post-doctoral education before receiving specialist certification in this area.

Besides doctors, other types of orthopedic jobs include orthopedic nurse positions and physician's assistants. Beyond the general training needed for either of these professions, individuals must also be trained in aspects of orthopedic medicine so as to assist other orthopedic specialists.

Many begin working in a general practice setting before deciding to pursue

The main advantages of robot-assisted orthopedic surgery over conventional orthopedic techniques are improved accuracy and precision in the preparation of bone surfaces, more reliable and reproducible outcomes, and greater spatial accuracy. Orthopedic surgery is ideally suited for the application of robotic systems. Robotic systems can be categorized as either passive or active devices, or can be categorized as positioning or milling/cutting devices.

Computer assisted orthopedic surgery is a related area of technological development in orthopedics; however, robot-assisted orthopedic surgery can achieve levels of accuracy, precision, and safety not capable with computer assisted orthopedic surgery.





***Over 250,000 patients die yearly*** due to hospital mistakes....human error. Not all of these are surgical mistakes, but how can we ignore numbers like these in light of possible technology solutions?

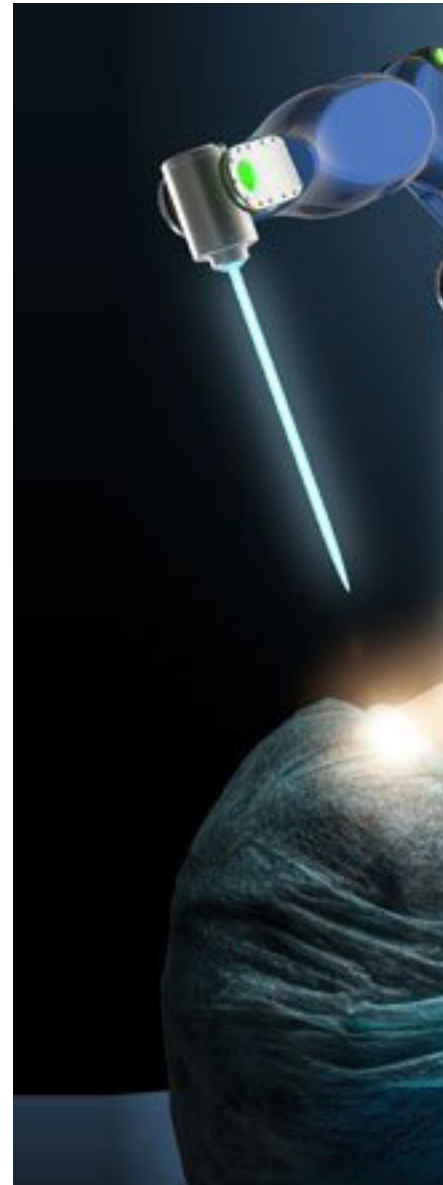
Applications of robot-assisted orthopedic surgery currently under investigation include total hip and knee replacement, tunnel placement for reconstruction of knee ligaments, and trauma and spinal procedures.

Robot-assisted orthopedic surgery is quickly becoming common place and has the potential to transform the way orthopedic procedures are done in the future.

### **Precise.**

These robots are doing what could not be done as well before by surgeons. Currently, there are only a few orthopedic procedures, such as partial knee and hip replacements that have robotic or computer-assisted technology to help facilitate the surgeries.

As the technology advances, companies have gone from developing facilitating technology to enabling technology. “Now, we are starting to see more programs that are enabling, which means making it possible to do surgeries that surgeons couldn’t do before.”







The robot is only able to follow the surgeons' plans and guide them. "Some surgeons think that a robot will make a bad surgeon good. If you don't understand the indications, biomechanics and musculoskeletal anatomy, it doesn't matter what tools you have in your hand, you won't do a good job."

Students.....either be a better doctor or build us a better robot.

***Does this interest you?***



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